Water Quality Index for the River Kagina at Shahabad (India)

[1]Ganesh

[1]Research Scholar, Department of Environmental Science, Singhania University, Pacheri Bari, Jhunjhunu, Rajasthan

[2]Dr. Sumer Singh

[2]Associate Professor, Department of Environmental Science, Singhania University, Pacheri Bari, Jhunjhunu, Rajasthan

ABSTRACT

River Kagina water quality, a tributary of the Mullamari, Bennithora & Kamalavathi flows are the a main tributaries to this river .system was calculated using water quality index (WQI).based on several parameters, the key index provides and states quality of water at point location. A goal of water quality indexes is to translate complex water quality data into information that is logical and useful for public. Different parameters are used to calculate the pH, (TDS), Th, Ca, Mg, alkalinity, (DO), (No3) & (Cl). The Kagina's WQI values ranged from 34.35to 38.26. WQI values less than 50 indicates water are free from impurities.

Key words: wqi river, Shahabad.

Introduction

Rivers are the most important type pf natural water, usually draining into sea or other forms, also water being fed along its course by meeting different tributaries. Rives are transporters of water and nutrients to different parts of world. River contain only about fraction of water in the world. At different stretch (Wetzel, 2001). Natural and human causes degrade surface waters, making them unfit for use (S. R., Carco et al., 1998& Whitton, B.A et al.,1998). Critical for societies & environment concerns, it is calculated by wide & various scientists. A amount of keys have established to illustrate water quality facts in simple and understandable arrangement. WQI, Horton created in early 1970s, essentially a precise method for computing a single value of different results. The results represent water quality of specific water. WQI tries to provide a device for presenting a mathematical appearance that is cumulatively and defines a specific quality (Miller et al., 1986). Factor analysis statistical methods were used to analyse facts, including its observation (Yamamota T et al., 1966, Herkins, 1974). River as well as costal water was used to evaluate WQI (Raniszewski etal., 1994, Gupta et al., 2003 and Avva nnavar &Shri hari, 2007). A water quality index is a method of summarising data into modest expressions for consistent recording to manage the community.

The index generates a value between 50 (excellent water quality) and 300 (unsuitable) (Vasanthavigar et al.,2010) gaol of study is to use a tool of water qulit index to investigate river quality at kagina in Shahabad, District Gulbarga (India), which is part of the mullamari, Bennethora river system (WQI). Figure1: Kagina the Kagina River originates in the anantagiri

hills near Vikarabad in Andhra Pradesh district of Ranga Reddy. Table 1 and Figure1 Show the sampling details for Mullamari and Bennethora Rivers, which join the Kagina.

Fig 1: Study Location

Table 1			
Sl no	Location name	Latitude	Longitude
1	Point 1	17° 5'38.61"N	76° 57'0.40"E
2	Point 2	17° 6'11.90"N	76° 57'11.73"E
3	Point 3	17° 6'37.55"N	76° 57'27.16"E

MATERIAL AND METHODOLOGY

Trial Collection

For once a month from Kagina River water are collected (Fig1) and Table 1 displays the location of Kagina River in Shahabad. It lasted two years, From May 2019 to April 2020.

Investigative Approaches

pH, Total dissolved Solids(TDS), and other parameters were taken on site. Other parameters such as chloride, dissolved oxygen (DO). Alkalinity, total hardness, calcium, and Magnesium ion were volumetrically analysed is done in laboratory Eaton et al., (1998), Trivedy & Goel (1986), Tandon (1986). It was done by taking into account eight main physicochemical properties using standards from (CPHEEI) & (Neeri 1991, and the ICMR 1975. Using eight important Parameters WQI is calculated

Table:- 2 :- Weightage Of Each Factor			
Parameters	Standards	Recommended Agency	Unit Weight
pH	6.5 - 8.5	ICMR / BIS	0.1176
Total Alkalinity	200	BIS	0.005
Total Hardness	300	ICMR / BIS	0.0033
T.D.S	500-2000	ICMR / BIS	0.002
Calcium	75	ICMR / BIS	0.0133
Magnesium	30	ICMR / BIS	0.0333
Chloride	250	ICMR	0.004
Nitrate	45	ICMR / BIS	0.0222
Dissolved Oxygen	5	ICMR / BIS	0.2

Rating Index

A scale of rating formed to each parameter of value. The scale starts from 0.0 to 300.0 with five intervals in between. The rating $q_i=>300$ indicates the parameter in water surpasses max allowable parameters & it states not fit to drinking. $Q_i=200$-300, parameters existing in water indicated that it has very poor water quality. The other ratings are $q_i=100$-200, $q_i=50$-100, and $q_i=50$ for poor quality, good quality, and excellent water, respectively. This is an enhanced from of rating rule provided (Vasanthavigar et al., 2010). The level of water quality in a given water basin, such as a lake, river, or stream, is represented by the WQI result.

RESULTS

Table 4: Basic statistics for various water quality parameters (in milligrammes per litre)					
Waterparameters	Min	Max	Mean	Std D	Variance
pH	7	7.9	7.4	0.21	0.04
HCO3	271.1	338.2	289.31	19.91	380
DO	5.3	9.5	7.13	1.05	1.05
NO3	0.27	2	1.18	0.55	0.29
Cl	13.9	35.1	22.75	6.46	39.95
TH	99.2	168.2	143.55	16.93	274.79
Ca	13.8	33.2	23.35	5.58	29.84
Mg	10.1	30.1	20.39	5.7	31.14
TDS	410	820	620.17	111.85	11988.47

Table 1 shows criteria of DO, Alkalinity & Total Hardness vary greatly when related to different variables such as pH, Cl, TDS, Ca and Mg. Variations in physicochemical parameters have been noted. Throughout the season, the water was unreactive and the temperature was almost steady. 99.2mg/L to 168.2mg/L Total hardness. Standard deviation was16.93. The calcium content of water in the current study ranged from 13.8mg/L -33.2 mg/L, while the magnesium ion at the 20.39 site ranged from 10.1 -30.1 mg/L. Except for one or two months during the survey, the calcium and magnesium ion concentration at the site are in acceptable limits. The pH of the water ranged between 7.0 and 7.9. Total dissolved solids are primarily the mineral found in water. The TDS ranges to in July 2019 to 410mg/L to 820 mathematical standard deviation was approximately 1.05. Dissolved oxygen levels at 5.3mg/L to 9.5 mg/L in Free State, it is generally by different salts (Trivedy & Goel 1986).

The alkalinity ranged from 271.10 mg/L to338.20 mg/L, with standard deviation of 19.91. Site lacked nitrite, nitrate, ammonia, and arsenic compounds. A WQI rating (Table3) indicates more pollution. Figure 1 demonstrates a sampling point on Kagina River, and Figure 2 demonstrates comparing WQI for the years 2019 & 2020.
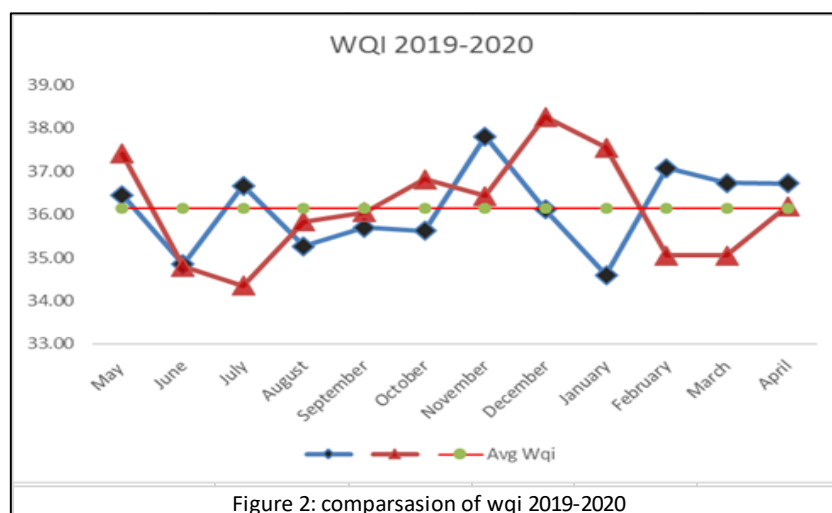

Figure 2: comparsasion of wqi 2019-2020

Discussion

The more DO in water, the cleaner form of water, the DO in site is more than 5.0 mg/L. on WQI quality of water is characterised as excellent to bad (Tiwari & Mishar 1985) table 5 displays the water quality index for months of 2019 and 2020. The lower WQI values indicates that the water is very clear throughout the months when it is less than 50. WQI values (Figure 2) for 2019 and 2020 are nearly identical, indicating that water is less polluted. The variation can be attributed to seasonal operation changing and thus the availability of water in the river. The Kagina has not been fully explored for such studies, and the status was previously inaccessible. The purpose of this research was to provide a simple, valid method for expressing the results of several parameters in order to assess the water quality by applying the WQI approach to River Kagina in India.

Table 5 water quality index 2019-2020

Months	2019	2020
May	36.45	37.41
June	34.84	34.79
July	36.66	34.35
August	35.26	35.83
September	35.7	36.05
October	35.62	36.82
November	37.81	36.43
December	36.11	38.26
January	34.6	37.55
February	37.07	35.05
March	36.73	35.05
April	36.72	36.19
May	36.45	37.41

CONCULSION

- The study fallouts shows water quality index was excellent condition.
- As results of WQI might not entirely convey the real concentration
- WQI has drawbacks than advantages. As instrument of information to public and law makers, it is not "a predictive model for methodical and technical claim" (McClelland, 1974).
- Found results states excellent condition during two years investigation.
- Different methods of WQI yields different results
- Due to Dissolved oxygen was complex matter because it is most important factor among nine factor during calculation.

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