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Water Quality Assessment In Terms Of Water Quality Index

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Abstract

Water quality index (WQI) is valuable and unique rating to depict the overall water quality status in a single term that is helpful for the selection of appropriate treatment technique to meet the concerned issues.WQI has been calculated by for five lakes at Haveri town in the pre and post monsoon seasons. WQI depicts the composite influence of different water quality parameters and communicates water quality information to the public and legislative decision makers. The water quality index indicated that most of the lakes come under poor category indicating the non suitability of water for human use. Due to the anthropogenic and agricultural disposal some of the lakes became unfit.

Key words: Water quality index, lake, physico chemical parameters , unit weight

1. Introduction

Water is one of the most essential natural resources for eco-sustainability and is likely to become critical scarce in the coming decades due to increasing demand, rapid growth of urban populations, development of agriculture and industrial activities especially in semi-arid regions. Variations in availability of water in time, quantity and quality can cause significant fluctuations in the economy of a country. Hence, the conservation, optimum utilization and management of this resource for the betterment of the economic status of the country become paramount [1]. The quality of water is defined in terms of its physical, chemical and biological parameters, and ascertaining its quality is important before use for various intended pur-poses such as potable, agricultural, recreational and industrial water usages, etc. [2].

WQI is an arithmetical tool used to transform large quantities of water quality data into a single cumulatively derived number. It represents a certain level of water quality while eliminating the subjective assessments of such quality [5-7]. It is intended as a simple, readily understandable tool for managers and decision makers to convey information on the quality and potential uses of a given water body, based on various criteria [3].

2. Materials and Methodology

2.1 Study Area

Haveri is situated in the center of Karnataka, it is the head quarter of Haveri District, which was declared as city municipal council on 05/12/2003.Haveri is basically a water scarcity area. Haveri town has a population of over 15.99 lakhs as per 2011 census.The percentage decadal growth is 11.08% and population density is 331/sq.km. Due to increase in the population city is experiencing rapid urbanization.

Akkamahadevi ,Dundibasaweshwar ,Mullankere ,Neharuhalankere and Heggere lakes are few among the many lakes in Haveri. Most of the lakes mentioned are man –made and are directly used as a source of domestic supply, some of them are used as reservoirs to conserve rainwater but human activities are responsible for the degradation of the lake as lake water is used for bathing and washing clothes, during washing large amount of detergents directly goes into the lake which increases the phosphate content of the lake water and becomes unfit for potable use.. As there is no Sewage-Treatment Plant (STP) in some areas so all the untreated wastes directly goes into the lake and changes the parameters of the lake, solid waste is also dumped close to the lakes, open defecation is also a common practice to the banks of the lake. The main conclusion is that majority of lakes in Haveri are becoming detrimental to humans day-by-day, it is a major concern for the local administrative bodies to look after the solution of the problems related to the lake otherwise it will have serious threat for the future.

Fig 2: Genaral view of Akkamahadevi Lake ,Haveri

Major problems of Akkamahadevi lake include the disposal of domestic wastewater from surrounding residential and commercial area, washing and bathing, wallowing of animals, and indiscriminate disposal of solid wastes.

Fig 3: General view of Dundibasaweshwar Lake ,Haveri

This lake is surrounded by the human habitation and it receives sewage and wastewater through number of unlined drains. The water quality of the lake is deteriorating on account of untreated sewage inflow, siltation, encroachment, excessive growth of weeds

Fig 4: General view of Mullankere lake

This lake is surrounded by human habitation and like other lakes it receives untreated sewage inflow and siltation, encroachment and weeds growth are the major constraints for the detoriation of water quality

Fig 5:General view of Neharuhalankere lake

This lake water is not suitable for drinking instead it is being used by large number of people living near or around the lake for daily needs of bathing, washing clothes & vehicle

Fig 6:General view Heggere lake

The water quality of this lake is deteriorating day by day by agricultural runoff, siltation, washing of clothes and vehicles and dumping of solid wastes

2.2 Sampling and Analysis

In present study lakes are monitored by using conventional method (i.e. samples were collected manually) for pre-monsoon and post-monsoon (Dec 2013 to May 2014). After conducting reconnaissance survey, sampling spots were choosen in lakes. Grab water samples were collected twice in every month between 8:00 am to 10:00 am in stopperd polyethylene bottle and transported to laboratory for the examination of water using standard methods as prescribed in American Public health association (APHA),American Water Works Association (AWWA).

2.3 Development of water quality ndex

2.4

Water Quality Index (WQI) is calculated using Weighted Arithmetic Index method (Sarkar, B. C., Mahanta, B. N., K. S., Paul, P. R., and Singh, G.,2006) as

$$WQI = \sum_{n=1}^{n} qnWn / \sum_{n=1}^{n} Wn$$

Where $W_n = k / S_n$,Where k = proportionality constant and S_n = Standard desirable value of n^{th} parameter.

$q_n = 100x(V_n - V_I) / (S_n - V_i)$,V_i = except in certain parameters like pH and DO, V_n=Observed value

Calculation of quality rating for pH and DO ($V_i \neq 0$)

$q_{pH} = 100 \times (V_{pH} - 7) / (8.5 - 7.0)$

q_{DO}= 100x (V_{DO}= 14.6) where n=number of parameters taken

Quality rating scale (q_n) for each parameter is assigned by dividing its concentration in water sample by its respective BIS standard values and the result is multiplied by 100. The suitable of WQI values for human being consumption are rated as given in table 4.4

Table 1: WQI classification of lakes

Class	**WQI values**	**Water quality status**
I.	Less than 25	Excellent water
II.	26-50	Good water
III.	51-75	Poor water
IV.	76-100	Very poor water
V.	More than 100	Unsuitable for drinking

3. Results and Discussions

3.1 General:

The average values of the various physico-chemical parameters of water samples collected during pre- and post-monsoon seasons of 2013-14 are presented in the table below

Table 2: WQI of Lakes in pre and post-monsoon

Sl.No.	Lakes	Pre-monsoon	Post-monsoon
1	Akkamahadevi Lake	68.62	47.25
2	Dundibasaweshwar Lake	107.53	77.32
3	Mullankere Lake	96.78	85.41
4	Neharuhalankere Lake	85.75	65.55
5	Heggere Lake	89.60	68.60

The WQI of lakes shows variation of 68.62 to 107.53 and 47.25 to 85.41 during pre and post-monsoon respectively. In order to understand the status of water quality, observed parameters were compared with the index values. Accordingly these groups were identified. First category having index values between 0-50 is considered as very good, with all parameters within the permissible ranges. Surprisingly only Akkamahadevi lake (47.25) fall under this category during post-monsoon. This clearly indicates temporary changes in quality pattern due to rainfall and dilution factors. A second category, which has the index value between 50-100, is significant as all lakes fall under this category during post-monsoon and during pre-monsoon except Dundibasaweshwar lake all lakes fall under this category.WQI is very high at Dundibasaweshwar lake during pre-monsoon which shows the signs of pollution throughout the year. The temporary variation in index values could be attributed to the excessive agriculture inputs flowing to the lakes either as overland or as irrigation return flows. The index values higher than 100 is considered as unfit for use. Therefore, it is necessary to take appropriate measures to improve the water quality fertilizers particularly at Dundibasaweshwar lake otherwise during the course of time the water will become unfit for usage.

Reference

1. Rajkumar V.Raikar and Sneha M.K., "Water quality analysis of Bhadravathi taluk using GIS – a case study", International Journal Of Environmental Sciences, Vol 2,No 2,2012.
2. Abdul Hameed M., Jawad Alobaidy., Bahram K. Maulood and Abass J. Kadhem., "Evaluating Raw and Treated Water Quality of Tigris River within Baghdad by Index Analysis" Vol 2, pp-629-635,2010.
3. N. Stambuk-Giljanović, "Comparison of Dalmatian Water Evaluation Indices," Water Environment Research, Vol. 75, No. 5, 2003, pp. 388-405.
4. Shweta Tyagi., Bhavtosh Sharma., Prashant Singh., and Rajendra Dobhal ." Water Quality Assessment in Terms of Water Quality Index." American journal of water Resource ,Vol. 1(3),pp. 34-38,2013
5. Sarkar, B. C., Mahanta, B. N., K. S., Paul, P . R., and Singh, G."Geo-environmental quality assessment in Jharia coalfield, India,using multivariate statistics and geographical information system," Environmental Geology,Vol 51(7),pp.453-458,2006
6. Bharti N, and Katyal.D "Water quality indices used for surface water vulnerability assessment" International Journal Of Environmental Sciences,Vol 2.(1) ,2011.
7. Abdul Hameed M. Jawad Alobaidy1, Bahram K. Maulood2, Abass J. Kadhem, " Evaluating Raw and Treated Water Quality of Tigris River within Baghdad by Index Analysis" J. Water Resource and Protection, Vol 2,pp. 629-635,2010