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RESEARCH ARTICLE

ASSESSMENT OF WATER QUALITY USING CCME WQI FOR HUBLI TEMPLE TANK, KARNATAKA STATE, INDIA

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ABSTRACT

The Canadian Council of ministers of the Environment (CCME) formulated a water quality index (WQI) to facilitate evaluation of surface water quality. It includes scope (F1), frequency (F2) and amplitude (F3) with a table of values ranging between 0-100 determining natures of index. Water quality of Hubli temple tank of Dharwad district was calculated using CCME WQI. The results advocate that the index values declined throughout the year and the quality of the water is deprived for all purposes.

INTRODUCTION

A critical component of Water Resources management is the collection, analysis, and distribution of water quality (WQ) data. Inherently technical WQ data often has to be communicated to diverse audiences. The communication of WQ data is especially challenging when the intended audience for the WQ data is the general public (Haseen khan et.al; 2005). Water quality in many fresh water bodies have deteriorated due to countless anthropogenic activities. Temple tanks are best examples of uncontrolled human activities not only in festival seasons but also in off seasons as they are the essential sources of water for devotees visiting the temple. The present study deals with the water quality assessment of Siddaroodh Math Tank- Hubli using CCME WQI (2001), for the data collected for a period of 12 months. The CCME WQI is an objective-based index that compares measured water quality values to guidelines to produce a score ranging from 0- representing worst quality, to 100- representing best quality. It facilitates better information about the water quality and helps us to recommend some remedial techniques to prevent future contamination. During the detailed study of temple tank of Hubli, considerable variations in water quality were recorded. In the present study an attempt has been made to evaluate surface water quality of Hubli temple tank.

MATERIALS AND METHODS

Study area

Dharwad district is a gateway between the Malenadu (Western Mountains) and Belavalanaadu (Deccan Plains). It has latitude of 15^0 28' N, longitude of $70^0$1' E and altitude of 700 mts above MSL. Siddaroodh Math Tank is a center of spiritual knowledge and divinity. It belongs to old Hubli of Hubli taluk, Dharwad district. It is famous for the "*Teppotsava*", a holy ritual during Shravan- masa, causes a lot of disturbance in the tank, as it is fed by flowers, fruits and holy items thrown into the tank during the offers done by the devotees. Lakhs of people gather to see this from neighboring states of Karnataka. Everyday hundreds of people visit this place and children enjoy feeding the tank fishes.

Sampling procedure and analysis

For Physico chemical parameters water samples were collected and analyzed for 18 water quality parameters for a period of 12 months (May 2012 to April 2013) following 'APHA', (1998). The parameters analyzed were Water temperature, pH, Alkalinity, Turbidity, Conductivity, Total Dissolved Solids, Total hardness, Calcium, Magnesium, Total Phosphates, Sulphates, Chlorides, Nitrates, Sodium, Potassium, CO_2, Dissolved oxygen & COD.

Calculation of CCME WQI

The water chemistry variables were subjected to water quality test designed by the Canadian Council of Ministers of the Environment-Water quality index (CCME- WQI) using the software CWQI – 1.0. The CCME-WQI (1.0) is based on a formula developed by the British Columbia Ministry of Environment, Lands and Parks and modified by Alberta Environment. The Index incorporates three elements: *scope* - the number of variables not meeting water quality objectives; *frequency* - the number of times these objectives are not met; and *amplitude* - the amount by which the objectives are not met (CCME, 2001). In the CCME -WQI a value of 100 (excellent) is the best possible index score and a value of 0(poor) is the worst possible (table-1). This index categorizes the quality of water for the overall use as well as for drinking, aquatic, recreation, irrigation and livestock rearing.

RESULTS AND DISCUSSIONS

The physico chemical parameters of temple tank water are analyzed and summarized with the help of graphical

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representation (Fig-1). Water quality in all months is below permissible limits according to the guidelines of WHO (2006).

According to the Canadian Council of Ministers of the environment (CCME), the tank water is rated as poor for all purposes and not suitable for any of the conditions. To support this, scorings of CCME WQI values are mentioned in table-1 & the water chemistry variables and the CCME WQI values of Hubli temple tank during 12 months are presented in table-2 respectively. It is learnt that water quality index changes with sudden changes in water temperature. Many of the earlier workers like Awammanavar and Shrihari, 2007; Basavarajappa et al, 2009; Siddaraju et al, 2010 have reported the effect of water temperature on water quality.

Dissolved oxygen and free carbon dioxide play a key role in poor water quality (Jayashankar et al; 2010). Among all the physico chemical parameters selected for the water quality index calculations, pH is an important parameter which determines the suitability of water for various purposes. In present study there are great variations in the parameters such as Turbidity, Nitrates, Phosphates, Total hardness, Magnesium, Dissolved Oxygen, Co_2 and COD due to continuous anthropogenic activities, festival in-puts, climatic changes, addition of ground water to surface water and lack of attention paid towards the sanitation and cleanliness. The results showed that the temple tank water CWQI values for overall (21), Drinking (11), Aquatic (13), Recreation (6) and Live stock (43); all are below 44, indicating poor water quality.

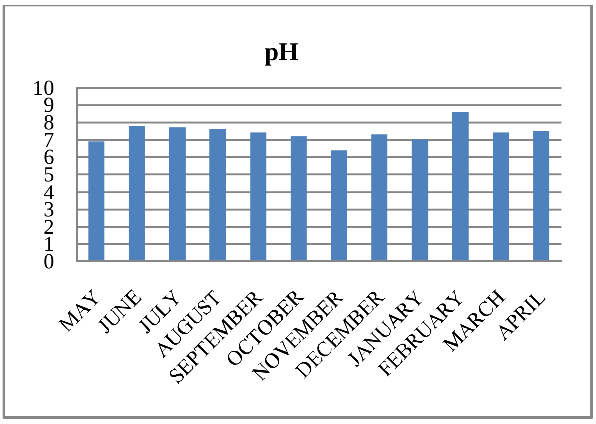
Table 1 Scorings of CCME WQI values

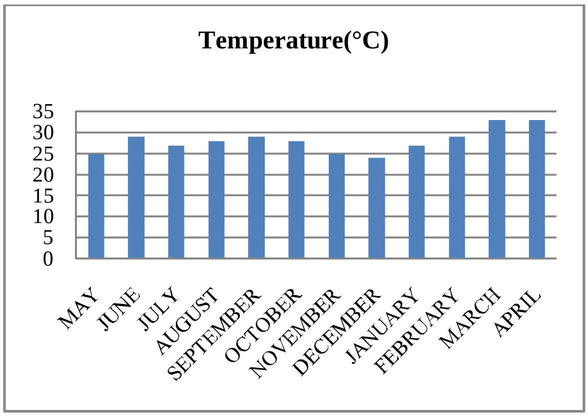
RANK	SCORE(CCME WQI Value)	INTERPRETATION
Excellent	95-100	Water quality is protected with a virtual absence of threat or impairment; conditions very close to natural or pristine levels.
Good	80-94	Water quality is protected with only a minor degree of threat or impairment; conditions rarely depart from natural or desirable levels
Fair	65-79	Water quality is usually protected but occasionally threatened or impaired; conditions sometimes depart from natural or desirable levels.
Marginal	45-64	Water quality is frequently threatened or impaired; conditions often depart from natural or desirable levels
Poor	0-44	Water quality is almost always threatened or impaired; conditions usually depart from natural or desirable levels.

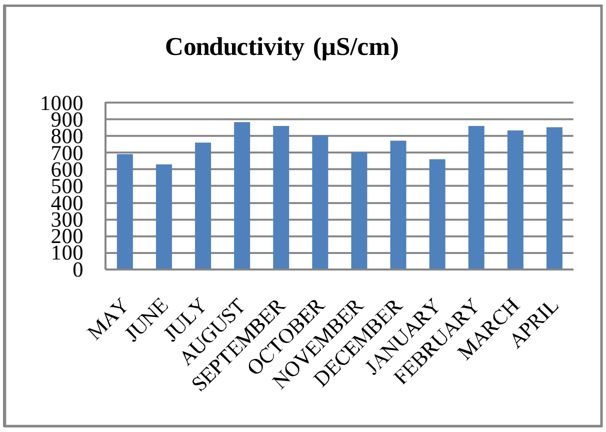
Table 2 Calculated CCME WQI values in Hubli temple tank

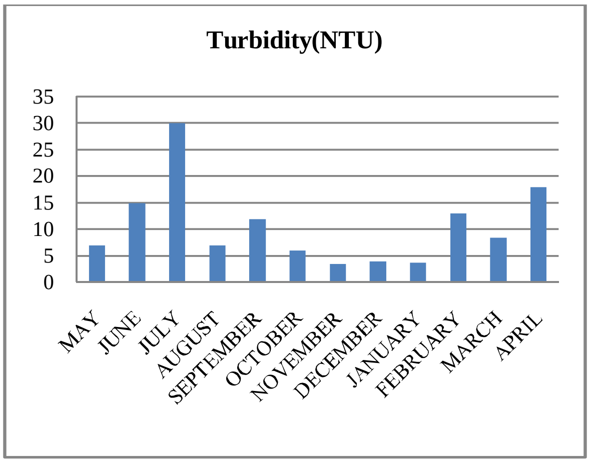
Data Summary	Overall	Drinking	Aquatic	Recreation	Livestock
CWQI	21	11	13	6	43
Categorization	Poor	Poor	Poor	Poor	Poor
F1 (Scope)	83	100	100	100	50
F2 (Frequency)	52	66	71	89	29
F3 (Amplitude)	96	97	88	93	79

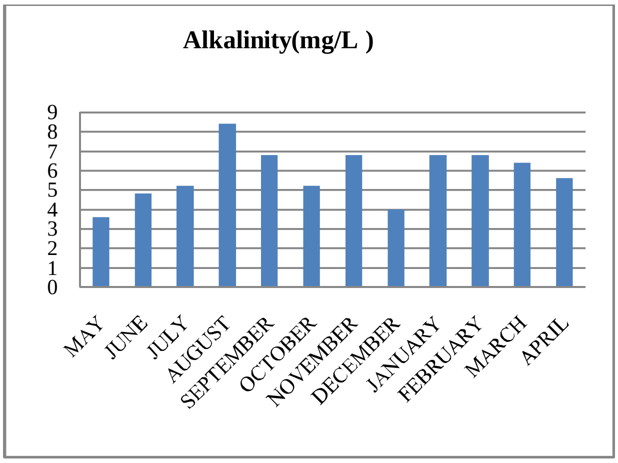
Fig1 Monthly Variations in water quality parameters at Hubli Temple Tank

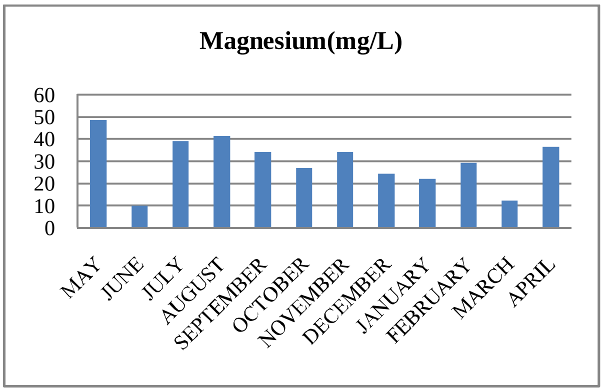


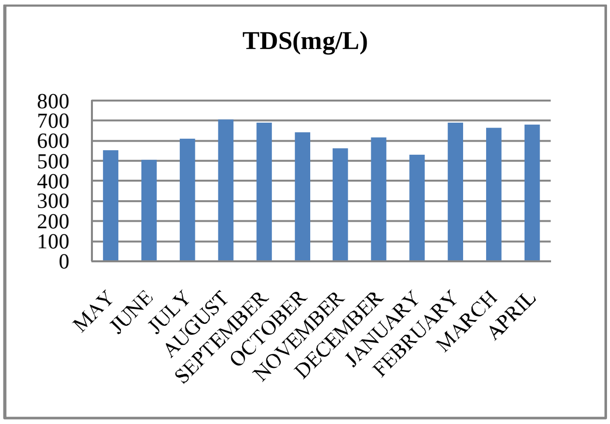


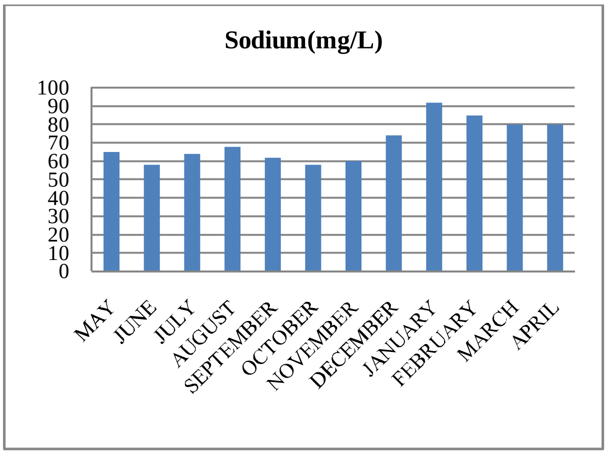


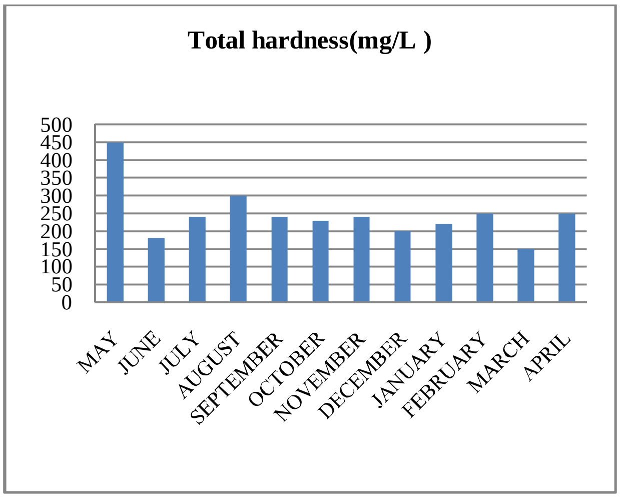


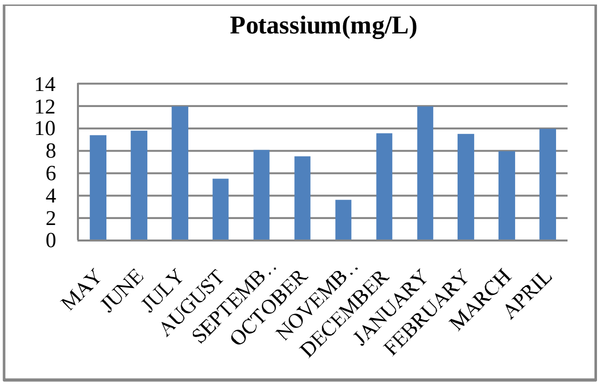

Alkalinity(mg/L)
0
1
2
3
4
5
6
7
8
9
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

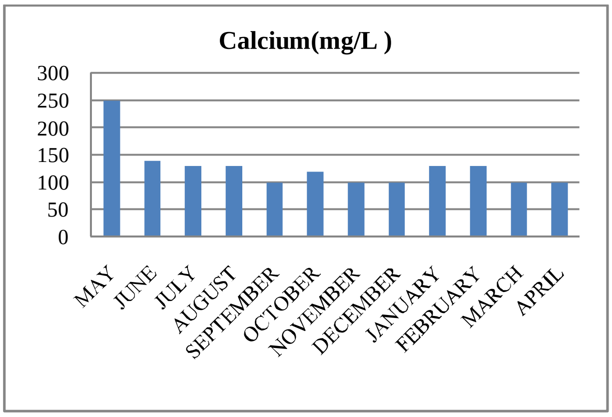

Magnesium(mg/L)
0
10
20
30
40
50
60
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

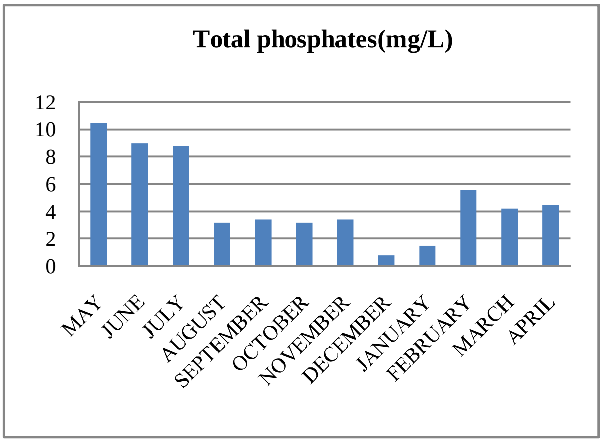

TDS(mg/L)
0
100
200
300
400
500
600
700
800
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

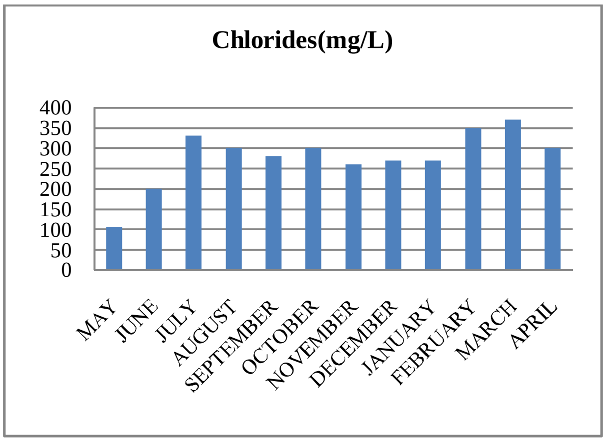

Sodium(mg/L)
0
10
20
30
40
50
60
70
80
90
100
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

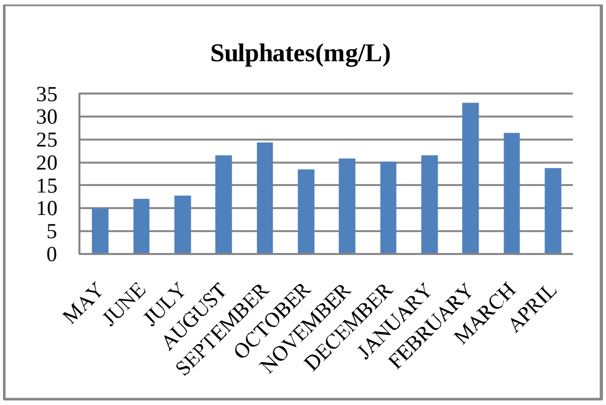

Total hardness(mg/L)
0
50
100
150
200
250
300
350
400
450
500
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

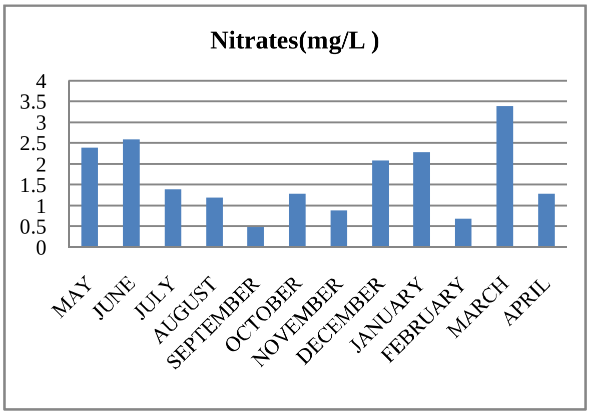

Potassium(mg/L)
0
2
4
6
8
10
12
14
MAY
JUNE
JULY
AUGUST
SEPTEMB…
OCTOBER
NOVEMB…
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

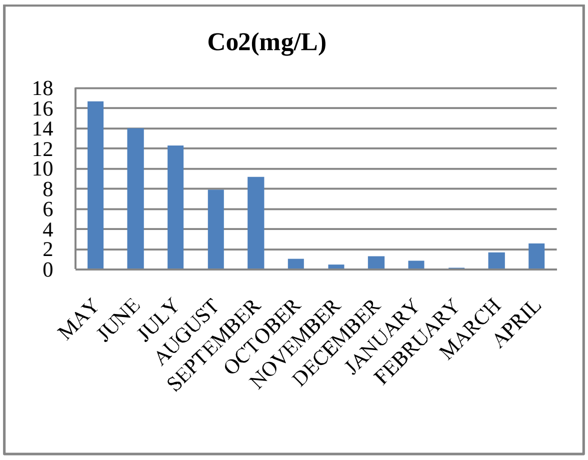

Calcium(mg/L)
0
50
100
150
200
250
300
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

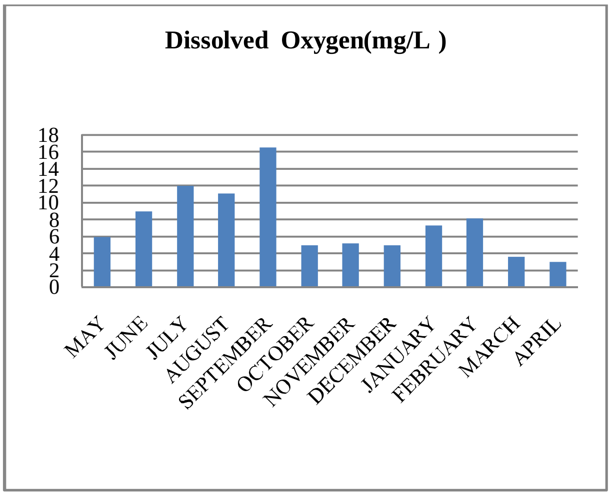

Total phosphates(mg/L)
0
2
4
6
8
10
12
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL

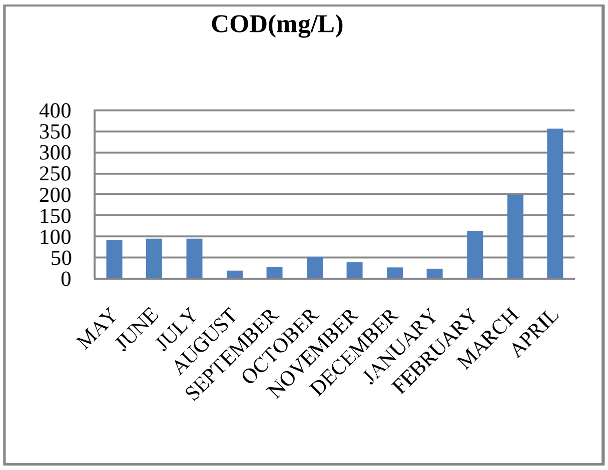












CONCLUSION

Depletion in water occurs when pesticides, chemical sewage and other effluents containing organic matter are discharged in to the water bodies. The present study shows poor water quality due to addition of ground water contaminated with sewage that increases undesirable values of chemical variables. In this regard, people should be made aware of the water quality, importance of sanitation and economical water treatment methods. The interpretation drawn from this explains that water quality is almost always threatened or impaired as the water quality levels are very low. For the assessment of water quality, Basavarajappa et al., (2009) applied CCME WQI to 4 lakes in Mysore; Jayashankar et al., (2010) applied CCME WQI to Temple ponds of Udupi districts; Hosmani S.P (2011) applied CCME WQI to know the water quality index for protection of aquatic life in lakes of Mysore; Giriyappanavar et al., (2013) applied CCME WQI to Fort lake of Belgaum. The CCME WQI was developed with the intent of providing a tool for simplifying the reporting of water quality data (CCME, 2001). It is a tool that provides meaningful summaries of water quality data that are useful to both technical and non-technical individuals interested in water quality results. It was developed to provide a broad overview of environmental performance (Amir Ali Khan et al, 2004). With minimum water quality data, simple and convenient water quality index can be used to summarize the status of temple tank water and communicated to the public.

References

1. APHA. *Standard methods for the examination of water and waste water*. American Public Health Association. New York. Inc. 1998.
2. Awammanavar, S. M & Shrihari, S (2007): Evaluation for water quality index for drinking purpose for river Netravathi, Mangalore, South India. Environmental monitoring and Assessment 43(1-3): 279-290.
3. Basavarajappa, S. H., Raju, N. S., Hosmani, S. P & Niranjana, S. R (2009): Studies on the water quality parameters of four fresh water lakes of Mysore, Karnataka. Indian Journal of environment and Ecoplan.16 (2-3): 413-418.
4. CCME (2001): Canadian environmental quality guidelines for the protection of aquatic life, CCME water quality index: technical report, 1.0.
5. Giriyappanavar, B.S and Patil, R. R (April 2013): Application of CCME WQI in Assessing Water Quality of Fort Lake of Belgaum, Karnataka. Indian Journal of Applied Research. 3(4), 32-33.
6. Giriyappanavar, B. S and Shivalli, P. B (2013): Phytoplankton diversity influenced by the chemical status in temple tank of Hubli-Dharwad, Karnataka. Accepted for publication in Research and Review: Journal of Botany, STM Journals.
7. Haseen Khan., Amir Ali Khan and Sarah Hall (June 2005): The Canadian Water Quality Index: A Tool for Water Resources Management; MTERM International Conference, AIT, Thailand, 06 – 10.
8. Jayashankara., Vijaya, M., Girish, R and Hosmani, S. P (2010): Microbial Diversity and Water Quality Index in Temple Ponds of Udupi District, Karnataka, India. Nature Environment and Pollution Technology; An International Quarterly Scientific Journal. 9(1), 197-202.
9. Khan A. A., Paterson, R. and Khan, H. (2004): Modification and application of the Canadian Council of Ministers of the Environment water quality index (CCME WQI) for the communication of drinking water quality data in Newfoundland and Labrador, Water Quality Research Journal of Canada, 39(3), 285–293.
10. Hosmani, S. P., Mahesh, M. K and Alakananda, B (2011): Water Quality Index for Protection of Aquatic life in Lakes of Mysore, Karnataka State, India. International Journal of Lakes and Rivers; 4(1), 91-102.
11. Siddaraju., Devi Prasad, A. G and Hosmani, S. P (2010): Assessment of Water Quality Using National Sanitation Foundation Water Quality Index (NSFWQI) for Lakes of Mandya, Karnataka State, India; 4(1), 27-33.
12. WHO (2006): World Health Organization, Guidelines for drinking-water quality: Volume-1, Recommendations. 3rd ed. Geneva.

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