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Water Quality Assessment of RoopSagarPond of SatnaUsing NSF-WQI

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Abstract: Fresh water is a critical, finite, vulnerable, renewable natural resource on the earth, and plays an important role in our living environment, without it, life is impossible. Standing water bodies have great importance as they are recharging resources for drinking, domestic and agricultural use before the civilization. Water quality of pond is important for health and economy of people. The present study is going to centralize on the RoopSagar pond of Mukundpur, Satna district in Madhya Pradesh.Physico-chemical analysis of the water does not provide the direct conclusions on the quality of water. Water quality index calculates all the parameters and gives an easy decision making output to analyze the quality of water. A Simple but useful index is the National Sanitation Foundation-Water Quality Index (NSF-WQI). This index can be calculated by determining only selected physicochemical parameters. Change in water temperature, pH, dissolved oxygen, biochemical oxygen demand, total phosphorus, nitrates, and turbidity were used for the calculation of the index.. From the listed data the quality of water was concluded.

Keywords: -RoopSagar pond, physico-chemical characteristics, NSF-WQI andWater quality.

I. INTRODUCTION

Water is essential for all socioeconomicdevelopment and for maintaininghealthy ecosystems. As population increasesand development calls for increasedallocations of groundwater and surface waterfor the domestic, agriculture and industrialsectors; the pressure on water resourcesintensifies, leading to tensions, conflictsamong users, and excessive pressure on theenvironment. The increasing stress onfreshwater resources brought about by everrising demand and profligate use as well as bygrowing pollution worldwide is of seriousconcern.

WQI is widely used tool in different parts of the world to solve the problems of data management and to evaluate success and failures in management strategies for improving water quality. The index is a numeric expression used to transform large quantizes of water characterization data into a single number, which represents the water quality level (Abbasi 2002). A number of indices have been developed to summarize water quality data for communication to the general public in an effective way. In general water quality indices incorporate data from multiple water quality parameters into mathematical equation that rates the health of water body with a single number. That number is placed on a relative scale to justify the water quality in categories ranging from very bad to excellent. This number can be easily interpreted and understood by political decision markers, non-technical water manager and the general public.

The water quality index (WQI) has been considered as one criteria for drinking water classification based on the use of standard parameters for water characterization. A commonly used WQI was developed by the National Sanitation Foundation (NSF) in 1970 (Brown et. al. 1970). The WQI is one of the most widely used of all existing water quality procedures. WQI was the intent of providing data (Liou et al., 2003). The index ranges from 0 to 100, where 100 represent an excellent water quality condition.

The present investigation RoopSagar anthropogenic pond of Mukundpur, Satna district in Madhya Pradesh aims to weigh up the suitability of water for various human activities and for the protection of aquatic life based on NSF-WQI.

II.MATERIALS AND METHODS

Study Area- The present investigation is going to centralize on RoopSagar anthropogenic pond of Mukundpur, Satna district in Madhya Pradesh. The topographical situation of RoopSagar pond is 81^0 15'East longitude and $24^0$42' North latitude in central India and situated on the Vindhya plateau at the height of 318 M. and area 841 Sq. meter but on the basis of revenue record the area of this aquatic body was noted 174.8 acre.The water from this pond is mainly used for the Cattle bathing, washing clothes, irrigation and other domestic purpose.
Sampling and Analysis- Composite surface water sampling methods was followed for the collection of samples between 9 to 11 am on first week of every month throughout the year (August 2011 to July 2012). Black plastic carbouys of one liter capacity were used for collecting the samples. Temperature and pH were analysed on the spot and winkelerization was done in separate 300 ml bottles for the estimation of

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Biochemical Oxygen Demand. For transportation of samples to laboratory dark coloured ice box was used in order to avoid the exposure of samples to sunlight variations in temperature. Samples were analysed for physic-chemical variables following methods APHA, 1998).

III. RESULT AND DISCUSSION

There are several reports on standing water body water quality assessment using physico-chemical parameters (Hosmani et. al., 1980 Ravikumar et. al., 2011, Giriyappanavar et. al. 2013). The water quality index (WQI) integrates complex analytical raw data and generates a single number that expresses subjectively the water quality. Such a rating scale allows for simplicity and consumer comprehensibility. The water quality index approach has many variant in the literature, and comparative evaluations have been under taken (Dunnette 1979, Miller et. al., 1986). A water quality index can be of different types depending on its final intended purpose. It can highly specific for different water bodies or could be a general one for all types of waters meant for human consumption. A WQI can also be used not just on readings at a single point of time but also on data collected over a period of time.The water quality index was calculated using NSF information software (Ramakrishnaiah 2009) and compared with standard water quality rating (table no.1).

Table No. 1: Water Quality Index Rating of the standing water.

WATER QUALITY INDEX (WQI)	RATING
90-100	Excellent(E)
70-90	Good (G)
50-70	Medium
25-50	Bad (B0
0-25	Very Bad (VB)

Table No.2 : Monthly variations in Physico-chemical parameters and WQI of the RoopSagar pond.

Parameters	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July
pH	7.4	8.4	7.8	7.5	8.3	8.5	8.2	7.9	7.4	7.8	7.9	8.0
Temp (0^0C)	26.5	26.8	25.2	24.5	21.5	20.8	22.4	23.4	26.0	29.5	32.0	29.8
DO mg/L	4.9	4.1	6.3	3.4	6.2	6.0	7.7	4.12	4.2	2.8	2.5	5.5
BOD mg/l	4.1	3.7	6.4	3.4	6.2	5.5	7.2	4.1	4.2	2.8	4.2	5.5
Turbidity (NTU)	16.8	12.0	8.3	9.6	3.5	4.5	6.2	5.0	6.5	4.0	12.2	15.5
Phosphate mg/l	2.54	0.25	0.19	0.40	0.57	0.16	0.18	0.20	0.24	0.22	0.17	2.13
Nitrate mg/l	0.52	0.45	0.25	0.21	0.18	0.28	0.15	0.14	0.19	0.14	0.11	0.12
WQI	55.5	60.12	59.65	66.75	59.20	59.4	58.55	59.70	62.80	64.25	61.56	55.25
Rating	M	M	M	M	M	M	M	M	M	M	M	M

The index values ranged from a minimum of 55.25 during the month of July and reached a maximum of 66.75 during November. The water quality of RoopSagar pond is rated medium during the all the month of study (table no.2). The conditions in it often stray from the normal levels. It is evident from the results that water quality in the pond under study is degraded considerably due to contamination of water by sewage from the village and diverse anthropogenic activities. Zaheeruddin and Khurshid (1998), Manish and Pawan (1998) have attributed industrial growth, urbanization and agricultural activities as the major source of water contamination. However in the present study, it is observed that the stress of the pond under study is largely due to entry of domestic sewage.

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