Asian Journal of Agriculture & Life Sciences Vol. 6(3), July 2021: 1-5

Website: www.crsdindia.com/ajals.html e-ISSN: 2455-6149

ORIGINAL ARTICLE

Analysis of Water Quality Index of River Asan for Potable Use in District Morena

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Received: 11th May 2021, Revised: 29th May 2021, Accepted: 12th June 2021

ABSTRACT

Morena district comprises four sub-divisions: Morena, Ambah, Joura and Sabalgarh. Morena sub-division comprises a lone tehsil and a lone block: Morena. Ambah sub-division comprises two tehsils and blocks: Ambah and Porsa. Joura sub-division comprises Joura tehsil, which is further divided into two blocks: Joura and Pahargarh. Today world is facing a number of challenges affecting the availability, accessibility, use and sustainability of its fresh water resources. Water is the most vital resource for living beings because there is no life without water as cellular activities never occur. Water is essential for the socio-economic development of human beings. Industrialization, urbanization, population explosion and green revolution have deteriorated the various sources of water.

Key words: *Water Quality Index, River Asan, Morena*

INTRODUCTION

Water is the most productive resource for zooplankton and other microorganisms. Zooplanktons are integral components of aquatic food web and contribute significantly to aquatic productivity in freshwater ecosystems. They feed on phytoplanktons which directly provide food source for larval vertebrates as well as related to the growth of larger organisms and fish. They play an important role in the conservation of energy from primary to secondary level. Zooplankton diversity depends on physic- chemical parameters and other environmental factors. There is plenty of water on the earth surface. The fresh water is however limited and a large part of it is in a polluted state at present. Keeping these points in mind, this study is designed to comparatively analyze the water quality of River Asan at upstream and downstream sites.

Because of rapid increase of population and concentration of factories around the costal region of Asan. Global studies show a challenging future and a chaotic view, when considering total use and water availability in third millennium. According to UN estimates by 2025, the demand for fresh water will rise by nearly 60% more than is currently available. Currently more than 1.1 billion people lack access to clean drinking water with 500 million people from India. Asan River is one of the most important River of Morena district. It is the bigger water collecting River of this region. It is situated in the middle of the district from south to north east it is extended in Jaura, Morena and south part of Ambah Tahsil. Kunwari water collecting area is situated on its west, north and north east part and in the south part Gwalior district is situated. The water of Asan River is mainly used for agricultural purpose. Villagers from nearby areas use water for bathing, washing clothes and for waste disposal etc. in some areas dead bodies are also drawn in this River, due to all these activities the water of Asan River is become polluted. Physiographically, the area is represented by north east – south west trending ridges and valleys (between 200 and 300 metres). The ridges are represented by sand stone and the valleys by shale. Today world is facing a number of challenges affecting the availability, accessibility, use and sustainability of its fresh water resources. Water is the most vital resource for living beings because there is no life without water as cellular activities never occur. Water is essential for the socio-economic development of human beings. Industrialization, urbanization, population explosion and green revolution have deteriorated the various sources of water. Keeping these points in mind, this study is designed to comparatively analyze the water quality of River Asan at upstream and downstream sites.

MATERIALS AND METHODS

Water sampling sites from River Asan at Murena. After each 3 months sample were collected at the each sampling stations at different times for the analysis of different parameters. Samples were collected in the middle of streams and at mid-depth in the direction of flow. Samples storage a low temperature (4 degree centigrade). Sampling was done significantly after each three months intervals for 1 year. The water samples of River Asan were collected. From all the sampling points October 2010 to July 2011 for the study of water quality. Samples from the River water were collected in five litres precleaned plastic bottles for physico-chemical analysis. One glass bottle (DO. bottle capacity 300 ml.) was filled with water at every sample point for the estimation of dissolved oxygen as referred by APHA (1992). Sample for MPN (Coliform and Faecal bacteria or Coliform) detection were collected in sterilized glass bottle and preserved in ice (APHA, 1991) water temperature was determined at the sampling point while other parameters were analysed in the laboratory.

(A) TEMPERATURE:

Temperature of water sample was measured by a centigrade mercury thermometer having marks from 1 to 100^0C with division caliberated for 0.1^0C.

(B) WATER FLOW MEASUREMENT:

A number of methods may be used for measuring flow of stream. The choice of methods depends largely on the affordability but the type of local effluents also influences. For this I used surface float method. It is a simple approach in which a float (Plastic ball) is thrown on the surface. The time required for a float to travel (t), a known distance (d) is observed and the average velocity is obtained by-

$$\left[\overline{V}\right] = \frac{d}{1.2t}$$

The factor 1.2 accounts for the fact that surface

(C) TURBIDITY (NEPHLOMETRIC METHODS):

When light is passed through a sample having suspended turbidity, some of the light is scattered by the particles, the scattering of the light is generally proportional to the turbidity. The turbidity of a sample is the measured from the amount of light scattered by the sample taking a reference with standard turbidity suspension.

Process (Preparation of turbidity standards)-

i). Stock turbidity suspension:

Solution A: Dissolved 1.00 mg. Hydraziesulfate $(NH_2)H_2SO_4$ in 100 ml. of distilled water.

Solution B: Dissolved 1.00 mg. Hezamethylene tetramine $(CH_2)_6N_4$ in 100 ml. in distilled water. Mixed 5.0 ml. solution A and 5.0 ml. solution B in a 100 ml. volumetric flask. Allow to stand for 24 hours at 25 ± 3 degree centigrade and diluted to mark and mixed. The turbidity of this suspension is 400 NTU.

ii). Standard turbidity suspension:

Diluted 10 ml. stock turbidity suspension to 100 ml. turbidity free water. The turbidity of this suspension is 40 NTU.

Procedure: Standardized the Nephelon turbidimeter by standard turbidity suspension. Then taken sample in Nephelon tube and immersed in ultrasonic bath for 1-2 sec. When buddle were released then read turbidity directly from turbidimeter in turbidity unit.

NTU = Nepholon turbidimeter reading x 0.4 dilution factor

(D) CONDUCTIVITY:

The unit of conductivity measurement siemens (s) cm^{-1}. The older unit mho cm^{-1} is now rarely used. The conductivity of most waters is generally low so the unit μs cm^{-1} shall be much appropriate. As the ionization of the solutes depends on the temperature variation the results are reported at 25^0C.

Procedure: Standardized the conductivity meter with 0.01N KCl solution and adjust the temperature at 25±0.1 degree centigrade. Then rinsed the cell with distilled water followed by portion of sample to be tested. Adjust the temperature of sample to 25+0.1 degree centigrade. Then measured the conductivity in sm^{-1} (milli sieams per meter).

Conductivity (mho) = observed conductivity x cell constant

Statistical Calculations: The statistical calculations were done by the following formula described by Fischer and Yates (1993).

RESULTS AND DISCUSSION

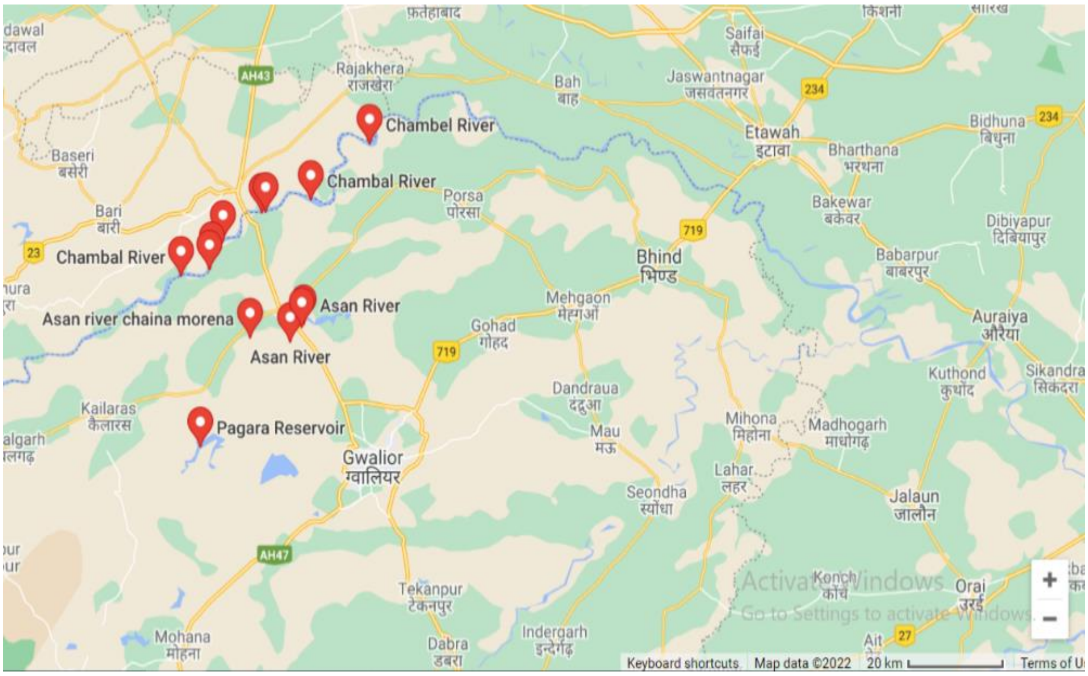

Fig. 1: Location of Asan River in district Morena (courtesy- Google maps)

Fig. 2: black water showing status of pollution in Asan River in district Morena

Table 1: Analytical Data Showing Temperature Variation in River Asan

Variable	Number of cases	Mean	Standard deviation
Temperature (^{0}C)			
Upstream Downstream	4 4	23.25 24.78	6.65 6.63
	Mean difference S.D. difference	1.53	0.02

Percent change in up and down stream: 6.17%

Table 2: Analytical Data Showing Water Flow Measurement in River Asan

Variable	Number of cases	Mean	Standard deviation
Water flow measurement			
Upstream Downstream	4 4	0.81 0.83	0.07 0.03
	Mean difference S.D. difference	0.0	0.04

Percent change in up and down stream: 2.40%

Table 3: Analytical Data Showing Turbidity in River Asan

Variable	Number of cases	Mean	Standard deviation
Turbidity			
Upstream Downstream	4 4	23.75 26.75	4.5 6.99
	Mean difference S.D. difference	3.0	2.49

Percent change in up and down stream: 11.21%

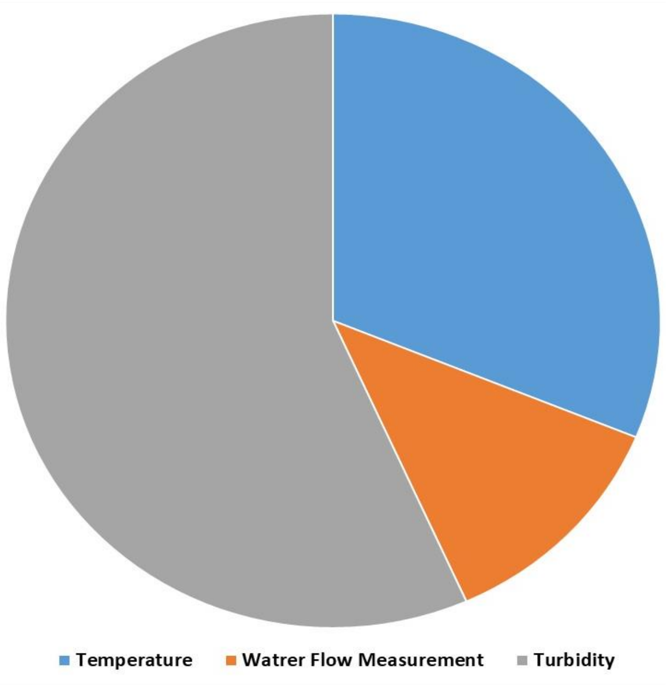

Fig. 1: Percentage change in water quality index from upstream to downstream in River Asan

The temperature of Asan water slightly varies at upstream site (A) and downstream site (D) during sampling of water. Minimum temperature is recorded in the end of Jan-2011 while maximum in the month of July-2011, However, variation in the temp. has been recorded in three months intervals in the present investigation. Such variation may be attributed to a lot of chemical composition due to discharge of major portion of the city sewage in to the River which exerts influence on the River temperature. The sewage and other waste when mixed with the River water, raise the temp. of the water as it is fact that on mixing the acidic or alkaline waste in a water body the temp. of water gets elevated. The mean temp. for each session, shows little variation from one sampling point to another. The basis of three season water temp. varies during rainy, winter and summer respectively. During summer temp. increases and in winter temp. declines, indicate that there is a reciprocal relationship between air and surface water temp. in the River. The water temp. is generally higher during the dry session. This may be due to the surface evaporation requiring heat from the water body. The above findings are in affirmation to Pandey (1986), P. Gandheswary *et al*. (1990), Hasnain *et al*. (1992), Verma *et al*. (2005) and Thakur *et al*. (2007) in River Ganga, Yamuna, River Asan and other polluted industrial belt of Rivers respectively. It becomes quite clear that water quality of upstream site (A) and downstream site (D) is different with regards to temp. parameter.

Water flow was maximum in July-11 at site (A) while it was minimum in Jan-11 at site (A). It may be due to hardness and turbidity of water. Turbidity is very much responsible for the disturbed speed of water flow and weather condition. In the present investigation a non significant turbidity value has been observed between upstream and down stream sites during Oct. 2010 to July 2011. Maximum turbidity recorded in the month of Oct. 2010 which may be due to highly silted condition. An increasing rate of turbidity is recorded from April 2011 to July 2011 at up stream site A against down stream site D. Most probably such higher values of turbity are due to higher concentration of suspended solid particles, coming through sewage system, drains as well as due to Foundary waste water. In winter season oct 2004 to April 2011 turbidity has been recorded maximum due to deficiency of proper running water in River as well as due to suspended solid particle which decrease the water flow velocity. During summer season rate of turbidity increased, may be associated with the velocity of water flow and also due to waste pollutants of city areas. The above finding clearly indicate that the turbidity is directly proportional to the different kinds of pollutants. The present investigation supported by Mathur, *et al.* (1998), Singh, *et al.* (1989), Tarzwell (1971) and Saxena and Chauhan (1993) who earlier recorded the rate of turbidity in River.

The results and pie chart clearly show that minimum percent change from upstream to downstream is in water flow measurement and maximum percent change is in turbidity. This is clearly depicted from data that turbidity is the main problem to be use this water for potable use in city.

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