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STUDY OF MICROBIAL POLLUTION POTENTIAL OF RIVER BINA AT SAGAR (M.P.)

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ABSTRACT:

Water is one of the best gifts to all living creature, given by nature. It is compulsory for the growth and maintenance of human body and also for many biological activities. It is very essential in one's daily life and therefore; it is highly desirable to protect the natural aquatic bodies from pollution. Assessment of the water quality of water in different revering system in India is very much needed at the moment. Water standard qualities can be maintained with the help if regular physico-chemical, biological and biochemical evaluation. It is high time to formulate methods to monitor the date in order to control indiscriminate activities of man and regulate permissible limits of contamination.

Present study is aimed at investigating the main factors responsible for water pollution in river Bina at Sagar. The quality of water is typically determined by monitoring microbial presence, especially total coliforms. The total coliform count varied in the range of 114 ± 2.98 to 190 ± 8.16 MPN/100 ml, 126 ± 7.50 to 237 ± 2.08 MPN/100ml, 179 ± 19.31 to 290 ± 21.60 MPN/100 ml during winter, summer and rainy season, respectively.

KEYWORDS:- *Microbial, pollution, coliforms, environment, water quality Bina River.*

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INTRODUCTION

Nature and mankind form an inseparable part of the life support system. This system has five elements air, water, land, flora and fauna which are inter-connected inter related and inter dependent and have coevolved and are co adopted. Deterioration in one inevitably affects the other four elements. If the deterioration is for a short term and the life support system had enough resilience, it repairs itself and reverts back to the original state. However, if the deterioration continues, the whole system including all life is thrown out of gear. This disturbance of system is called pollution; this may be in air, water and land causing air pollution, water pollution and land pollution (Odum 1977, Khoshoo, 1986 and Bhargava 1987, Brima 2017).

The water and water bodies have their own morph metrological, physico–chemical and biological characteristics. These characteristics are being influenced by addition of undesirable, concentrations of various physical, chemical and biological pollutants the physical and chemical characteristics from biotic and biological forms abiotic factors. The abiotic and biotic components are interrelated to each other. The higher concentration of abiotic factors diminishes he biotic population. Temperature, turbidity, light intensity etc, are also influence factors change the natural water characters. The presences of impurity of water. The aquatic needs and other phytoplankton improves the water quality through their photosynthetic characteristic and also improving dissevers oxygen level.

The water body have been a topic of great interest for ectopically. The lentic water ecosystem is an ideal system for studying various ecological functions and factors. On the account to various cited

literature, it have been noted that various type of biotic factor play the important role as the bio-monitoring factor, which deals the purity and impurity of water.

The biota of an aquatic ecosystem directly reflects the conditions existing in the environment and the data generated in the past have been utilized for biological monitoring of water pollution levels. Age of the water or length of the time. Exposure to light and airs critical to development of a from plankton community. It is known that human activates have bad impacts on pond, phytoplankton community. It is known that human activities have bad impacts on pond, phytoplankton. The great natural, seasonal and spatial variability in pond ecosystem. Make assessment of water quality and human impacts difficult. Non-point source run of has been identified as the most important and wide spread source of pollution problems.

The quality of river water is deteriorated because of in-stream uses of water in the following ways. During survey it was observed that rural areas are situated on both the side of Bina, which are engaged mainly in the agriculture and cattle farming. These cattle's while wading in the river transfer fecal matter and other types of pathogens in the river. Also the vigorous movement and activities of the cattle inside the water disturb the river bed where the pollutants are settled in the form of sludge. This ultimately deteriorates the quality of the river water to a considerable extent.

Among the anthropogenic activities, mass bathing or ritual activities such as bathing, washing and other rituals adds detergents, soap, ash, polythene carry bags and other domestic wastes in water increases the pollution load on the water body (Marale et al., 2010 and Arora et al., 2013) by enhancing faecal coliform load (Kushreshtha and Sharma, 2006; Telang et al., 2009; Zabed et al., 2014).

Mass bathing at the banks of the Bina is performed at some places, especially during festivals, this increases the pollution load. Besides this, open defecation and cloth washing were also seen along the banks. In some cases crossing over of the river at some places through bullock carts and transporting of dung through it was also observed. All these factors either singularly or in combination increase the pollution load considerably.

The present study was made on water quality and occurrence of some respect to physico-chemical parameters in Bina River Sagar (M.P.).

MATERIAL AND METHODS:-

The quality of river water is deteriorated because of in-stream uses of water in the following ways. During survey it was observed that rural areas are situated on both the side of Bina, which are engaged mainly in the agriculture and cattle farming. These cattle's while wading in the river transfer fecal matter and other types of pathogens in the river. Also the vigorous movement and activities of the cattle inside the water disturb the river bed where the pollutants are settled in the form of sludge. This ultimately deteriorates the quality of the river water to a considerable extent.

Samplings were conducted during 2015, at six different stations viz. I-VI of river Bina during the winter, and summer seasons. Water samples were collected monthly in the morning at 8 am to 10 am from surface layer of the river from 2015, 12 water samples (2000 ml/ sampling site) were collected in presterilized bottles from the surface and 1.5 ft below the surface from all the sampling sites of river Bina on seasonal basis i.e. during winter and summer seasons. Samples were brought to the laboratory under ice-cold conditions and processed immediately. Test for water contamination in which the number of the colonies of coliform-bacteria Escherichia coli (E. coli) per 100 milliliter of water is counted (Kodarkar M.S., 1992).

The density of bacteria is calculated on the basis of positive and negative combination of the tubes using MPN tables or it may also be calculated by Thomas formula :

$$\text{MPN}/100\,\text{ml} = \frac{\text{No. of positive tubes} \times 100}{\sqrt{[(\text{ml. sample in negative tubes}) \times (\text{ml. sample in all tubes})]}}$$

RESULT AND DISCUSSION:-

The coliform group of bacteria has been the principal indicator of the suitability of a particular water for domestic use. Experience has established the significance of coliform group densities as criteria of the degree of pollution and thus of the sanitary quality of the sample (Francy 1993, APHA 1998).

All organisms that produce a colony with a golden-green metallic sheen within twenty four hours incubation on a suitable medium are considered members of the Coliform group. The sheen may cover the entire colony or may appear only in a central area or on the periphery. Investigations, indicate that the coliform group present in gut & feces of warm blooded animals generally include organisms capable of producing gas from lactose in a suitable culture medium (44.5±0.2^{o}c) whereas the coliform organisms from other sources generally cannot produce gas under these conditions.

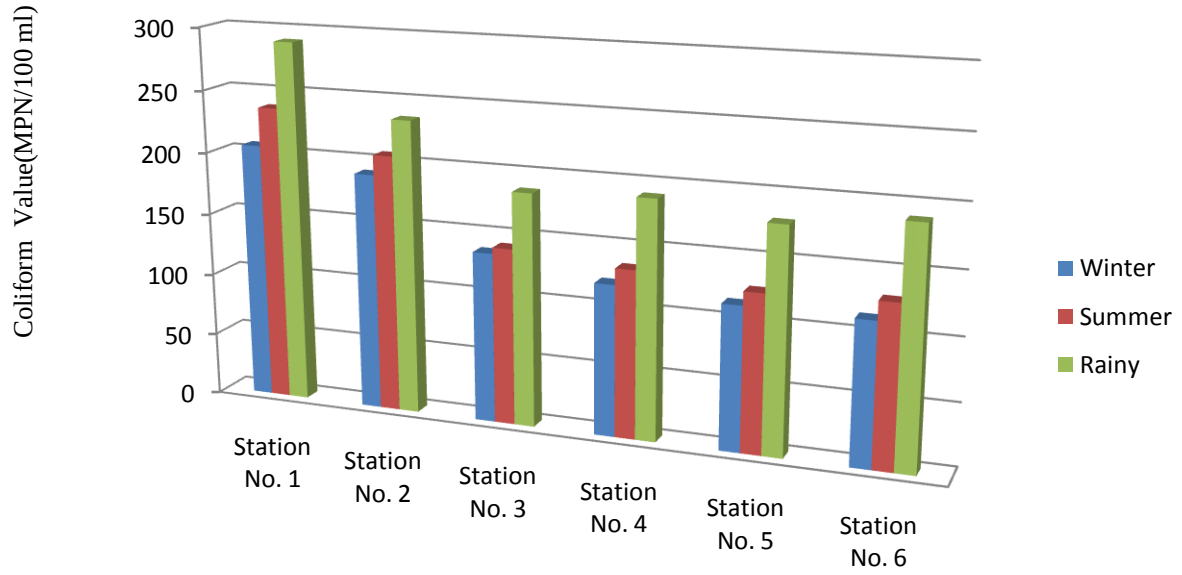
The coliform group thus defined is based on the production of aldehydes from fermentation of lactose. It is customary to report results of the coliform test by the multiple–tube fermentation procedure as a Most Probable Number (MPN) index (APHA 1998). The multiple tube fermentation technique involves inoculating the sample and or its several dilutions in a suitable liquid medium. After incubating for forty-eight hrs. the tubes are examined for gas production by the coliform organisms. This is known as the presumptive test. Since this reaction can be produced by the organism other than coliforms the positive tubes from the presumptive tests are subjected to a confirmatory test. For a very definite presence of coliform bacteria, the complete test is carried out. The density of bacteria is calculated on the basis of positive and negative combination of the tubes using MPN tables.

The observed values (Table No. 1) of MPN per 100 ml varies from station I to VI between 206 to 114 in winter, 237 to 129 in summer and 290 to 189 in rainy season. It is clear that MPN count is highest at station I in all three seasons, which indicates severe pollution. In general the values are maximum during the rainy season; hence coliforms are maximum in river water during this season. On the other hand the minimum values are observed in winter season, therefore, the coliform are found least in this season.

Table No. 1- Seasonal Variation of Microbial pollution of water in Bina River at Sagar (M.P.) (M.P.)

Sampling Station	Winter	Summer	Rainy
Station No. 1	206 ± 7.50	237 ± 2.08	290 ± 21.60
Station No. 2	190 ± 8.16	206 ± 4.78	235 ± 14.71
Station No. 3	136 ± 4.34	141 ± 4.34	186 ± 18.25
Station No. 4	121 ± 3.77	134 ± 7.50	190 ± 18.25
Station No. 5	115 ± 4.76	126 ± 7.50	179± 19.31
Station No. 6	114 ± 2.98	129 ± 12.50	189± 16.00

Fig. No.1. Seasonal Variation of Microbial Pollution in Bina River at Sagar (M.P.)



CONCLUSION:-

The quality of water is typically determined by monitoring microbial presence, especially total coliforms, fecal coliforms and fecal streptococci. The total coliform count coliform count varied in the range of 114 ± 2.98 to 190 ± 8.16 MPN/100 ml, 126 ± 7.50 to 237 ± 2.08 MPN/100ml, 179 ± 19.31 to 290 ± 21.60 MPN/100 ml during winter, summer and rainy season, respectively. The bacteriological parameters investigated during the present course of study indicated that the pollution level has reached to its soar. Results indicated that water is not potable for drinking and other recreational purposes.

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