The Biobrio ISSN : 2393-9508 e-ISSN: 2582-4902
An International Quarterly Journal of Life Sciences
Website: www.thebiobrio.in SJIF 2022:7.34
9 (1&2): 790-793, 2022

Analysis of physicochemical and biological parameters on the quality of Gahari nadi, (Phulout) of Madhepura, Bihar

***Md. Kaishar Alam[1], Arvind Kumar[1] & Arun Kumar[2]**
[1]Department of Zoology, T.P. College, B.N.M.University, Madhepura, Bihar, India
[2]University Department of Zoology, B.N.M.University, Madhepura, Bihar, India

Received : 25th January, 2022 ; Accepted : 4th March, 2022

ABSTRACT

A study was conducted on Gahari nadi using eight parameters pH, Temperature, Total Dissolved Solids (TDS), Turbidity, Nitrate-Nitrogen (NO_3-N), Phosphate (PO_{43}-), Biological Oxygen Demand (BOD), Dissolved Oxygen (DO) measured at six different sites (S1-S6) along the river Narmada. Three methods (Weighted Arithmetic Water Quality Index, National Sanitation Foundation Water Quality Index and Canadian Council of Ministers of the Environment Water Quality Index) were used for calculation of water quality index. This was observed that the water quality was found to be excellent to good in the season summer and winter and poor to unsuitable for human consumption in the season monsoon along the river Narmada. The fall in the quality of water in monsoon season was due to poor sanitation, turbulent flow, soil erosion and high anthropogenic activities.

Key Words - Gahari nadi, Physicochemical and biological parameters

***Corresponding author :** prf.arunkumar@gmail.com

INTRODUCTION

For human and industrial growth, water is considered the primary requirement. Increase in population and industrialization, the demand for freshwater has increased in the last decades. The rivers fulfil this demand, providing water for human life and agricultural purposes. Due to the waste discharged from human and industrial activities, the quality of river water has deteriorated, affecting human and aquatic life. According to WHO, CPCB, BIS, and ICMR, the water quality of about 70% of river water are contaminated due to pollutants in India, and some of the river water is too poor for human consumption (Ramakrishnaiah *et al*., 2009; Jindal & Sharma, 2010). Assessment of the quality of river water using various parameters ways and techniques to protect the river water have been reported in the literature (Santosh *et al.*, 2008). In addition, the water quality index incorporates the different physical, chemical and biological parameters to determine water quality. Finally, Physico-chemical and biological parameters on the quality of water of the Gahari nadi have been performed, discussing the water's suitability for human consumption. The microorganism flora is vast in water and related to fish mainly, with the column living fishes *Labeo rohita*. Water management in fish ponds is one of the vital factors contributory to fish culture's success. Atmosphere plays a vital role in disrupting the balance between the host and also the infectious agent. Micro organisms in aquatic systems, particularly new systems, are utilised as an associate index of the abundance of the microorganism community.

MATERIALS AND METHODS

The river water samples were collected from the selected from different location from Gahari nadi from Oct 2018 to sept 2019 as per standard sampling methods (APHA 2005). The parameters

studied were Temperature, pH, dissolved oxygen, carbon dioxide, total alkalinity, transparency, biological oxygen demand, conductivity, plankton.

Fish samples of *Labeo rohita* were collected from Kosi River, Bhelwa village of Madhepura (village Pond) and a pond from Madhepura town (Town pond). Water samples were collected once a month throughout the study period. Water samples were collected in sterilised chemical reagent bottles each from the surface and bottom for study.

The water of the river and ponds lake was carried out followed the pour and unfold plate technique as expressed in customary ways to examine water and wastewater. Petri dishes were set out; two plates per dilution were tested. Every dilution (0.1ml) was measured into the Petri dishes middle, employing a recent pipette for every dilution. With a sterilised glass rod, the content was unfolded as quickly as attainable and also the medium was also allowed to line. Then the Petri dishes were inverted and kept at 25^0C for 24-48hr. The plates having 30-300 colonies were counted for the viable count. The colony or viable count /ml were calculated by multiplying the standard range of colonies per numerable plate by the reciprocal of the dilution.

A lightweight hurt killed fish samples collected for investigation on the neck region. The slimes were collected by scraping with a sterile surgical knife. Necessary dilution was created in physiological saline (0.85% NaCl) following the denary dilution technique.

The body surface of fish samples was disinfected with alcohol. Their abdomen was opened by antiseptic dissection so the liver was taken out fastidiously with the assistance of a sterilized extractor. The liver samples were weighed in a sterile boat and homogenised to prepare suspension in physiological saline. After that, the rest was diluted with sterile physiological saline.

The excretory organ (Kidney) samples were taken out as same procedure of liver.

RESULTS AND DISCUSSION

Table 1: Physico chemical parameters of River (Gahari nadi, Phulout) Period October 2018 to September 2019

Month	Air temp. (^{O}C)	Water temp. (^{O}C)	pH	DO (ppm)	CO_2 (ppm)	TA (ppm)	Conductivity	Transparency (cm)	BOD (ppm)	Plankton (ml)
Oct' 18	24.5	21	7.6	6	20	202	2.82	36	14.8	0.3
Nov' 18	26.7	17.2	7.5	6	22	216	2.74	33.2	15.8	0.3
Dec' 18	24.2	22.4	7.4	6.4	20	210	2.6	32.6	16.2	0.4
Jan' 19	19.4	16.2	7.6	8	16	196	2.3	29.5	19.2	0.3
Feb' 19	21.6	18.4	7.6	7.6	20	190	2.34	30.5	19.4	0.4
Mar' 19	25.2	24.5	7.9	6.4	14	180	2.4	30.1	20.2	0.4
Apr' 19	27.5	29.5	8.2	6	10	188	2.5	29.5	23.8	0.4
May' 19	34	31	8.5	5.6	8	188	2.66	29.2	25.8	0.3
Jun' 19	34.5	30.5	8.6	5.6	8	186	2.68	29	26.2	0.3
Jul' 19	27	29	8.1	6.4	10	186	2.7	30.2	24.4	0.3
Aug' 19	25.4	27	8	6	12	192	2.8	34	20.4	0.2
Sep' 19	28.4	26.5	7.8	5.6	18	196	2.8	26	18.6	0.2
Average	26.53	24.43	7.9	6.3	14.83	194.16	2.61	30.81	20.4	0.31
SD	4.38	5.3	0.39	0.76	5.14	10.56	0.18	2.68	3.88	0.07

Table 2: Bacterial load in different organs of fish collected from sample site

Month	Bacterial load (x10^7cfu)		
	Slime	Liver	Kidney
Oct' 18	1.06	3.35	2.6
Nov' 18	5.78	6.74	5.29
Dec' 18	3.67	3.88	9.37
Jan' 19	1.32	1.48	4.85
Feb' 19	1.14	2.96	2.45
Mar' 19	5.79	1.44	5.56
Apr' 19	2.05	2.66	2.38
May' 19	2.37	9.64	9.36
Jun' 19	6.85	2.37	5.18
Jul' 19	1.85	4.58	3.04
Aug' 19	1.2	0.23	0.18
Sep' 19	0.15	0.22	0.15
Average	2.91	3.29	4.98
SD	2.26	2.71	2.77

pH

As per different standards proposed by WHO, ICMR, CPCB, and BIS, pH should be between 6.5 to 8.5. pH less than 6.5, it discontinues the making of vitamins and minerals in the human body. More than 8.5 pH values cause the taste of water saltier and cause eye irritation and skin disorder for a pH of more than 11. The rainwater, which has no minerals beneficial for the human body, has a pH of 5.5–6 and is not harmful for drinking purposes. pH in the range of 3.5–4.5 affects aquatic life (Adarsh & Mahantesh, 2006). The pH of the selected site was7.9±0.39, which falls under the permissible range.

Dissolved Oxygen (DO)

The dissolved oxygen reveals the changes that occur in the biological parameters due to aerobic or anaerobic phenomena and signifies the river/ stream water condition for aquatic and human life (Chang, 2005). The aquatic life come in stress due to low values of DO (Cox, 2003). The suitable range of DO mg/l is 5–14.5. for the natural water. The range of DO lies between 4 to 6 mg/l ensuring better aquatic life in the water body. The dissolved oxygen of the selected site was 6.3±0.76, which falls under the permissible range.

Biochemical Oxygen Demand (BOD)

The standard given by CPCB and BIS for BOD is 2–3 mg/l for classes A, B, and C, respectively. BOD is used to determine the requirement of oxygen for stabilizing household and industrial wastes. The effluents disposed of by domestic and industries into the surface and groundwater contaminate the quality of the water, which can be assessed by BOD determination. According to the WHO drinking water standard, BOD should not exceed 6 mg/ l. Three mg/l is the maximum BOD for fisheries (Adarsh & Mahantesh, 2006). The BOD in the present study was found to be 20.4±3.88, which is much higher than the recommendation. However, it may be due to the waste carried in the river from the local areas of agricultural and domestic waste.

Transparency

The increase of turbidity of water results in interference of the penetration of light. This will damage aquatic life and also deteriorate the quality of surface water. For example, in the monsoon season, heavy soil erosion and suspended solids from sewage increase the turbidity, which affects the river and aquatic life (Verma *et al.*, 1984). High turbidity values minimize the filter runs, which cause pathogenic organisms to be more hazardous to human life. The water body's transparency was 30.81±2.68, which is higher than the recommendation may be due to the much organic load in the water body.

The bacterial load in body slime, live and kidney of fish sample collected from river water during Oct 2018 to Sept 2019 was found to vary from 1.91± 1.23x10^7, 2.43± 1.54x10^7, and 3.31± 2.36 x10^7 cfu / ml. The bacterial load in slime, kidney and liver was 2.91±2.26 x10^7, 3.29±2.71x10^7

The correlation of different parameters studied was significantly correlated with body weight; bacterial load in slime was significantly correlated with bacterial load in liver and in kidney and bacterial load in liver was significantly correlated with

bacterial load in kidney. The study revealed that there is an existence of positive correlation of bacterial load in body slime with liver as well as with kidney of *L.rohita*.

REFERENCES

Adarsh, S., Mahantesh, B., 2006. Personal Communication. Resident Doctors of Medicine. Hanagal Shree Kumareshwara Hospital, Bagalkot, Karnataka, India.

APHA (American Public Health Association), 2012. Standard Methods for the Examination of Water and Wastewater, 22nd ed. American Public Health Association, Washington, DC.

BIS (Bureau of Indian Standards) 10500, 2012. Specification for Drinking Water. Indian Standards Institution, New Delhi, pp. 1–55

Brown, R.M., Mcclelland, N.I., Deininder, R.A., Tozer, R.G., 1970. A water quality index: do we dare? *Water Sewage Works* 117 (10), 339–343.

Brown, R.M., McLellend, N.I., Deininger, R.A., O'Connor, M.F., 1972. A water quality index crashing the psychological barrier. *Indic. Environ.Qual.* 1, 173–182

Chang, H., 2005. Spatial and temporal variations of water quality in the Han River and its tributaries, Seoul, Korea, 1993–2002. *Water Air Soil Pollut.* 161, 267–284.

Cox, B.A., 2003. A review of currently available in-stream water quality models and their applicability for simulating dissolved oxygen in lowland rivers. *Sci. Total Environ.* 314–316, 335–37

Jindal, R., Sharma, C., 2010. Studies on water quality of Sutlej River around Ludhiana with reference to physicochemical parameters. *Environ. Monit. Assess.* 174, 417–425.

Ramakrishnaiah, C.R., Sadashivaiah, C., Ranganna, G., 2009. Assessment of water quality Index for the groundwater in Tumkur Taluk, Karnataka State, India. *Electron. J. Chem.* 6 (2), 523–53

Santosh, M., Avvannavar, Shrihari, S., 2008. Evaluation of water quality index for drinking purposes for river Netravathi, Mangalore, South India. *Environ. Monit. Assess.* 143, 279–290

Verma, S.R., Sharma, P., Tyagi, A., Rani, S., Gupta, A.K., Dalela, R.C., 1984. Pollution and saprobic status of eastern Kalinadi. *Limnologia*. 15, 69–133