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HEALTH AND ABILITY OF THE PUNPUN RIVER OF NABINAGAR (BIHAR) WITH SPECIAL REFERENCE TO ITS CONSERVATION

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ABSTRACT

Limnological investigations in the Punpun river of Nabinagar (Bihar) were conducted for one year i.e. January 2018 to December 2018, to study the changing physico – chemical parameters in the river water due to natural and man-made activities. The study revealed that the river water is fit for industrial as well as irrigational purposes but not safe for bathing and drinking purposes. The required management and conservation strategies of river were also studied.

KEYWORDS: Health, Ability, Punpun River, Nabinagar & Conservation

INTRODUCTION

Inland fishery resources of Bihar comprise of about 3200 Km river length of which the Punpun river occupies a length of 200 Km. The river plays a significant role in the biodiversity conservation as well as economic development of the state, in particular and country in general.

River is a dynamic body of water, which flows from higher ground elevation, like hills and mountains, towards lower levels, like the sea. In its journey, it comes across a varied range of terrain, ranging from pebbly highlands to sand – covered alluvial reaches to silty and clayey stretches of the deltaic plains. The velocity of the river also changes from very swift in the hills to placid in the lower plains. (Sen,2006).

Rivers are relatively large lotic water bodies, created by natural processes. Hynes (1979) described rivers as a manifestation of the landscapes that they drain.

The Punpun river is also known as Punah – punah is a holy river of Magadh Division of Bihar. It is famous for Pind Daan and oblation of water to the manes in honour of deceased ancestors. The Punpun takes its rise in the Shobichak and Saraiya village situated on the northern border of Palamu district of Jharkhand State and enters into the district of Aurangabad of Bihar, east of the village Bara. It lies geographically between 24°11´ - 25°25´N latitude and 84°10´ - 85°10´E longitude at 300 meter elevation, having a catchment area of about 8530 square Km. The Punpun is a hilly stream and during its course through the Aurangabad district of Bihar, it is fed by a number of hill torrents, namely the Adri, the Batre, the Batane, the Dhawa, the Kasman, the Ramrekha, the Madar etc. Nabinagar is situated on the left side of the river Punpun, 6 Km north from the place of its origin, forming the southern portion of the Magadh Division which geographically lies at 24°62´ N latitude and 84°12´E longitude. The Punpun after flowing one Km in Palamu district of Jharkhand flows 27.35 Km in Nabinagar area. The Punpun is famous for valuable raw materials for building construction and precious stones like Gomed, Garnet, Sfatick, Mariyam etc. Nabinagar Super Thermal Power Project is also situated near the river.

The study of river has gained immense importance of multiple use of river water. From time immemorial rivers are meeting the multifarious demand of society at the expense of its own ecosystem health (Born, 1999). In recent years

aquatic resources are subjected to increasing anthropogenic stress. Pollution strongly affects the life of aquatic organism depending on physical and chemical characters of aquatic environment. The changes in physico – chemical composition of water may lead to drastic change in the community of aquatic biota, some of which, the others may diminish. Such changes in structure and function of biota form the basis of water quality assessment.

A good number of work has been carried out by many Indian scientists on the ecology of various rivers of India in general and Bihar in particular (Bairoliya, P. K. et al 2010; Das, M. K. et al. 2014; Gopal, 1995; Giri, S. et al. 2008; Joshi, B. D. and Bisht, R.E. 1993; Kaur, S. and Joshi, B.D. 2003; Kumar, A. 2000; Mishra, S.K. 2000; Mishra, B.P. and Tripathi, B.S. 2003;Mukhopadhyay, S.K. 1996; Nath, D. et al. 2007; Nath, D. et al. 2008; Narain, S. and Chauhan, R. 2000; Sinha, R.K. 2006; Singh, M.R. and Gupta, A.2010; and Zafar, A. and Sultana, N. 2008 etc.), but no work has been done on the health and ability of the Punpun river with special reference to its conservation, hence the present studies was mainly confined to provide a baseline data for further advancement in studies. In this respect, the physico – chemical features of the river were studied.

MATERIALS AND METHODS

Water samples were collected during morning (10 – 11 AM) in plastic containers at monthly intervals for a year (Jan, 2018 – Dec, 2018) and taken to laboratory for various physico – chemical analysis. Temperature, pH, Total dissolved solids were chemically fixed on spot. Standard methods prescribed by APHA – AWWA – WEF, 2005; Trivedy and Goel, 1986; WHO, 1993 and Welch, 2009, 2010; were followed for physico – chemical analysis of water samples.

RESULTS AND DISCUSSIONS

The minimum maximum value of various geographical and abiotic parameters of the river Punpun of Nabinagar from January 2018 to December 2018 and their permissible limits is given in Table 1.

Table 1: Various Geographical and Abiotic Parameters of the River PUNPUN of Nabinagar (Jan.2018 – Dec. 2018) and their Permissible Limits All values are in mg L^{-1} except Temperature, Rainfall and pH.

1	Length of the inland fishery resources of Bihar	3200Km
2	Length of the Punpun river	200 Km
3	Length of the Punpun river in Nabinagar area	27.35 Km
4	Catchment area of the Punpun river	8530 Sq. Km
5	Elevation of the river Punpun	300 Meter
6	Elevation of Nabinagar	138 Meter

		Range	Tolerance Limit
7	Min. Temerature (^{o}c)	10.7 –28	10-15.6 (Ave. Temp)
8	Max. Temperature (^{o}c)	24 – 41.9	
9	Rainfall (mm)	3 – 311	
10	pH	7.2 – 8.2	6.5 – 8.5
11	Total solids	1080 – 1310	
12	Dissolved solids	700 – 950	
13	Suspended solids	360 – 380	
14	DO_2	7.2 – 11.8	3
15	Free CO_2	0.95 – 1.95	6
16	Chloride	1.65 2.30	200
17	Total alkalinity	70.8 - 89.5	

Nabinagar geographically lies between 24.62° latitude and 84°12°E longitude at an elevation of 138 meters and from the southern portion of the Magadh Division of Bihar. The climate of Nabinagar is warm in temperature. The summers are much rainy than the winters. During course of investigation, the minimum and maximum temperature ranged between 10.7 – 28 and 24 – 41.9°c respectively. Rainfall ranged between 3 and 311 mm. Maximum rainfall was recorded in the month of July. The water of the river Punpun was found slightly alkaline (7.2 – 8.1). It is obvious that pH 7 is considered to be the most standard for various reaction as well as human beings. The pH limit was found within the acceptable range for various purposes (ISI). Solids (Suspended, dissolved, total) present in water were within the tolerance limit. Suspended and dissolved solids cause turbidity in water. During investigation, it was observed that selting and rainfall increases the turbidity causing less transparency. The value of DO_2 ranged between 7.2 and 11.8 mg L^{-1}. Dissolved Oxygen is a general indicator of water quality which shows the health and ability of the water body. It is source of Oxygen for respiration of aquatic organisms. Organisms have specific requirement of Oxygen. A minimum concentration of 5 mgL^{-1} was considered necessary to maintain the ichthyofauna of the waterbody. During summer, the value of dissolved Oxygen was found to be low while the river flow was slow and the temperature was high. During the course of investigation, free CO_2 ranged between 0.95 and 1.95 mg L^{-1}. The chief source of carbon is free CO_2 of atmosphere and that dissolved in water. Plants and animals also return carbon to the atmosphere as free CO_2. The presence of free CO_2 during course of investigation indicates that the free CO_2 was not utilized by the phyloplanktons. Chloride value ranged between 1.65 and 2.30 mgL^{-1}. Chlorides play metabolically active role in photolysis of water and photophosphorylation reaction in autotrophs. The high concentration of chlorides is an indicator of water pollution that is caused by organic wastes of animal origin or industrial effluents. Chloride concentration was within the permissible limit. Rivers running around the city and industrial belts are under the stress of severe water pollution (Gupta etal. 2002). During course of investigation soil erosion, silting, sewage disposal, industrial wastes disposal, human bathing, cloth washing, cultural activities, open defecation, agriculture and deforestation were observed, thus making an impact of human activities, which were obvious. Sinha (2006) noticed that the Ganga river system is also facing many such challenges, which are likely to intensify in future. Total alkalinity ranged between 70.8 and 89.5 mgL^{-1} which showed decreasing trends in rainy season (July – October). Thus, it may be concluded that the water of the Punpun river is fit for industrial as well as irrigational purpose but unfit for bathing and drinking purpose.

REQUIRED MANAGEMENT / CONSERVATION

There is no doubt that renewable resource like rivers have been damaged to the extent that the vital characteristics of their renewability have become vulnerable. In view of the growing stresses and declining resources, more importance needs to be given to ecological management and evaluation of the resource. The following most important strategies are required for sustainable effective management / conservation of rivers:

- Introduction of broad based research.
- Improved procedure for environment assessment.
- Long term monitoring.
- National and international Coordination.
- Public awareness and participation etc.

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