PHYSICO-CHEMICAL STUDY OF RIVER PARVATI, BARAN DISTRICT, RAJASTHAN

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Abstract: ***Rivers are the largest freshwater system and have great variety of aquatic fauna, specially fishes .River system needs improvement and development as fishes are managed on its water quality .Biodiversity and conservation of any natural water body depends on physical and chemical nature of water. Deterioration of water quality affects the fish community which is environmental challenge. Study of physic-chemical characteristic needs global attention to maintain biodiversity of aquatic fauna. The Parvati River is a tributary of the Chambal River which enters in Baran district from Kariyahat Kasba. With the change of climate all parameters are effected which evaluate the quality of river. Study of physic-chemical characteristic was carried out from the month of September 2017 to May 2018 as per following seasons: Monsoon –September, post monsoon (autumn) October and November, Summer March to May.***
Water from three stations of the River Parvati was collected in each h month. Temperature and pH were studied on the spot and remaining water was analysed in laboratory. Certain important parameters i.e. Biological demand oxygen, Chemical demand Oxygen, Turbidity, Total Alkalinity, Total Hardness, Total dissolved salts were studied.

Index Terms: Biochemical oxygen demand (BOD), Total dissolved solid (TDS), Chemical oxygen demand (COD),Total Alkalinity (TA), Total Hardness (TH).

I. INTRODUCTION

In any aquatic ecosystem quality of water depends on the physic chemical properties. Water analysis parameters play important role on growth and development of biodiversity as fishes. Effluents of industries, agricultural and human activities are emitting toxic substances in water bodies which influence the physical, chemical and biological nature of water (Saxena et.al; 1993, Fokmare et.al; 2002, Jaiswal et.al; 2010, Saha et.al; 2012, Shah et.al; 2015, Gupta et.al; 2017). The Parvati River is most important water source for Baran district. It is significant ecologically because it has very rich fish diversity .Many river's aquatic fauna are under stress due to loads of nitrates, chlorides, organic compounds. Day by day increment in these substances is effecting the water quality (Thirumalas et.al; 2011, Kumari et.al; 2013). Increased water temperature, decreased dissolved oxygen level and pollutants are the main factors which effects the water quality (Bhatt et.al;1992,Desai et.al;1995.Singh et.al;1999,Singh B.N 1999).Thus assessment of water quality as physico -chemical parameters needs constant monitoring .The growth and reproduction of aquatic fauna is affected by these factors. The pollution creates offensive taste, change in level of temperature, pH, dissolved oxygen, biological demand oxygen, Chemical oxygen demand, alkalinity, hardness, turbidity, total dissolved salts which leads disturbance in river. As the production of organic material increases in water which effects the production of fishes. Thus in view of above it was decided to study the water quality of the river Parvati.
The present investigation will bring awareness in people of Baran district and results will guide residents for suitability of water for fishes. Degradation and human interference in the river has created heavy demand for regular study on quality of water.

II MATERIAL AND METHOD

Study Area-

Parvati River is the chief river of Baran. It runs from Kariyahat kasba to Chhabra Tehsil. It is tributary of Chambal river.It is present at east longitude of 75º to 79.5º and north latitude of 24º to 25.60º.
A short study was undertaken from the month of September 2017 to May 2018 to assess the quality of water. Three stations at the river site were selected:
Station S1- Amalavada
Station S2- Kishanganj
Station S3- Digodpar

Collection of water samples-

The sampling stations were visited every month between 8AM to 12 PM on each sampling day and water samples were collected in two DO bottles (300 ml capacity) and one large PVC bottle (two litre capacity).The temperature and pH were noted on the spot but for remaining physico- chemical analysis samples of water were taken to laboratory in ice box jars to avoid unpredictable changes.

Analysis of Physico-Chemical factors-

Average values of physico-chemical parameters of Parvati River water (from Sept2017 to May 2018) were determined using Standard Methods (APHA, 1988).
Glass mercury thermometer and pH meter were respectively used to note temperature and pH on the spot.

Other parameters as dissolved oxygen (by Azide modification method), BOD, COD and total alkalinity (by titrimetric method), total hardness (by EDTA titrimetric method), total dissolved solids (by gravimetric method), turbidity (by Nephelometer).were estimated and compared with standard values.

III. RESULTS AND DISCUSSION-

The result of physico-chemical parameters observed of the Parvati river water during the study period is presented by figure 1.1

Temperature-Changes in temperature of any water body effects the rate of biological growth. Temperature also changes when season and weather changes. The increase in the industrial, agricultural and sewage effluent also change the temperature. The river temperature during study period ranged between 19.9º to 33.0ºC.In the month of September 2017 the temperature noticed was comparatively high due to solar radiation. Downfall in temperature was observed from November to January and after that till May gradual increase was noticed. According to the standard value if the temperature increases more, the cause may be due chemical reaction or biological activities.

pH- pH parameter shows direct effect on aquatic organisms. The biological process, carbon dioxide uptake, variation in dissolved oxygen all depends on pH of the river water. The pH ranged from 7.6 to 8.7 which is almost normal. According to standard value of BIS pH 6.5 to 8.5 is desirable and class A permissible.

Biological Oxygen Demand (BOD) - The growth of fishes and aquatic organisms depend on BOD. The value of BOD is also related to temperature .BOD shows the oxygen needed by bacteria to decompose organic matter of river water. In the month of May the BOD of station 1 and the station 3 were increased due bacteria, micro organisms, organic waste which enters in water body. According to BIS standard value, BOD is 0.3 to 3.5mg per litre and whereas 2.0 mg is appropriate for the growth of fisheries. Water was observed moderately polluted in the month of May.

Chemical Oxygen Demand (COD)- COD of the river water ranged within 6.0mg per litre to 100.0mg per litre .Higher value of COD i September 2017 at S2 station and in May 2018 too high at all stations indicates contamination of river water due to increased inorganic and organic substances.

Total Alkalinity (TA)-For aquatic fauna alkalinity of water protects them from acidic medium. Carbonate, bicarbonate, limestone, rocks, calcium, magnesium are the main cause of alkalinity. The standard value of BIS is 200mg per litre which is suitable range for river. In the month of February at the station S1 was 290mg per litre and then from March till May there was regular increase at all station due to pollution.

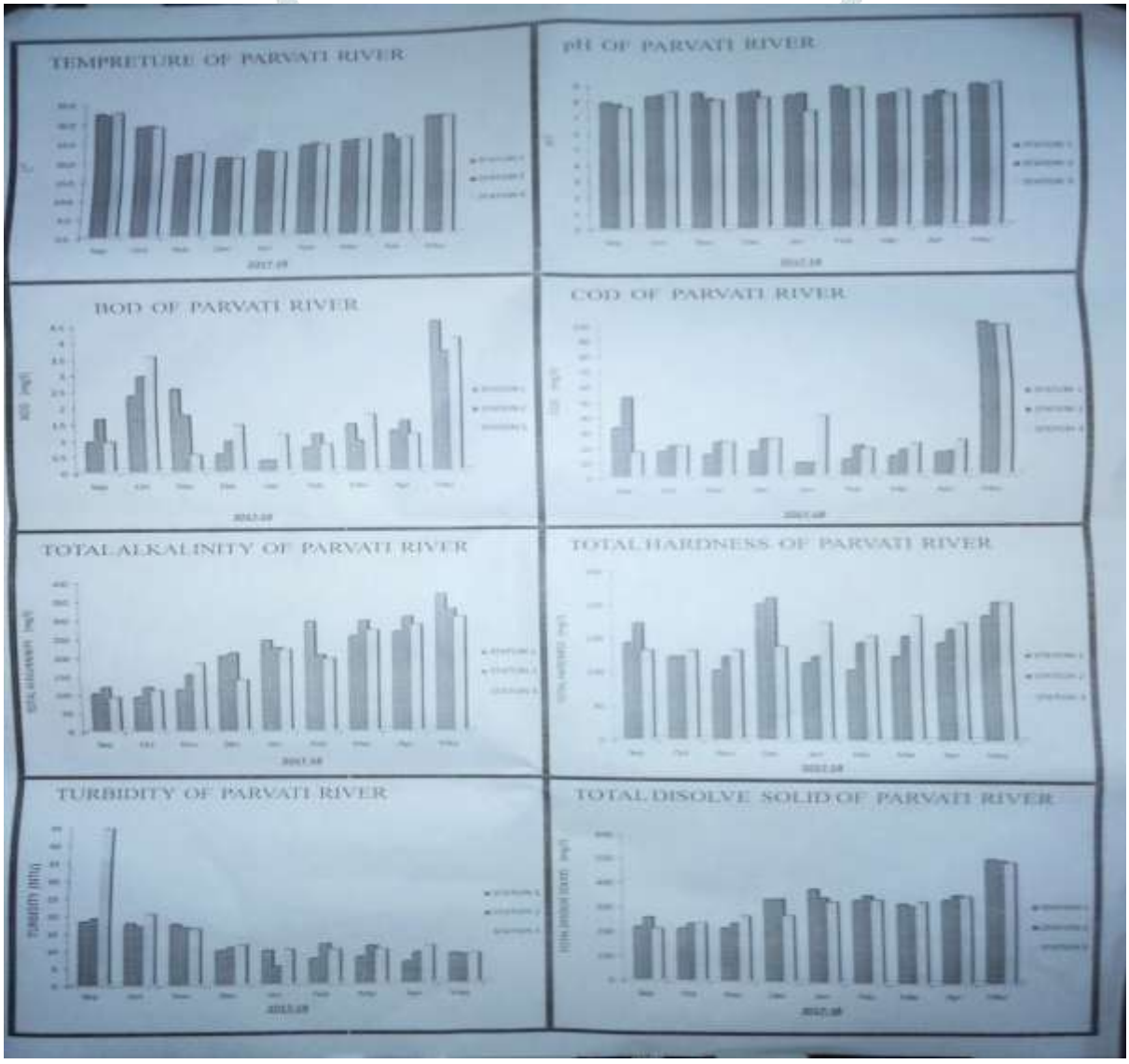

Fig1.1-Results of Physico-Chemical characteristics of Parvati River

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Total Hardness (TH) - The presence of calcium and magnesium concentration indicates the total hardness of the river. The value obtained shows that in the month of December, the hardness of S1 and S2 and in the month of May of all the three stations showed temporary hardness due to increase of bicarbonates and carbonates.

Turbidity- The suspended matter in the water shows the level of turbidity. Organic particles, sand, clay, silt creates turbidity turbidity and affects the fishes. According to BIS desirable value of turbidity is 5 NTU. The value ranged from 4.6 to 45NTU in the month of September and October at all the stations after the rainy season.

Total Dissolved Solid (TDS)-The total dissolved solid from industrial, agricultural medium when reaches in the river then the dissolved salts, minerals, sewage waste, bicarbonates, effect the fishes. According to the Environment Protection Agency and BIS 500 mg/litre is desirable. In the month of May it increased which indicates that water was hard.

IV.CONCULUSION- For successful production of fishes the balance in physical, chemical characters of water of river is essential. The results showed that physico-chemical monitoring was satisfactory but some parameters showed higher range in the month of September and May due to increase of suspended particles from runoff and higher temperature. For the development of any district water is main factor. Assessment of various parameter help in maintaining the quality of river water. During these months few parameters showed higher level due to increase in organic matter and mild pollution. River system can be developed and managed for fisheries by studying several levels as it provides food for rural and urban community and employment for fisherman.

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