PROSPECTS OF FISHERIES POTENTIAL IN MITHILANCHAL WITH SPECIAL REFERANCE TO BIRAUL, DARBHANGA, BIHAR (INDIA)

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ABSTRACT

The ancient Mithila State, referred to as Mithilanchal, is one of the poorest regions of India, having about 8 crore population. The people of this region depend mainly on agriculture, animal husbandry and aquaculture for their lively hood. Fishery is important among them, having prospect to revive the economy, and nutritional demand, if the fish farmers practice the latest scientific methods for the upkeep of numerous water bodies like Rivers, ponds, chaurs and floodplains wetlands or mains etc. This region still runs in great short of fish supply in comparison to demands. The present study is an endeavour to explore the potentiality of water bodies of mithilanchal, The analytical result of water from ten parts of mithilanchal shows that proper farming of fish with proper management of pH, carbonate buffering, proper contents of ammonium, carbondioxide, chlorine, hydrogen sulphide, nitrate, nitrogen, oxygen, phosphorous, calcium carbonate, etc is essential for optimum production of popular carps along with other species of fishes. The findings recorded during represent investigation (pH - 6.15 – 7.65, Conductivity (mhos/cm) - 180 – 240, Dissolved O2 (mg/l) - 5.46 – 6.66, Free CO2 (mg/l) - 2.66 – 4.88, Carbonate alkalinity (mg/l) - 5.85 – 26.14, Chloride (mg/l) - 9.65 – 12.30, Total hardness (mg/l) - 64.15 – 114.25, Calcium (mg/l) - 17.36 – 38.45, Magnesium (mg/l) - 6.65 – 10.25, Sodium (mg/l) - 14.8 – 16.4, Potassium (mg/l) - 1.225 – 1.465, Silicate (mg/l) - 4.76 – 6.22, Phosphate (mg/l) - 0.002–0.004, Nitrate (mg/l) - 0.413 – 0.537) indicates that the prospect of fishery is bright if managed scientifically with proper nutrients and timely application of required chemical compounds.

Key words: *Fresh water, Carp, Climatic factor*

INTRODUCTION

Fish is an important source of animal protein for many households. According to FAO (2007), fish contribute more than 60% of the world supply of protein, especially in the developing countries. India is one of the mega diversity countries with respect to freshwater fish species (650+species). In freshwater fish diversity, India ranks eighth in the world and third in Asia (Kottelat and Whitten 1996).

Presently 26 districts of bihar and Jharkhand is supposed to be mithilanchal which includes large cities like Bhagalpur, Muzaffarpur and Darbhanga. mithilanchal having abundance of

freshwater resource Viz. River, ponds, chaurs, moins etc, has still not been able to tap even 30% of the potential and for fish production. There is immense potential for the production of major carps like rohu, catla, and exotic carps like silver carps, grass carps, common carps; cat fish like singhi, mangur, Tilagria like kowai and some other species.

According to state Fisheries Department North Bihar comprises 821 sq. kms. of wetland areas in the form of lakes (36548 ha), Oxbow lakes (4735 ha) and ponds and swamps (46800 ha) Pandey *et al*., (1998). Bihar is the fourth largest inland fish producing states in India. The total fish production in Bihar is 2.8 lakh tones against the annual requirement of about 4.5 lakh tones. The Indian fish fauna is divided into two classes, viz., Chondrichthyes (cartilage fishes) and Osteichthyes (bony fishes). The chondrychthyes (800 living species) containing the sharks, rays and rat fishes are characterized by a cartilaginous skeleton and are commonly referred to as the cartilaginous fishes. By far the largest extant group is the bony fishes (Osteichthyes 20,000 living species) exhibiting a rich diversity and found in all aquatic habitats.

Reservoirs present a good opportunity for studying the effect of scale on the relative importance of climatic factors that determine diversity. On a broad scale, reservoirs are recent and their communities are a combination of species from the former riverine fish fauna as well as introduced species (Fernando & Holcík 1991; Oliveira & Goulart 2000; Oliveira *et al.*, 2004). In Bihar the fish fauna and the water body in general and flood prone areas in particular are highly mismanaged. It is roughly estimated that nearly 25 per cent of the total geographical area of Bihar is flood prone and 6 per cent of it falls in north- Bihar alone. The river basins of north Bihar is mainly known as Kosi river basin which has the largest flood prone areas (10.80 lakh ha.) and thus, there is the most common saying that 'Kosi is sorrow of Bihar'. The other major rivers of north Bihar are Bagmati, Adhwara group, Kamla Balan, and Kosi. Nearly 70.23 percent of the sub zones are flood –prone.

In Mithilanchal, through water quality shows great suitability for fish production which is evident from the present study, but the unscientific and ignored management of pond in restocking i.e. removed of predators, living, standardizes, of ph, control pesticides, water pollution, pond fertilizer, harvesting and awareness towards financial analysis and proper marketing. Many enhance the potential of fish farming in this region and can remove properly of people apart from nutritional support utilising to fish protects to keep people healthy. The objectives of the present study were to document the fish species in relation to physico-chemical characteristics of water and suggest appropriate conservation and management strategies.

MATERIALS AND METHODS

Description of the Study Area

Kamala reservoir is located at Darbanga district of Biraul near Pokhram village, of Bihar. The reservoir is situated at latitude 260 27' 26.81 North and longitude 860 11' 20.98 East. It is located at an elevation of 601 m above msl. The kamala basin gets the inflows from the north east monsoon (June-September). The catchment area of the study site is about 1.6km at a stretch. The average rainfall of that area is 117 cm to 513 cm. The water of the reservoir is used for fisheries, and

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irrigation. The climate of this area is extreme ends of both warm and cool. The fishes were collected from the kamala reservoir with the help of local fishermen during the year June 2007 to May 2008. The fishes were preserved in 10% formaldehyde solution for taxonomic analysis. Water samples were collected at early hours between 8 am to 10 am and further transported to the laboratory immediately for further analysis. Water temperatures was measured at the time of sampling using mercury thermometer, pH was measured with standard pH meter (Global DPH 500), and the chemical properties viz., EC, dissolved oxygen, organic carbon, organic matter, alkalinity, total hardness, calcium, sodium, nitrates, phosphates, chlorides, silicates, are determined (APHA, 1998; Trivedi and Goel (1984) Identification and economic importance of fishes was carried out with the help of standard literature (Day, 1951; Jayaram, 1981; Datta Munshi and Shrivastava, 1988; Talwar and Jhingran, 1991).

RESULT AND DISCUSSION

Physical status

The water quality data is depicted in **Table1**. Water temperature ranged from 22.150C to 31.350C throughout the study period. Highest water temperature was recorded during summer season (31.350C) whereas least was observed in winter season (22.150C). Turbidity is due to the presence of suspended matter, silt, clay, colloidal particles, plankton, and other microorganisms (Kataria *et al.*, 1996). The pH was observed in the range of 6.15 to 7.65 which indicates that water was slightly alkaline in 26.14 mg/l and bicarbonate alkalinity ranged from 93.5 to 115 mg/l it was highest during summer season. Electrical conductivity (EC) of an aqueous solution is a measure of the ability to carry out an electric current (Parashuram and Singh 2007). EC ranged between 180 to 240mhos/cm. High electrical conductivity was recorded during winter season. This may be due to greater ionic concentration of the inlet flow (Prithwiraj Jha and Sudip Barat 2003).

Chemical status

Dissolved oxygen (DO) is the most important parameter which can be used as an index of water quality, primary production and pollution. DO values ranged from 5.46 to 6.66 mg/l. Minimum values of DO were recorded during monsoon season and maximum during summer months. Minimum DO in months may be due to high metabolic rate of organisms. Maximum DO may be due to low atmospheric temperature. Similar trends were made by Adebisi (1981) and Deshmukh and Ambore (2006). The DO level (75 mg/l) of reservoir water may be favourable for aquatic organisms (Rajashekara *et al.*, 2007). Biochemical oxygen demand has been used as a measure of the amount of organic materials in aquatic solution, which support the growth of micro organisms. Biochemical oxygen demand values ranged from 0.5 to 2.75 mg/l. Maximum values during winter was probably due to presence of high amount of organic matter brought in by the surface run off of heavy rain (Rice 1938). During rainy season, Biochemical oxygen demand values were low; this is because the temperature retards the rate of reproduction of organisms. Total hardness is a measure of the capacity to precipitate soap. It is the sum of the polyvalent cations present in water. The total hardness ranged

from 64.15 to 114.25 mg/l. Maximum hardness was recorded during summer season due to the accumulation of precipitated and evaporated particles which may due to high temperature. The total hardness values were within the permissible limits prescribed by WHO. Chlorides are important in detecting the concentration of ground water by waste water. In the present study, the chloride value ranged between 9.65 and 12.30 mg/l. similar results were observed by Damodharan and Suresh (2005).

Nutrient status

The calcium reflected a high value of 38.45 mg/l during summer and lowest value of 17.36 mg/l during monsoon season, while magnesium was high during summer 10.25mg/l and low 6.65 mg/l during winter. Similar trend was observed in case of sodium which ranged between 14.8 mg/l –16.4 mg/l. Level of potassium and silicate varied between 1.43 mg/l – 4.2 mg/l and 4.54 mg/l – 6.1 mg/l respectively. The level of phosphate and nitrate showed a poor concentration in comparison to subdivision Biraul being in the range of 0.003 mg/l – 0.004 mg/l and 0.42 mg/l – 0.55 mg/l. Nutrients like phosphate, nitrate, calcium, magnesium, and ammonia were in low level, indicates the moderately oligotrophic status of the water body.

Table 1 Physico-chemical analysis of the surface water of river Kamala stretch (site 1) in village Pokhram, Biraul during summer, monsoon and winter season.

Characters	**Summer**	**Monsoon**	**Winter**	**Range**
Appearance	Normal	Normal	Normal	Normal
Water color	LG	DG	DG	NG to DG
pH	6.15 ± 4.02	7.25 ± 4.05	7.65 ± 4.06	6.15 – 7.65 ± 4.00
Temp. (0C)	31.35 ± 1.00	28.55 ± 1.02	22.15 ± 0.12	22.15 – 31.35 ± 1.22
Conductivity (mhos/cm)	220 ± 1.07	180 ± 0.07	240 ± 1.07	180 – 240 ± 0.52
Carbonate alkalinity (mg/l)	26.14 ± 1.10	18.64 ± 2.20	5.85 ± 2.03	5.85 – 26.14 ± 2.22
Dissolved O2 (mg/l)	6.66 ± 1.02	5.466 ± 1.10	6.6 ± 1.02	5.46 – 6.66 ± 2.02
Free CO2 (mg/l)	4.88 ± 1.00	2.66 ± 1.07	3.77 ± 0.6	2.66 – 4.88 ± 1.02
Bicarbonate alkalinity (mg/l)	115.0 ± 2.07	93.50 ± 3.77	104.50 ± 4.0	93.50 – 115.0 ± 4.00
Total hardness (mg/l)	114.25 ± 1.07	76.45 ± 0.50	64.15 ± 0.05	64.15 – 114.25 ± 0.6
Magnesium (mg/l)	10.25 ± 0.05	9.75 ± 0.06	6.65 ± 0.08	6.65 – 10.25 ± 0.10
Chloride (mg/l)	9.65 ± 0.7	12.30 ± 0.8	10.85 ± 0.75	9.65 – 12.30 ± 0.8
Phosphate (mg/l)	0.004 ± 0.05	0.002 ± 0.02	0.002 ± 0.01	0.002 – 0.004 ± 0.2
Calcium (mg/l)	38.45 ± 0.06	33.10 ± 0.04	17.36 ± 0.08	17.36 – 38.45 ± 0.03
Sodium (mg/l)	14.8 ± 0.05	16.2 ± 0.06	16.4 ±	14.8 – 16.4 ± 0.09

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Silicate (mg/l)	6.2 ± 0.052	4.76 ± 0.03	5.2 ± 0.042	4.76 – 6.2 ± 0.06

Apart from agriculture, all other human activities are negligible considering pollution factor in the catchment area agriculture is the main activity with significant usage of fertilizers and pesticides. These pollutants ultimately reach the reservoir due to run off. Even though there is no possibility of a high pesticide level in the reservoir water, in the higher order organism like fishes it becomes significant due to bio magnification. Thus, it shows that there is a great need for measuring the effect of pesticide on aquatic species.

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