

**Limnological and Ichthyological studies of a Temple Pond of Laxmisagar,  
Madhubani, Bihar with special references to its conservation and  
management**

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### **ABSTRACT**

The present investigation was carried out to study the limnological and Ichthyological status of a temple pond of Laxmisagar, Madhubani, Bihar (India) with special references to its conservation and management. The physico-chemical parameters of the pond suggest that the temple pond of Laxmisagar is medium productive and the fish yield of the temple pond can be enhanced, if managed properly on scientific lines. 32 genera of phytoplanktons and 11 genera of zooplanktons were observed in the study area.

**Keywords:** *Limnology, Ichthyology, Conservation, Management.*

### **INTRODUCTION**

In India, inland water in the form of pond, lakes and tanks with potentialities of fish culture is approximately 2.34% of total area (7.5 million hectares) of the country, many of the water bodies contain either unused or not properly used for fish culture due to the lack of adequate scientific know how. In recent year researches conducted by CBRI have revolutionized fish culture in India and a net production of about 85,000 kg/hac/year has been achieved. Now a days fish culture programme is expanding under the pressure of increasing population in India, China, Indonesia, Vietnam, Cambodia, USA and Africa. The cultivation of a number of economically useful species, artificial fertilization of various fish pond, induced breeding, *etc.* has opened new vistas in the fish cultivation programme:

There are a number of studies pertaining to limnology and fisheries of inland water bodies in India (Mahajan and Kunhere, 1996; Kumaraguru, 1997; Kumar and Sharma, 2005; Pal, 2008; Paul and Mukherjee, 2006 and Chaudhary *et al.*, 2010) but scientific information on the limnological and Ichthyological status of the temple pond at Laxmisagar, situated in Bhauwara, (Near Policeline) Madhubani, Bihar with reference to its conservation and management are lacking for commercial exploration of the fishery.

Hence the present study is aimed to give an account of the physico – chemical characteristics of the pond's water and fisheries status of this pond and finally to suggest its conservation and management strategies.

## MATERIALS AND METHODS

Water samples were collected in clean plastic containers at monthly intervals for a year. Water samples were collected at a distance of about 5 meters from the bank at a depth of about 0.25 m. The samples were analyzed for their physico-chemical characteristics according to APHA-AWWA, WPCF (1991), Trivedy and Goel (1986) and Welch (1948). Details of morphometry and hydrology were collected from the public works department, Govt. of Bihar and from the department of fisheries. The fishes were captured by cast net and were fixed in 3% formalin solution. The identification, classification and nomenclature of fishes are based on standard literatures (Day, 1878, 1889; Hamilton, 1822; Jayaram 1981; Talwar and Jhingran, 1991 and Mishra, 2012.)

## RESULTS AND DISCUSSION

The colour of the pond water was light greenish and transparency ranged between 38.0-50.10 cm during course of investigation. Water temperature varied between 15-32.5 C. Parameter of temperature is basically important for its effect on the chemistry and biological reactions in the organisms in water. At elevated temperatures, metabolic activity of the organisms increases, requiring more oxygen but at the same time the solubility of O<sub>2</sub> decreases. The disease resistance in the fishes also decreases with the rise in temperature. The pH of the water ranged between 7.4 – 8.2 which remained alkaline in all the seasons. Total solids and the TDS ranged between 230-285 mg l<sup>-1</sup> and 250.50 mg l<sup>-1</sup> respectively. The bicarbonate alkalinity ranged between 81.10-146.25 mg l<sup>-1</sup>. The hardness was recorded 72.50-142.00 mg l<sup>-1</sup> which was considerably medium. The dissolved O<sub>2</sub> was favorable ranging from 5.6-12.5 mg l<sup>-1</sup> (Table 1). The delineation of physico-chemical parameters given in the foregoing paragraphs tends to suggest that the studied pond is medium productive. The fish yield of the pond, if managed properly on scientific lines can be enhanced.

**Table 1**  
**Physico- chemical characteristics of the Temple pond of Laxmisagar in mg l<sup>-1</sup> except temperature, pH and transparency.**

Sl. No.	Parameters	Ranges
1	Atm. Temperature	13 -- 43 <sup>0</sup> c
2	Colour	Light greenish
3	Water temperature	15-32.5 <sup>0</sup> c
4	Transparency	38-50.10 cm
5	pH	7.4-8.2
6	DO	5.6-12.5
7	Free CO <sub>2</sub>	3.0-15.5
8	Carbonate alkalinity	5.50-32.50
9	Bicarbonate alkalinity	81.10-146.25
10	Hardness	72.50-142.00
11	Chloride	5.50-20.10
12	Total Solids	230-285
13	Total Dissolved solids	20.00-25.50

### Ichthyofauna

Fishing is carried out traditionally by local fishermen obtaining these on leases. Fishing crafts used were wood built small boats. The gears employed were dragnets and

castnets. The ichthyofauna of this pond consisted of 25 species belonging to 11 families. The major carps, minor caps, cat fishes, feather backs, livefish and air breathing fish constitute the fish population of this pond. Among major carps Bhakur (*Catta catla*), Showed maximum representation followed by Rohu (*Labeo rohita*), Naini (*Cirrhinus mrigla*), Grass Carps (*Ctenopharygodon idellus*), common carps (*Cyprinus carpio*) and Silver Carp (*Hypophthalmichthys nobilis*). The common predatory fish were Boari (*Wallago attu*), Tengra (*Mystus spp.*), Garai (*Channa spp.*) Kawai (*Anabas Testudineus*), Bulla (*Glossogobius giuris*), Singhi (*Heteropneustes fossils*). The weed fishes comprised chanari (*Chanda spp.*), Sidhari (*Puntius spp.*). The eradication of predatory weed fishes, undesirable fishes and mixed fish farming are essential.

### Topography of the pond

The shape of the Laxmisagar pond is rectangular, having a water spread area of 3.5 Ha. This pond has a temple on its south side, the statue of goddess Kali facing north. The average depth of this non drainable pond is about 6 m and this pond never dries. This pond is being polluted due to anthropogenic activities like bathing, washing, and disposal of waste water from the west side of the human habitation (Fig. 1).



**Fig.1. The Temple Pond of Laxmisagar, Bhauwara, Madhubani (Bihar)**

Madhubani district is located at a longitude of 25<sup>0</sup>-59' to 26<sup>0</sup>-39' east and the latitude is 85<sup>0</sup>-43' to 86<sup>0</sup>-42' north. Madhubani occupies a total of 3501 sq. kms. area and is under earthquake zone 5. Rainfall varies between 900 mm and 1300 mm. average rainfall in Madhubani district is 1273.2mm. The district has vast low line planes intersected by numerous streams and marshes but traversed also by upland ridges. The land is high in Madhubani. The soil of the district is highly calcareous, a mixture of clay and sand in varying proportions. The soil has negligible proportion of sand and since it can retain moisture, it is suited to paddy and sugarcane cultivation. The district has a rich alluvial plain intersected by numerous rivers and streams coming from the Nepal hills and running parallel to each other from north to south. The important rivers of the district are the little Baghmati, Kamla, Kareh, Balan, and Tilzuga. The climate is generally healthy. Temperature goes up to about 42<sup>0</sup>C and the minimum temperature is 13<sup>0</sup>C, paddy, sugarcane and makhana are the key crops of the district. Pisciculture is known to be one of the main sources of revenue in the District.

**Conservation and Management**

1. A continuous monitoring of water quality should be done to conserve the flora and fauna of this pond.
2. The sewage inflows should be stopped.
3. Washermen to be shifted to other places.
4. Control of weeds physically and by modern methods of biological control to check weed growth.
5. The wading of the cattle in the pond should be stopped.
6. The pond should be exploited properly as a fish resource.
7. The pond should be embanked properly by making brick walls.
8. Soil erosion and silting should be checked by afforestation on the available land in the catchment area.
9. Controlled and reduced use of fertilizers on the fields near pond ecosystem.
10. To provide habitat for bird nesting, feeding and fish spawning.
11. To arouse public awareness to keep the pond clean.

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