



## WATER QUALITY OF TWO CARP CULTURE AGEING PONDS OF LNMU, CAMPUS, DARBHANGA, BIHAR

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### AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author KS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NKP and SK managed the analyses of the study. Author SK managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

Water quality is an important criteria for assessment of the productivity of pond. The study was designed to assess the quality of pond water of Anandbag Pond & Manokamna temple pond of LNMU, Campus, Darbhanga, Bihar, with respect to physico-chemical parameters including turbidity, conductivity, dissolve O<sub>2</sub>, free CO<sub>2</sub>, PH, Potassium, zinc, iron, sodium, chloride & hardness. The results were evaluated and compared with both ponds water quality standards. It is found that based on physico- chemical parameters, both ponds water is not suitable for domestic uses.

**Keywords:** Physico-chemical parameters; pond water; anandbag pond; manokamna temple pond; domestic uses.

### 1. INTRODUCTION

In human health, water has a profound influence and quality of the water supplies, is important in determining the health of individuals & whole communities. Safe water quality is major concern with reference to public health importance as health and was being of human race, is closely tied up with

the quality of water used. Pond water are also facing pollution like other water bodies [1]. Due to discharge of effluents from various industries, domestic water, land agricultural drainage resulting in the degradation of water quality of pond resources [2]. Sewage nitrate & phosphate passing into aquatic bodies causes opportunistic planktons undergo algal bloom using these nutrients which increases BOD

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(Biological oxygen demand). BOD increase the rate of  $O_2$  consumption. So, BOD indirectly major cause of water pollution, during decomposition. DO(dissolved oxygen)levels decreases so aquatic animals die out [3]. Several indices based on limnological parameters have been suggested [4,5] to assess the trophic structure of water bodies. The nutrient enrichment results in diminishing economic, socio and recreational values of pond [6].

Physico-chemical analysis of Amandabag pond and Manokamna temple pond water bodies was done following the standard methods [7,8,9]. Planktons were sampled with a conical planktons net made up of bolting cloth and were counted with the help of plankton counting cell and Identification of plankton were done by observing through the microscope and by using standard keys for plankton identification.

Authors has been undertaken to evaluate the water quality of two ponds of LNMU, Campus, Darbhanga, Bihar is due to these ponds are man made or artificially constructed reservoirs to provide water for irrigation purposes or domestic use. Water quality of these ponds of LNMU Campus Darbhanga became very pathetic due to these water bodies practically receive domestic wastes and drainage water throughout the year.

From the foregoing observations of the physico-chemical parameters, it can be concluded that the present two pond water bodies show the characters of eutrophication. Low dissolved oxygen, high biochemical oxygen demand indicate the eutrophic status of the present two water bodies. A relatively higher concentration of chlorides also indicate the unsuitability of water body for domestic use.

However there is a dearth of literature related to the water quality of Darbhanga, District ponds especially those related to LNMU, Campus, Darbhanga. The present study has been under taken to assess the water quality of two representative ponds of LNMU Campus, Darbhanga, Bihar.

### 1.1 Aim of the Study

The aim of present study was to investigate the effect of water quality on pond productivity and trophic status of Anandbag pond and Manokamna Temple pond of LNMU, Campus, Darbhanga, Bihar. After successful study of water quality of both ponds, to examine the tendency of ponds towards eutrophy.

## 2. MATERIALS AND METHODS

Water sample of ponds was collected in high grade plastic bottles of one litre capacity rinsed with

distilled water, and before collection of water samples, they were rinsed thrice with sample water. The water samples were collected from the surface near the margins of the both ponds between 10 am to 11.30 am. After addition of appropriate preservatives like magnesium sulphate, alkali iodide and sulphuric acid at the sampling sites. The collected water samples were transferred to a water testing laboratory, for analysis of various physicochemical parameters. The guidelines given by [10,11] were followed for water sampling. The Dissolved oxygen (DO) was fixed at selected site and above mentioned [10,11] methods were adopted for the analysis of pond water samples. Some selected parameters were analyzed within 36 hours.

Monthly sample were collected from both pond of L.N.M.U, Campus Darbhanga. Physico-chemical analysis of water was done following the standard methods [7,8,12]. Planktons were sampled with a conical planktons net made up of bolting cloth (No. 21) and were counted with the help of plankton counting cell and Identification of plankton were done by observing through the microscope and by using standard keys for plankton identification.

## 3. RESULTS AND DISCUSSION

Physico-chemical analysis of water of two carp culture ageing ponds water has been summarised in Table 1. The concentration of zinc, hardness and conductivity were more in Manokamna temple pond. Potassium, iron and chloride were higher in Anandbag pond during period of investigation (year, 2012-2013) whereas turbidity, dissolve  $O_2$ , free  $CO_2$  and PH were showing near about equal for both the ponds.

Biological quality of water were evaluated interms of Nygaard's status induces. Nygaards [13] proposed fine indices mentioned in Table 2. Nygaard's trophic status indices were based on specific taxon. So chlorophyceae, Cynophyceae and compound indices can't be applied on the present study. Physico-chemical parameter's in the year, 2013 of the study as compared with 2012 showed marked increase indicating that input & nutrients is more in both ponds than its assimilating capacity accord with Odum, [14]. Accumulation of nutrients is the over fertilization of water body i.e. eutrophication. Increased chloride content of Manokamna Temple pond collaborating the findings of [15-19]. Hardstedt [20] observed zinc & iron concentration in zooplankton & it may be the higher concentration of iron in Anandbag pond it may be attributed to grater abundance of zooplankton (Table 4). In the present investigation only two indices proposed by Nygaard's [13] could be

**Table 1. Physico- chemical analysis of the Anand Bag pond (ABP) and Manokamna temple pond(MTP) of LNMU, Campus, Darbhanga, Bihar (Mean value)**

Sl. No.	Parameters	AB Pond, 2012	AB Pond, 2013	MT Pond,2012	MT Pond, 2013
1.	Hardness (Mg/L)	59	61.5	62.5	63
2.	Chlorides (Mg/L)	60.36	54.68	44.35	51.14
3.	Iron (Mg/L)	0.23	0.15	0.2	0.15
4.	Turbidity	17.6	18	20.5	19.5
5.	Conductivity	0.33	0.34	0.44	0.45
6.	Dissolve O <sub>2</sub> (ppm)	5.9	6.5	6.3	6.2
7.	Free CO <sub>2</sub> (ppm)	30	31	29.6	29.8
8.	PH	5.4	5.8	5.36	5.6
9.	Sodium (Mg/L)	5.3	5.8	5.36	5.8
10.	Potassium (Mg/L)	6.29	6.6	5.79	6
11.	Zinc (Mg/L)	0.092	0.093	2.7	2.6

**Table 2. Nygaards trophic status indices (1949) Index of Anand Bag pond (ABPond) and Manokamna Temple pond (M T Pond) of LNMU Campus, Darbhanga, Bihar**

	AB Pond 2012	AB Pond 2013	MT Pond 2012	MT Pond 2013
Bacillariophycean	0-0.4	0-1.6	0.25	0.33
Euglenophyta	0-0.3	0.1	0.4	--
Cynophycean	0-0.4	0.1-0.4	---	--
Chlorophycean	0-0.6	0.2-8	---	--
Compound	0.01-1	1.2-2.6	---	--

**Table 3. Phytoplankton diversity of the Anandbag ponds(ABP) and Manokamna Temple pond(MTP)of LNMU campus. Darbhanga, Bihar**

Zooplanktons	ABP, 2012	ABP, 2013	MTP,2012	MTP,2013
Chlorophyceae	5	4	5	6
Bacillariophycea	3	4	5	5
Cynophyceae	3	4	4	4

**Table 4. Zooplankton diversity of Anandbag ponds (ABP) and Manokamna temple pond (MTP)of LNMU, Campus Darbhanga, Bihar**

Zooplanktons	ABP, 2012	ABP, 2013	MTP,2012	MTP,2013
Rotifers	05	05	06	06
Cladacera	04	05	05	06
Copepods	02	01	02	02

applied viz. Euglenophyceae and Bacillariophyceae (Table 2). On the basis of Bacillariophyceae index Anand bag pond under oligotrophic status where Manokamna temple pond indicated mild pollution. Similarly on the basis of Euglenophycean index, Anand bag pond suffer from mesotrophic & Manokamna temple pond oligo trophic status. In this way we come to conclude that both ponds more towards eutropy.

In summary, zinc, hardness, and conductivity were higher in Manokamna temple pond, while potassium, chloride and iron were higher in Anandbag pond during the course of study. where as turbidity, dissolve O<sub>2</sub>, free CO<sub>2</sub> and PH were showing near about equal for both the ponds. In general, Limnological conditions in the fish Culture pond in fact affected the development of the different components of the plankton population during the period analysed. Future studies aiming at evaluating

the effect of adequate management of water quality on planktonic population are thus encouraged.

#### 4. CONCLUSION

From the above results and discussion it could be concluded that water quality of the Anandbag pond and Manokamna Temple ponds are not suitable for fish culture as well as domestic purposes. The excessive pollution of both ponds water is mainly due to the unprotected Bank of ponds, drainage connection, disposal of domestic wastes, washing of cattle and lack of social awareness. People of this region will care for the proper and better upkeeps of both ponds for the purpose of fish farming and economy.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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