WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 10, 1035-1037. Case Study ISSN 2277–7105

IMPACT OF URBANIZATION ON THE HYDROBIOLOGY OF ANCIENT SILK CITY PONDS: A CASE STUDY OF BHAGALPUR, BIHAR

Dr. Priyama Kumari*

University Department of Zoology, T.M. Bhagalpur University, Bhagalpur, Bihar.

Article Received on 15 April 2026,
Article Revised on 05 May 2026,
Article Published on 16 May 2026,

https://doi.org/10.5281/zenodo.20205497

***Corresponding Author**

Dr. Priyama Kumari

University Department of Zoology, T.M. Bhagalpur University, Bhagalpur, Bihar.

How to cite this Article: Dr. Priyama Kumari*. (2026). Impact of Urbanization on The Hydrobiology of Ancient Silk City Ponds: A Case Study of Bhagalpur, Bihar. World Journal of Pharmaceutical Research, 15(10), 1035–1037.
This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

Urban freshwater bodies in historical cities like Bhagalpur face significant ecological degradation due to rapid population growth and inadequate waste management. This study evaluates the hydrobiological status of two perennial ponds—Sahjangi and Bhairwa—situated in the heart of the "Silk City". Analysis of physico-chemical parameters and plankton density indicates a shift toward eutrophic conditions. Increased levels of average BOD (4.42 mg/l) and COD (5.80 mg/l) reflect a high organic load resulting from urban runoff and domestic discharge. The study highlights the urgent need for integrated pond management to preserve these vital urban ecosystems.

KEYWORDS: Ponds, Hydrobiological, Temperature.

1. INTRODUCTION

Bhagalpur, known globally as the "Silk City," is one of the oldest settlements on the banks of the River Ganges. Historically, the city’s numerous ponds served as the primary source for groundwater recharge, domestic use, and traditional aquaculture. However, the last few decades have seen a paradigm shift in the hydrobiology of these systems. As urbanization accelerates, these ponds have transitioned from pristine water bodies into "urban sinks," receiving untreated sewage, solid waste, and nutrient-rich runoff from the surrounding catchment areas.

The hydrobiology of an urban pond is a reflection of the city's environmental health.

Excessive nutrient loading, particularly Nitrogen and Phosphorus from domestic detergents and sewage, leads to accelerated primary productivity, often resulting in harmful algal blooms and oxygen depletion. This process, known as cultural eutrophication, alters the species composition of both phytoplankton and zooplankton, favoring pollution-tolerant taxa.

In Bhagalpur, ponds like Sahjangi and Bhairwa are not just ecological entities but socio-economic assets for the local fishing communities. The impact of urbanization on these ponds is multifaceted, affecting water transparency, dissolved oxygen levels, and the overall biotic integrity. This research provides a critical assessment of how urban stressors influence the limnological profile of these ancient water bodies, offering data-driven insights for urban planners and environmentalists.

2. MATERIALS AND METHODS

- Study Area: The study focused on Sahjangi Pond (West Bhagalpur) and Bhairwa Pond (Central Bhagalpur, 25°14'47"N, 86°57'13"E). Bhairwa is a domestic pond used for cattle bathing and fisheries.
- Water Quality Analysis: Standard methods (APHA) were used to analyze 18 parameters including Turbidity, Total Dissolved Solids (TDS), BOD, and COD.
- Hydrobiological Monitoring: Monthly monitoring was conducted from January 2021 to December 2022 to capture seasonal fluctuations.
- Planktonic Study: Samples were filtered through a bolting silk net (No. 30) and identified using standard keys.

3. RESULTS AND DISCUSSION

The data reveals that urban encroachment has significantly influenced the chemical signature of the water. High TDS (average 84.33 mg/l) and low transparency levels (average 55.33 cm) suggest a high influx of suspended solids from urban runoff.

Table 1: Hydrological Status.

Parameter	Bhaiwa (Avg)	Sahjangi (Avg)	Status/Indication
Transparency	55.33 cm	59.33 cm	Moderate; influenced by runoff
pH	7.29	7.34	Slightly alkaline
DO	6.09 mg/l	6.13 mg/l	Healthy oxygen levels
BOD	4.42 mg/l	4.42 mg/l	High organic load
COD	5.80 mg/l	5.83 mg/l	Chemical/organic pollution
TDS	84.33 mg/l	84.67 mg/l	Reflects urban encroachment
Hardness	125.41 ppm	127.13 ppm	Moderately hard

Representative average values derived from seasonal ranges in thesis data.

3.1 Biological Integrity and Plankton Diversity

A total of 18 zooplankton species were recorded, categorized into Rotifera (44%), Cladocera (37%), Copepoda (13%), and Ostracoda (6%). The dominance of Rotifera species like Brachionus calyciflorus and Keratella tropica is a biological indicator of the high organic enrichment typical of urban ponds.

3.2 Statistical Correlations of Stress

Pearson correlation analysis highlighted critical ecological relationships:

- Temperature vs. DO: A strong negative correlation (-0.738) indicates that as urban heat increases water temperature, oxygen availability drops, stressing fish populations.
- BOD and COD: Both values remain within "optimum" ranges for aquaculture (<10 mg/l) but are near the threshold where increased urbanization could lead to septic conditions.

4. CONCLUSION

While both Sahjangi and Bhairwa ponds currently maintain a delicate chemical equilibrium suitable for aquaculture, the indicators of urban stress are evident. High phosphate and nitrate levels, coupled with the dominance of pollution-tolerant rotifers, signify ongoing eutrophication. To preserve these ancient "refuges," the study recommends strict regulation of sewage discharge and the implementation of green buffer zones around the pond catchments.

REFERENCES

1. Kumari, P. (2023). Study of Primary Productivity of Fish Ponds of Bhagalpur, Bihar. Ph.D. Thesis, T.M. Bhagalpur University.
2. APHA (2017). Standard Methods for the Examination of Water and Wastewater.
3. Boyd, C.E. (1982). Water Quality Management for Pond Fish Culture.
4. Odum, E.P. (1963). Ecology.
5. Wetzel, R.G. (2001). Limnology: Lake and River Ecosystems.