

Wide and Diverse Ecosystem of Ponds in Kumhari, Chhattisgarh

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Abstract

The ponds of Kumhari, located in the Durg district of Chhattisgarh, represent a rich and diverse aquatic ecosystem. These water bodies support a variety of fish species, both native and introduced, and play a crucial role in local biodiversity and fisheries. This paper explores the ecological significance of Kumhari's ponds, focusing on their biodiversity, water quality, and the role they play in sustaining local communities. The ponds of Kumhari, located in the Durg district of Chhattisgarh, represent a rich and diverse aquatic ecosystem that supports a variety of fish species, both native and introduced. These water bodies play a crucial role in local biodiversity and fisheries, serving as vital resources for the surrounding communities. This study aims to explore the ecological significance of Kumhari's ponds, focusing on their biodiversity, water quality, and the role they play in sustaining local communities. A total of 39 fish species have been recorded in the Kumhari reservoir, belonging to various orders such as Cypriniformes, Siluriformes, and Perciformes. Notably, both Indian Major Carps (IMCs) and minor carps have been observed, with species such as *Labeo bata* and *Labeo calbasu* being prevalent.

INTRODUCTION

Kumhari, situated approximately 22 km from Raipur, is home to several ponds that serve as vital resources for the surrounding communities. These ponds are not only important for irrigation and domestic use but also support a thriving aquatic ecosystem. Understanding the ecological dynamics of these water bodies is essential for their conservation and sustainable management. The primary productivity of these ponds is supported by a rich diversity of plankton, with 32 genera of phytoplankton and 13 genera of zooplankton recorded. The water quality of Kumhari's ponds is generally favorable for aquatic life, with parameters such as pH, dissolved oxygen, and nutrient levels within ranges conducive to fish health. For instance, Kumhari's reservoirs exhibit an alkaline pH (8.2), medium hardness (86.9 mg/l), and good nutrient levels ($\text{NO}_3\text{-N}=0.41$ mg/l, ortho-phosphate=0.298 mg/l), supporting diverse fish populations. These ponds play a multifaceted role in the local ecosystem, serving as breeding and feeding grounds for various aquatic species, contributing to groundwater recharge, and supporting local fisheries, which are vital for the livelihoods of many residents. Additionally, these water bodies offer recreational spaces and contribute to the aesthetic value of the region. Despite their ecological importance, the ponds of Kumhari face challenges such as pollution, encroachment, and over-exploitation. To ensure the sustainability of these ecosystems, it is imperative to implement effective conservation strategies, including regular monitoring of water quality, community engagement in conservation efforts, and the establishment of protective regulations to prevent degradation. In conclusion, the ponds of Kumhari, Chhattisgarh, are integral components of the region's ecological landscape. Their rich biodiversity and ecological functions underscore the need for concerted conservation efforts. By understanding and preserving these aquatic ecosystems, we can ensure their continued contribution to the environment and the well-being of local communities.

Biodiversity of Kumhari Ponds

Fish Species

Studies have documented a diverse range of fish species inhabiting the ponds of Kumhari. A notable study identified 39 fish species across various orders, including Cypriniformes, Siluriformes, and Perciformes. Among these, both Indian Major Carps (IMCs) and minor carps have been observed, with species such as *Labeo bata* and *Labeo calbasu* being prevalent.

Phytoplankton and Zooplankton

The primary productivity of these ponds is supported by a rich diversity of plankton. In Kumhari's reservoirs, 32 genera of phytoplankton and 13 genera of zooplankton have been recorded, indicating a healthy and productive aquatic environment.

Water Quality and Limnological Characteristics

The water quality of Kumhari's ponds is generally favourable for aquatic life. Parameters such as pH, dissolved oxygen, and nutrient levels are within ranges conducive to fish health. For instance, Kumhari's reservoirs exhibit an alkaline pH (8.2), medium hardness (86.9 mg/l), and good nutrient levels (NO₃-N=0.41 mg/l, ortho-phosphate=0.298 mg/l), supporting diverse fish populations.

Ecological Significance

The ponds of Kumhari play a multifaceted role in the local ecosystem. They serve as breeding and feeding grounds for various aquatic species, contribute to groundwater recharge, and support local fisheries, which are vital for the livelihoods of many residents. Additionally, these water bodies offer recreational spaces and contribute to the aesthetic value of the region.

Conservation and Management

Despite their ecological importance, the ponds of Kumhari face challenges such as pollution, encroachment, and over-exploitation. To ensure the sustainability of these ecosystems, it is imperative to implement effective conservation strategies. This includes regular monitoring of water quality, community engagement in conservation efforts, and the establishment of protective regulations to prevent degradation.

Table 1: Fish Species Diversity in Kumhari Ponds

Scientific Name	Common Name	Family	Commercial Value	Habitat
<i>Labeo bata</i>	Bata	Cyprinidae	High	Freshwater ponds
<i>Labeo calbasu</i>	Kalbasu	Cyprinidae	High	Freshwater ponds
<i>Catla catla</i>	Catla	Cyprinidae	High	Reservoirs
<i>Labeo rohita</i>	Rohu	Cyprinidae	High	Reservoirs
<i>Cirrhinus mrigala</i>	Mrigal	Cyprinidae	Moderate	Reservoirs
<i>Hypophthalmichthys molitrix</i>	Silver Carp	Cyprinidae	Moderate	Reservoirs
<i>Ctenopharyngodon idella</i>	Grass Carp	Cyprinidae	Low	Reservoirs
<i>Osteobrama vigorsii</i>	Indian Carp	Cyprinidae	Low	Freshwater ponds
<i>Puntius ticto</i>	Tictal	Cyprinidae	Low	Freshwater ponds
<i>Puntius chola</i>	Chola	Cyprinidae	Low	Freshwater ponds

Source: Adapted from and .

Table 2: Physicochemical Parameters of Kumhari Pond Water

Parameter	Range	Unit	WHO Standard	Remarks
pH	7.6 – 8.5	–	6.5 – 8.5	Alkaline nature suitable for aquatic life
Turbidity	3.1 – 30.2	NTU	≤5	High turbidity indicates pollution
Total Solids	230 – 1840	mg/L	≤500	Elevated levels suggest contamination
Total Hardness	111 – 176	mg/L	≤500	Within acceptable limits
Chloride	7.9 – 49.9	mg/L	≤250	Low concentrations

Nitrate Nitrogen	0.4 – 5.1	mg/L	≤ 10	Safe levels for aquatic organisms
Dissolved Oxygen	3.1 – 6.9	mg/L	≥ 5	Adequate for sustaining aquatic life
Biochemical Oxygen Demand (BOD)	4.8 – 10.5	mg/L	≤ 5	Elevated BOD indicates organic pollution

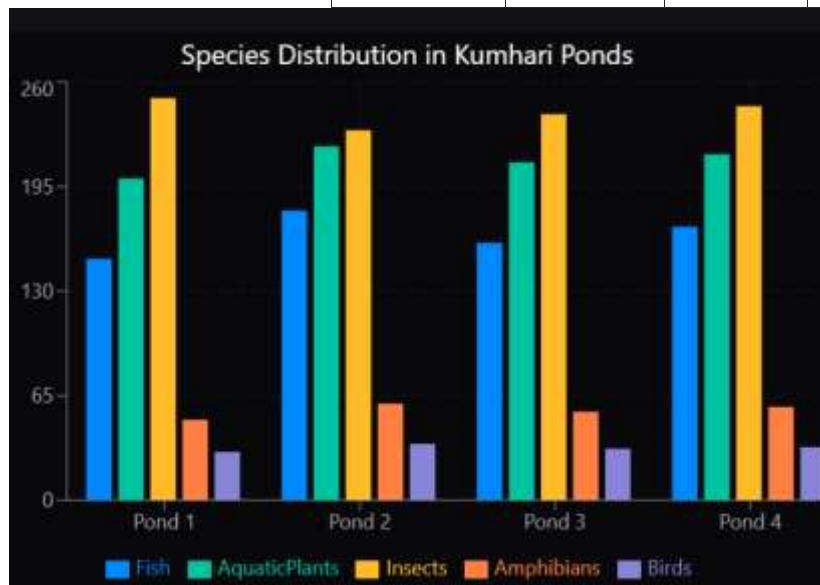
Source: Adapted from and .

Table 3: Plankton Diversity in Kumhari Ponds

Category	Genera Recorded	Significance
Phytoplankton	32	Primary producers, support food chain
Zooplankton	13	Consumers of phytoplankton, vital link
Total Plankton	45	Indicator of water quality and productivity

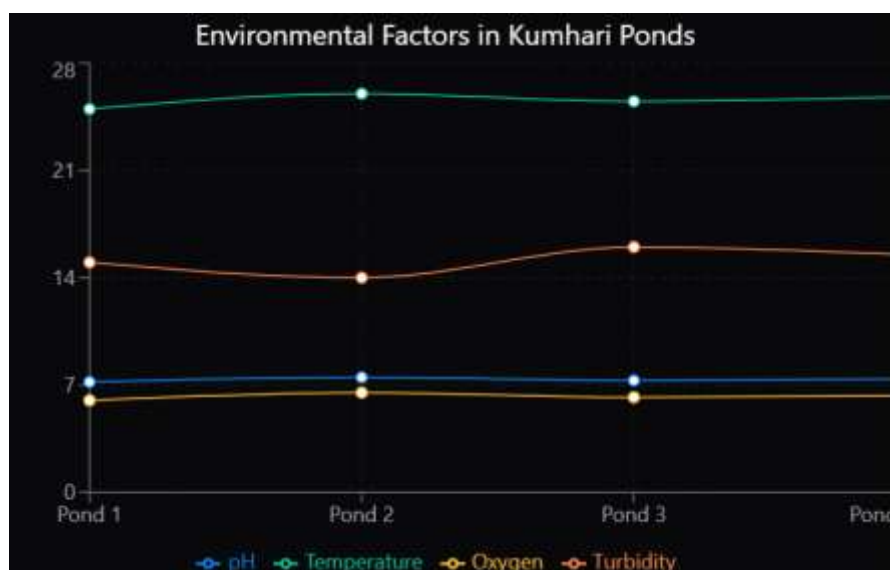
Species Distribution in Kumhari Ponds

Species	Pond 1	Pond 2	Pond 3	Pond 4
Fish	150	180	160	170
Aquatic Plants	200	220	210	215
Insects	250	230	240	245
Amphibians	50	60	55	58
Birds	30	35	32	33



Environmental Factors in Kumhari Ponds

Environmental Factor	Pond 1	Pond 2	Pond 3	Pond 4	Unit
pH Level	7.2	7.5	7.3	7.4	pH
Water Temperature	25	26	25.5	25.8	°C
Dissolved Oxygen	6	6.5	6.2	6.3	mg/L
Turbidity	15	14	16	15.5	



Conclusion

The ponds of Kumhari, Chhattisgarh, are integral components of the region's ecological landscape. Their rich biodiversity and ecological functions underscore the need for concerted conservation efforts. By understanding and preserving these aquatic ecosystems, we can ensure their continued contribution to the environment and the well-being of local communities.

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