



COMPARATIVE ACCOUNT ON SOME WATER PARAMETERS AND GASTROPODS COMPOSITION OF CHULBANDH DAM AND KUADHAS RIVER OF GONDIA MAHARASHTRA INDIA.

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Abstract

Phylum Mollusca is much diversified and exists in various environments as marine water, fresh water, estuarine water, wetlands and on land. Class Gastropoda includes soft bodied animals with univalve, spirally coiled shell. Freshwater gastropods play important role in food chain and water clearance thus enabling diverse species habitation in water body. Some species are used as food by human also, but some are transmitters of nematode and parasitic infections. This study examines the composition of gastropods in the Kuadhas river and Chulbandh dam in the Gondia region of Maharashtra. It also assesses the water quality of these bodies, as low quality poses a threat to the survival of these animals. 9 species of gastropods belonging to 2 order and 5 families were found. All nine species were found in Kuadhas river with descending order of dominance are *Thiara tuberculata*, *Thiara granifera*, *Bellamyia bengalensis* form *typica* and form *mandiensis*, *Bellamyia dissimilis*, *Gabbia orcula* var. *producta*, *Indoplanorbis exustus*, *Gyraulus convexiusculus*, *Lymnea acuminata*. 5 species found in Chulbandh dam were with dominance of *Bellamyia bengalensis* form *typica*. Other four species were rare including *Bellamyia bengalensis* form *mandiensis*, *Indoplanorbis exustus*, *Gyraulus convexiusculus* and *Lymnea acuminata*.

Keywords: Freshwater Gastropods, Chulbandh dam, Kuadhas River, Gondia

Introduction

After insects, molluscs make up the second-largest group of animals in the entire animal kingdom. The study of malacofauna constitutes an important aspect of biodiversity study in a particular geographical region. The phylum is much diverse and highly resilient and exist in all ecosystems except the air. Class Gastropoda of phylum Mollusca includes soft bodied animals with univalve, spirally coiled shell. Shell of molluscs exhibits various characters that helps for taxonomical identification of them. They act as prey for many species of birds and small animal predators of other invertebrates or as scavengers. (Sánchez, O et al., 2021). The water quality of the water body is enhanced due to the presence of malacofauna in it as clean and clear water comes out of the molluscan body by a filter-feeding mechanism. Light penetration is possible in such water and ample aquatic vegetation can grow. Mollusks are bioindicators that help ecologists to judge the health of an ecosystem. (Kumar, R et al., 2019). Several snails and slug species are also important from a medical point of view since they can act as first hosts of several trematode worms or being transmitters of nematodes and parasites. (Sánchez, O et al., 2021). Juveniles of molluscs are quite sensitive to the chemical and physical characteristics of water. (Cummings, K.S. et al., 2016). Research has been done in various regions of Maharashtra on molluscan diversity and effects of various water parameters on them. Since

there hasn't been any prior research on molluscan diversity in this area, the current study was conducted to investigate the diversity of gastropods in the water reservoirs of the Gondia district.

Materials and Methods

Gondia is regarded as the entry point to Maharashtra from central and eastern India and is situated quite close to the states of Madhya Pradesh and Chhattisgarh. The Gondia District has extremely high summer temperatures,

extremely low winter temperatures, and an average relative humidity of 62 percent. Built across the Chulbandh River close to Goregaon, the Chulbandh Dam is an earth-fill construct.

The dam's attractive feature is the rain-fed water within the verdant hills' catchment. It is located 21.2288407° N and 80.2235413° E. A sub-tributary of Bagh, the Kuadhas river rises in the Darekasa mountains and runs through the district.



Figure 1: Location of study area (A) Chulbandh dam (B) Kuadhas river of Gondia district Maharashtra India.

Malacofauna study and water sample analysis was conducted from May 2023 to December 2023. Quantification of malacofauna was done by the quadrat sampling method (Christian and Harris 2005). Molluscs shells were collected by hand picking method from littoral zone of water bodies. No live molluscs were collected during study. Shells after proper washing and cleaning were used for the identification of species. Species identification was done by using standard keys Subba Rao N. V.(1989), Ramkrishna and Dey (2007). Water sample was analyzed for temperature, pH, color, turbidity, total dissolved solids, total hardness, alkalinity, free carbon dioxide, dissolved oxygen, silica,

phosphate, sulphate and nitrate contents of water body. Analysis was carried out by following standard protocols (APHA, 1998; Trivedi and Goel 1984).

Result and Discussion

Water analysis: During the study period physicochemical parameters recorded of Chulbandh water body are temperature ($27.1 - 32.0^{\circ}\text{C}$), pH (7.19- 7.54), Color was found below quantification limit, Turbidity (0.4 -1.97 NTU), Phosphate (BQL -0.29 mg/L), Sulphate (1.33 – 5.91 mg/L), Nitrate (1.34 – 4.92 mg/L), Total Dissolved Solids (58- 94 mg/L), Alkalinity (25 – 44 mg/L), Total Hardness (35 – 50 mg/L), Dissolved Oxygen (6.00-6.70mg/L),

Silica (2.38- 4.87 mg/L), Free CO₂ (3.09 – 5.28 mg/L). Kuadhas river water properties found were are temperature (26.2 – 34.2⁰C), pH (7.15- 7.32), Color was found below quantification limit, Turbidity (1.5 -2.61 NTU), Phosphate (BQL -0.30 mg/L), Sulphate (8.73 – 10.38 mg/L), Nitrate (1.14 – 3.86 mg/L), Total

Dissolved Solids (82- 224 mg/L), Alkalinity (42 – 104 mg/L), Total Hardness (45 – 130 mg/L), Dissolved Oxygen (5.50- 6.80mg/L), Silica (BQL- 4.24 mg/L), Free CO₂ (3.17 – 7.04mg/L). All tested parameters are found within permissible limits (APHA, 1998; Trivedi and Goel 1984).

Table 1. Physicochemical Analysis of Chulbandh dam and Kuadhas river in Gondia District Maharashtra India

Water Parameters	Chulbandh Dam		Kuadhas River	
	Minima	Maxima	Minima	Maxima
Temperature (⁰ C)	27.1	32.0	26.2	34.2
pH	7.19	7.54	7.15	7.32
Color(Hazen)	BQL(QL=1)	BQL(QL=1)	CU BQL(QL=1)	BQL(QL=1)
Turbidity (NTU)	0.4	1.97	1.5	2.61
Phosphate (mg/L)	BQL(QL=0.1)	0.29	BQL(QL=0.1)	0.30
Sulphate (mg/L)	1.33	5.91	8.73	10.38
Nitrate (mg/L)	1.34	4.92	1.14	3.86
Total Dissolved Solids (mg/L)	58.00	94.00	82.00	224.0
Alkalinity (mg/L)	25.00	44.00	42.00	104.00
Total Hardness (mg/L)	35.00	50.00	45.00	130.0
Dissolved Oxygen (mg/L)	6.00	6.70	5.50	6.80
Silica (mg/L)	2.38	4.87	BQL(QL=0.2)	4.24
Free CO ₂ (mg/L)	3.09	5.28	3.17	7.04

Gastropods composition:

Kuadhas river has greater composition of molluscs than that of Chulbandh Dam. All nine species of gastropods belonging to 2 orders and 9 families were recorded from Kuadhas river. *Thiara tuberculata* was the most dominant species found at this site followed by *Thiara granifera*, *Bellamyia bengalensis form typica* and form *mandiensis*, *Bellamyia dissimilis*, *Gabbia orcula var. producta*. *Indoplanorbis exustus*, *Gyraulus convexiusculus*, and *Lymnea acuminata* were rare species recorded from Kuadhas river. In Chulbandh dam, *Bellamyia bengalensis form typica* predominated followed by *Bellamyia bengalensis form mandiensis*. *Indoplanorbis exustus*, *Gyraulus convexiusculus* and *Lymnea acuminata* were found rarely in Chulbandh dam during this study period. The

habitat loss brought on by the dam's construction may be the cause of the decreased mollusk abundance at Chulbandh Dam, along with increased human activities. Significant positive correlation of molluscs with total dissolved solids, biological oxygen demand, alkalinity, hardness and chemical oxygen demand of water body while moderate positive correlation with temperature, total dissolved solids and chlorides was noted by Dorlikar, A. V. et al., (2014) in Gorewada reservoir of Nagpur Maharashtra. With support to this Kuadhas river showing higher values of these have greater gastropods composition than Chulbandh dam (Table 1). Garg R. K. et al., (2009), Saddozai, S. et al., (2013) observed same correlation of water parameters and molluscan composition.

Figure 2. Collected and Identified Gastropods species from Kuadhas river and Chulbandh dam of Gondia district Maharashtra

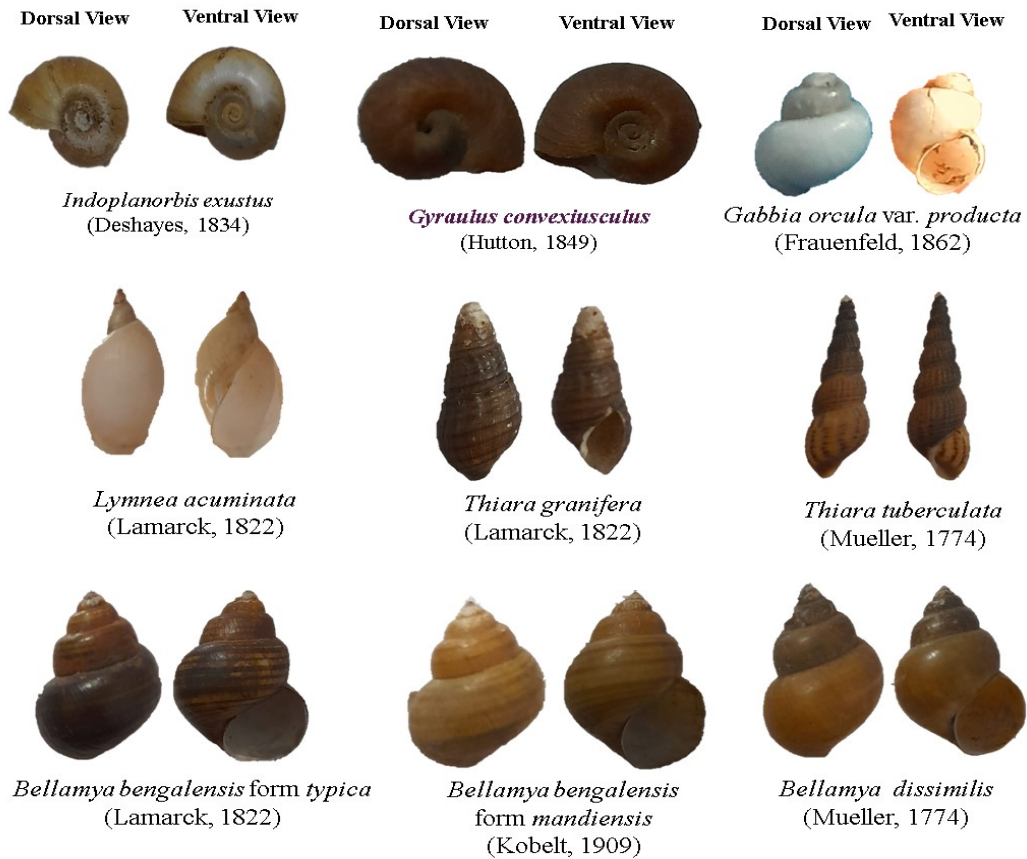


FIGURE 3: PERCENTAGE OF GASTROPOD SPECIES FROM CHULBANDH DAM

- Bellamya bengalensis form typica
- Bellamya bengalensis form mandiensis
- Indoplanorbis exustus
- Gyraulus convexiusculus
- Lymnea acuminata

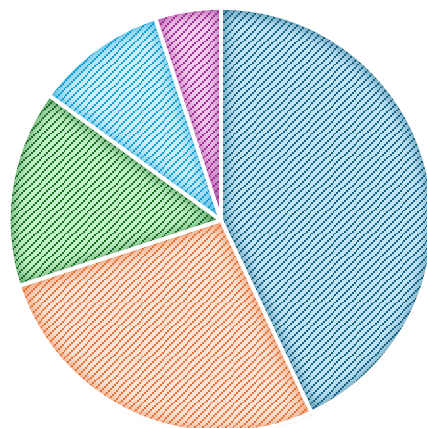


FIGURE 4 : PERCENTAGE OF GASTROPOD SPECIES FROM KUADHAS RIVER

- | | |
|------------------------------------|--|
| ▪ Thiara tuberculata | ▪ Thiara granifera |
| ▪ Bellamya bengalensis form typica | ▪ Bellamya bengalensis form mandiensis |
| ▪ Bellamya dissimilis | ▪ Gabbia orcula var. producta |
| ▪ Indoplanorbis exustus | ▪ Gyraulus convexiusculus |
| ▪ Lymnea acuminata | |



Conclusion

Nine species of gastropods were recorded from Kuadhas river and Chulbandh dam during study period. Some of these species as *Thiara tuberculata* and *Thiara granifera* are indicators of good quality of water bodies (Alhejoj, I et al., 2017). were found also edible species *Bellamya bengalensis* (Tripathy, B. and Mukhopadhyay, A., 2015) was also reported and use as food by villagers in this region. The study will be further continued to explore malacofauna and its seasonal distribution in various water bodies of Gondia district.

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