



Study of freshwater Prawn Diversity from Ujani Dam, Maharashtra

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Abstract:

This study investigates the diversity of freshwater prawns in four sites (Padasthal, Ganjeawalan, Palasdev, and Kumbhargaon) of Ujani Dam, Maharashtra, during the period from June 2022 to December 2022. A six-month survey was conducted to assess the prawn species present in the area, with a focus on the Macrobrachium and Penaeus genera. The study identified three species of prawns belonging to these genera. The study identified three species of prawns belonging to these genera: Macrobrachium rosenbergii, Macrobrachium malcomsoni, and Penaeus monodon. The findings provide valuable insights into the freshwater prawn diversity in Ujani Dam and contribute to the understanding of the local aquatic ecosystem. These results can aid in the formulation of conservation and management strategies for sustaining the biodiversity of freshwater prawns in the region.

Keywords: freshwater prawns, diversity, Ujani Dam, Maharashtra, Macrobrachium, Penaeus, survey, biodiversity, conservation, management.

Introduction:

Conservation of aquatic biodiversity especially freshwater diversity is one of the important matters of concern as it is exhausting at an accelerated rate due to various factors like human activity, loss of habitat, over harvesting, increasing pollution levels, competition from exotic species and other biotic and abiotic components. Freshwater is essential for life and yet it comprises of only 3% of total water present on earth (Souilmi and Tahraoui 2021). Freshwater ecosystem includes lakes, rivers, wetlands and these harbour remarkable life diversity and serve as home to 10% of total species (Strayer and Dudgeon 2010). Decapoda is the most significant order that includes enormous diversity of freshwater crustaceans. Among decapoda crustaceans, caridean shrimp and prawns represent second largest group after Brachyura (Davis et al 2018) and about 800 species living in fresh water have been described from this infraorder (De Grave et al 2015).

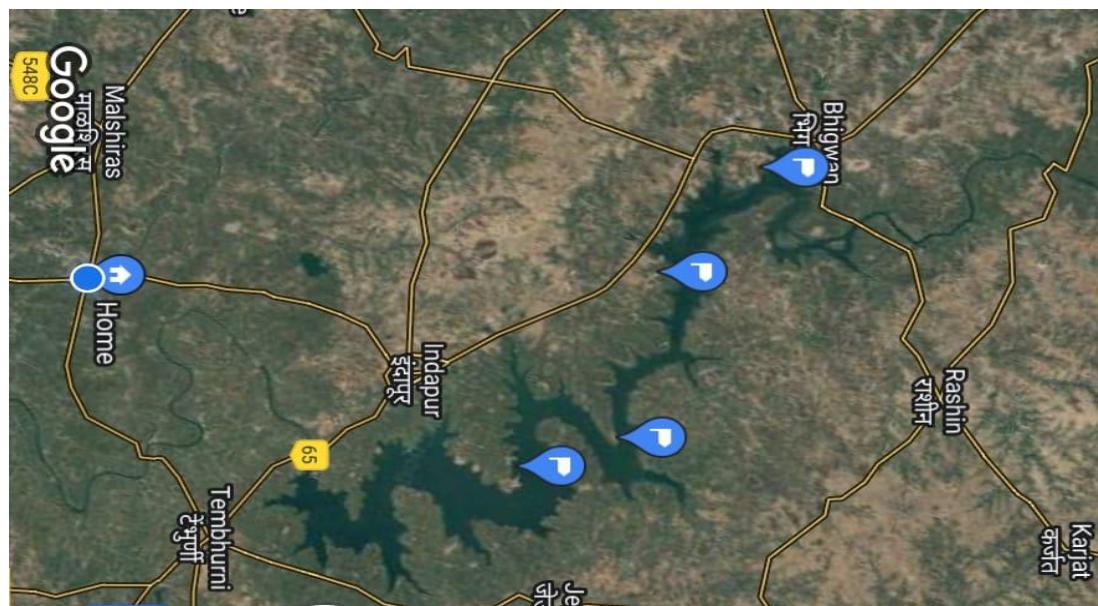
Freshwater prawns form economically important group as most of them are harvested from the wild or cultured for food as well as aquarium trade. Overall diversity of freshwater prawns is rapidly declining or under risk category mainly due to competition from invasive species, change in climate and commercial developmental projects (De Grave et al 2015). Freshwater prawns play a crucial role in the recycling of nutrients, structuring and functioning of the ecosystem (Snyder, 2016) and form one of the most dominant biomass rich group in the river ecosystem (Greathouse and Pringle 2006). Being keystone species in the river ecosystem, they actively participate in sustaining the food web by transferring nutrients and energy from decay matter and producers to higher trophic levels and also play an important role as scavengers (Camara et al 2009). Quality of water and anthropogenic pollution can be determined by presence of species and their abundance (Sharma and Chowdhary 2012, Susilo et al 2020).

Ujani Dam is a prominent reservoir located in the Solapur district of Maharashtra, India. Constructed on the Bhima River, it serves multiple purposes such as irrigation, hydroelectric power generation, and water supply. The dam has also created a vast water body, offering favorable conditions for diverse aquatic life, including fish species. The reservoir formed by Ujani

Dam supports a rich fish biodiversity due to its size and ecological characteristics. It provides a suitable habitat for various freshwater fish species, attracting both native and migratory species. The availability of abundant food sources and favorable water conditions contribute to the thriving fish population in the reservoir.

Material and Methodology

Ujani Dam is a significant water reservoir with a storage capacity of approximately 3,195 million cubic meters. It has a vast catchment area of around 10,634 square kilometers. One of the primary purposes of Ujani Dam is to provide irrigation water for agricultural activities in the region. The dam helps in the irrigation of agricultural lands in Solapur, Ahmednagar, Osmanabad, and Pune districts, thereby supporting agricultural productivity. The study aimed to investigate the diversity of freshwater prawns in Ujani Dam, Maharashtra, during the period from June 2022 to December 2022. Ujani Dam is a significant water reservoir located in Maharashtra, India, known for its diverse aquatic ecosystems.



(Fig.1) Satelite Image of Ujani Dam. (Padasthal, Ganjeawalan, Palasdev, Kumbhargaon)

Four specific sites within the Ujani Dam region were selected for the survey they are 1) Padasthal 2) Ganjeawalan 3) Palasdev, and 4) Kumbhargaon (fig.1). These sites were chosen based on their ecological characteristics and potential to harbor various prawn species. The survey spanned six months, allowing for a comprehensive assessment of the prawn population dynamics and species composition.

Throughout the survey period, field sampling techniques such as netting, trapping with the help of local fishermens. Collection of prawns done in between 7 a.m. to 4 p.m. The collected prawns were then carefully counted on spot and brought to the lab for identification. Collected prawns stored in 5% formaline for further research work. Collected prawn sample identified by the Sreejith S. Kumar Senior Zoological Assistant Zoological Survey of India (ZSI) Western Ghats Regional Centre Kozhikode, Kerala, India.

Result:

Ujani dam, provides a suitable habitat for various aquatic organisms, including prawns. The dam's reservoir and surrounding water bodies offer favorable conditions for the growth and survival of freshwater prawns. Freshwater prawns are a valuable component of aquatic ecosystems and have ecological significance. They play a crucial role in nutrient cycling, as they feed on organic matter and detritus, helping to maintain water quality. Additionally, prawns serve as an important food source for other organisms, including fish and birds.

Local communities engage in prawn fishing or aquaculture activities, capitalizing on the presence of prawns in Ujani Dam. Prawn fishing can provide livelihood opportunities and contribute to the local economy. Understanding the prawn biodiversity and ecology in Ujani Dam can aid in the development of appropriate conservation and management strategies to sustain the prawn populations and ensure the long-term health of the aquatic ecosystem.

As a result of the survey, three distinct species of freshwater prawns belonging to the *Macrobrachium* and *Penaeus* genera were identified. These findings provide valuable insights into the diversity and distribution patterns of prawns within the Ujani Dam region. The study identified three species of prawns belonging to these genera: *Macrobrachium rosenbergii*, *Macrobrachium malcomsonii*, and *Penaeus monodon*. Identification confirmed by The Sreejith S. Kumar Senior Zoological Assistant Zoological Survey of India (ZSI) Western Ghat Regional Centre Kozhikode, Kerala, India.

Fig. 2 Tiger prawn (*Penaeus monodon*)



Fig.3 *Macrobrachium malcomsonii*



Fig. 4 *Macrobrachium rosenbergii*

Morphology of *Macrobrachium rosenbergii*, *Macrobrachium malcomsonii*, and *Penaeus monodon*:

1. *Macrobrachium rosenbergii* (Giant River Prawn):

- Size: *Macrobrachium rosenbergii* is one of the largest freshwater prawn species, with adults reaching lengths of up to 30 centimeters or more.
- Body Structure: It has a robust body with a long and muscular abdomen. The body coloration varies, ranging from brownish-green to bluish-gray, with distinctive white stripes along the length of the body.
- Claws: One of the distinguishing features of *M. rosenbergii* is its large and powerful claws (chelipeds), with males having significantly larger claws than females. These claws are used for defense, capturing prey, and courtship displays.
- Rostrum: The prawn has a long, tapering rostrum (a pointed extension of the carapace) that projects forward from the head.

2. *Macrobrachium malcomsonii* (Indian River Prawn):

- Size: *Macrobrachium malcomsonii* is a medium-sized freshwater prawn, typically growing up to 12-15 centimeters in length.
- Body Structure: It has a slender and elongated body, with a flattened carapace. The body coloration varies from olive-green to brownish, often with darker spots or markings.
- Claws: *M. malcomsonii* also possesses well-developed claws, although they are relatively smaller compared to those of *M. rosenbergii*. The claws aid in feeding and defensive behavior.
- Rostrum: Similar to *M. rosenbergii*, *M. malcomsonii* has a long and pointed rostrum, projecting forward from the head.

3. *Penaeus monodon* (Giant Tiger Prawn):

- Size: *Penaeus monodon* is a large marine prawn, known for its size and commercial importance. It can grow up to 33 centimeters in length.
- Body Structure: *P. monodon* has a robust and elongated body, featuring a laterally compressed carapace. The body coloration varies from light brown to dark brown, often with distinct tiger-like stripes on the carapace and abdomen.
- Rostrum: The prawn has a pronounced rostrum that extends forward from the head. The rostrum may have teeth-like projections along its edges.
- Appendages: *P. monodon* possesses five pairs of walking legs and five pairs of swimming appendages (pleopods) on the abdomen, which aid in locomotion and swimming.

Understanding the diversity of freshwater prawns is essential for effective conservation and management strategies. By documenting the presence and abundance of different species, this study contributes to the broader understanding of the local aquatic ecosystem and supports the development of sustainable practices to protect and preserve these valuable resources.

The findings of this study can be utilized by environmental agencies, researchers, and policymakers for implementing conservation measures and ensuring the long-term viability of freshwater prawn populations in Ujani Dam, Maharashtra. Additionally, these results can serve as a baseline for future research on the ecological dynamics and conservation status of freshwater prawns in the region.

Conclusion:

The study conducted from June 2022 to December 2022 in the four sites of Ujani Dam, Maharashtra, provided valuable insights into the diversity of freshwater prawns in the region. The survey identified three prawn species belonging to the *Macrobrachium* and *Penaeus* genera, namely *Macrobrachium rosenbergii*, *Macrobrachium malcomsonii*, and *Penaeus monodon*.

The presence of these prawn species highlights the ecological richness and suitability of Ujani Dam as a habitat for diverse aquatic organisms. *Macrobrachium rosenbergii*, known as the Giant River Prawn, is a notable find due to its large size and economic importance. The presence of *Macrobrachium malcomsonii*, the Indian River Prawn, further contributes to the prawn diversity in the dam. Additionally, the discovery of *Penaeus monodon*, the Giant Tiger Prawn, underscores the connection between Ujani Dam and marine prawn species.

The identification of these prawn species provides a foundation for future research and conservation efforts in the region. Understanding their population dynamics, ecological interactions, and habitat requirements is crucial for effective management and conservation of freshwater prawn species in Ujani Dam.

Further studies can focus on investigating the distribution patterns, abundance, and life history characteristics of these prawn species. Such research can shed light on the ecological roles of prawns in the dam ecosystem, including their impact on nutrient cycling, food webs, and overall ecosystem health.

Conservation strategies should be developed to safeguard the habitats and populations of these prawn species. This may involve implementing measures to protect water quality, maintaining suitable habitats, and establishing sustainable fishing practices to ensure the long-term viability of prawn populations in Ujani Dam.

Overall, the findings of this study contribute to the knowledge of prawn diversity in Ujani Dam, Maharashtra. The presence of *Macrobrachium rosenbergii*, *Macrobrachium malcomsonii*, and *Penaeus monodon* underscores the importance of preserving and managing the dam's freshwater ecosystems to support the conservation of these valuable prawn species and maintain the overall ecological integrity of the region.

Reference:

1. Cai Y and Ng PKL 2002. The freshwater palaemonid prawns (Crustacea: Decapoda: Caridea) of Myanmar. *Hydrobiologia* 487: 59-83
2. Bakhtiyar Y, 2008. Food preferences of *Macrobrachium dayanum* (Henderson) and *Labeo rohita* (Hamilton) and nutritional status and culture of food organisms. Ph.D. Dissertation, University of Jammu, Jammu, India.
3. Camara IA, Konan MK, Diaman D, Edia G and Gourence EO 2009. Ecology and diversity of freshwater shrimps in Banco National Park, Côte d'Ivoire (Banco River Basin) *Knowledge and Management of Aquatic Ecosystem* 393: 05.
4. Sharma N 2015. Taxonomy and population dynamics of freshwater prawns inhabiting some Jammu waters. M. Phil Dissertation, University of Jammu, Jammu, India.
5. De Grave S, Smith KG, Adeler NA, Allen DJ, Alvarez F, Anker A, Cai Y, Carrizo SF, Klotz W, Mantelatto FL, Page TJ, Shy JY and Villalobos JL 2015. Dead Shrimp Blues: A global assessment of extinction risk in freshwater shrimps (Crustacea: Decapoda: Caridea). : e0120198.
6. Snyder MN, Freeman MC, Purucker ST and Pringle CM 2016. Using occupancy modeling and logistic regression to assess the distribution of shrimp species in lowland streams, Costa Rica: Does regional groundwater create favorable habitat. *Freshwater Science* (1): 80-90. 35
7. Jewel MAS, Haque MA, Khatun R and Rahman MS 2018. A comparative study of fish assemblage and diversity indices in two different aquatic habitats in Bangladesh: Lakhandaha Wetland and Atari River. *Jordan Journal of Biological Sciences* 11: 427-434
8. Davis KE, De Grave S, Delmer C and Wills MA 2018 Freshwater .transitions and symbioses shaped the evolution and extant diversity of caridean shrimps. *Communications Biology* 1:16
9. Prasad, S. 2020. Maturation and fecundity of large freshwater prawn *Macrobrachiumgangeticum* (Bate) and *Macrobrachiummalcolmsonii* (Edwards). In the Ganga river system in India, *Current Journal of Applied Science and Technology*.39(21):148-155
10. Souilmi F and Tahraoui S 2021. Assessment of spatial and seasonal water quality variation of the upstream and downstream of Oum Er-rabia River in Morocco. (1): 47- *Indian Journal of Ecology* 4851.

11. Nidhi Slathia and Seema Langer 2022 Study of Freshwater Prawn Diversity from Different Rivers of Jammu, India Indian Journal of Ecology (2022) 49(1): 183-186.
12. Ahmed, N. Ambrogi, AO, Muir, J. F. 2013. The impact of climatic change on prawn post larvae fishing in coastal Bangladesh. Socioeconomic and ecological perspective, Mar. Policy, 39:224-233.
13. Ahmad, J. 1999. Freshwater prawn fisheries resource and opportunities for their development: BookCinrarens, D, 39; Raipur. Allied Printers New Delhi. Pages 1-136.
14. Pandey, A. K. Upadhyay, A. K. and Lakra, W. S. 2010. Diversity of commercially important freshwater prawns and their aquaculture potential in India. J. Exp. Zool. India, 13 (1):121-128.
15. S. S. Patil and Patil, Study of Fish Faunal Diversity of ujani Reservoir, Near Bhigwan, Dist. Pune PLANTA – Vol.-3, 2021: 699 – 703
16. Bobdey, A. D (2014). Ichthyo diversity and Conservation Aspects in a Lake and Riverecosystem in Bhandara District of Maharashtra, India: A Comprehensive study of surface water bodies. Interdisciplinary Research Journal, 4(2):103-112 (2014).
17. D. S. Kumbhar, S. A. Shaikh, D. K. Mhaske (2018), Fish faunal diversity of bhima River At Pedgaon, Shrigonda (Ahmednagar District), IJCRT, Volume6, Issue 2 April 2018, ISSN: 2320-2882,2018.
18. Fresh water Fishes of Western Indonesia and Sulawesi. Periplus Editions (HK) Ltd,Indonesia, 221 pp., 84 pl.Jadhav and Bhosale. "Fish fauna of Bhima River at Pedgaonnear Pune, India."J. Ecobiol.8: 75-76.
19. Khedkar D.D.(2004); Evaluation of pollution status of Ambanala, Amravati and its effect on some local vegetables. Ph.D. Thesis, Amravati University, Amravati.
20. Levêque, Christian, et al (2007). "Global diversity of fish (Pisces) in fresh water. "Fresh water animal diversity assessment. Springer, Dordrecht, 2007.545-567.

