International Journal of Zoology and Applied Biosciences
Volume 11, Issue 1, pp: 76-79, 2026
https://doi.org/10.55126/ijzab.2026.v11.i01.011
ISSN: 2455-9571
http://www.ijzab.com
Research Article

USE OF MACROINVERTEBRATES TO DETECT WATER QUALITY OF RIVER WARDHA NEAR PULGAON

[1]Dipti B. Kadu, [2]Ujwala W. Fule and [3]Manjusha S. Bhoyar

[1*]Department of Zoology, Arts and Science College, Pulgaon, Wardha 442302, India
[2]Hutatama Rashtriya Arts and Science College, Ashti, Wardha 442202, India
[3]Arts, Commerce and Science College, Arvi, Wardha 442201, India

Article History: Received 28th October 2025; Accepted 22nd December 2025; Published 1st January 2026

ABSTRACT

The rivers of India play an important role in the lives of the Indian people. The river system provides irrigation, potable water, cheap transportation, electricity, as well as provide livelihood for a large number of people all over the country. This easily explains why nearly all the major cities of India are located by the banks of river. The rivers also have an important role in Hindu mythology and are considered holy by all Hindus in the country. Many people work on water quality by applying physico-chemical parameters, but for the first time quality of water was monitored by studying macroinvertebrate fauna. Macroinvertebrates means the animals without back bone, can be seen with necked eyes and whose home is streams, rivers, wetlands and lakes. The study was carried out from January 2020 to December 2021. The present paper embodies the biodiversity of macroinvertebrates from rivers Tapi, Sipna, Khandu, Khapra, Gadga, Dolar in Satpuda. They form the bio-indicators of lentic water ecosystems.

Keywords: Macroinvertebrate, Water quality, Satpuda, Livelihood, Mythology.

INTRODUCTION

Fresh water is one of the sources of scarce natural resource and its conservation is assuming greater and greater significance because day by day it is going on polluting. So, up till now people are interested in water quality because they want to know if their water is safe drinking and can support healthy population of fish and other animals, that's why they perform physico-chemical analysis of water and test the water quality. But here is one another way of finding out quality of water that is the study of macroinvertebrates, (the water quality indicators) from the particular water body. Each aquatic species from tiny bacterium to whale is unique. It is not size but the genetic composition of plants and animals that makes all the life forms special. Each species has its own inheritant genetic library that codes its ability to survive in the changing environment; the best example of this is macroinvertebrates. That's why we are dealing with Macroinvertebrates. The paper "Biodiversity Studies: Science and Policy" by Ehrlich and Wilson emphasis the necessity for study of biodiversity and their role in balancing and conservation of ecosystem.

Macroinvertebrates are involved in the mineralization and recycling of organic matter. Many larval forms of the insects, crustaceans and mollusks serve as food source for birds and fishes. Macroinvertebrates are very important organisms in the aquatic environment and occupy almost all conceivable habitats having wide range; they are important components of food web in an ecosystem . There interactions with other biotic communities and with abiotic factors within their microhabitat, makes them interesting and valuable indicators of water quality. Macroinvertebrates are valuable indicators of stream quality for several reasons. They are influenced by the physical, chemical, and biological conditions of a stream, making them reliable reflections of overall water health. Being relatively sedentary, they cannot easily escape pollution, so their populations accurately represent the environmental state of the stream. Certain species are highly intolerant of pollution, while others may exhibit

*Corresponding Author: Dipti B. Kadu, Department of Zoology, Arts and Science College, Pulgaon, Wardha 442302, India Email: diptimem@gmail.com

changes due to habitat loss. As an essential part of the aquatic food web, macroinvertebrates play a crucial ecological role. Many species spend over a year in the water, allowing for long-term assessment of stream conditions. They are also easy to collect and can be monitored throughout the year. Since macroinvertebrate communities differ across various regions and water bodies, the health of a water body can be effectively estimated by examining the richness and diversity of its macroinvertebrate community. Macroinvertebrates are very important organisms in the aquatic environment and occupy almost all conceivable habitat having wide range of habitats. They are important components of food web in an ecosystem. A preliminary report on the biodiversity of selected higher macroinvertebrate groups of some freshwater bodies which are larger, easily visible invertebrates from Western Maharashtra" by Pande *et al*. (2020). Their interaction with other biotic communities and with abiotic factors within their microhabitat makes them interesting and valuable indicators of water quality. Sharma *et al*., (2011) studied biodiversity of specific larger, visible macroinvertebrates which act as biological indicator of pollution of Central Himalaya River, Tawiof Jammu and Kashmir. They form exclusive stable diet of higher animals like amphibians, reptiles, birds and mammals. Wallace and Webster, (1996) reported the crucial role of macroinvertebrates in nutrient cycling, decomposition in aquatic ecosystems. Macroinvertebrates also act as a vital link of food chain and are used as bioindicators of water quality.

MATERIALS AND METHODS

Macroinvertebrate collection

The macroinvertebrates were collected in the early hours of morning between 7.00 a.m. to 9.30 a.m. as most of the animals found in mud, cling on stones, rocks, rootlets, twigs, and leaves of aquatic plants. The macroinvertebrates were collected from all water depths from still and shallow slowly flowing waters of all the five sites. They were collected from water's surface, from within water, from the sediment or bottom or from submerged gravels, rocks, stones, logs, rootlets, twigs, aquatic plants, particularly sedges and rushes and leaf litter because each type of habitat provides a surface or space on, within or near which macroinvertebrates can live. Various equipments were used for sampling, sorting and identification during the present investigation were sampling nets, spoons, pipettes, forceps, droppers, 2 liters capacity glass bottles, small buckets, sorting trays, ice-block trays, magnifying glass, clipboards, pencils, markers, stickers, etc.

RESULT AND DISCUSSION

The present investigation serves as an effective approach for assessing water quality through the study of aquatic macroinvertebrates. During the study, a total of 4 species of Annelida, 70 species of Arthropoda, and 15 species of Mollusca were recorded (Figure 1-8). Compared to pollution-tolerant organisms such as midge flies, worms, leeches, and pouch snails, a higher diversity was observed among species like stone flies, water penny beetles, mayflies, alderflies, mussels, riffle beetles, damselflies, dragonflies, crayfish, amphipods, black flies, caddisflies, isopods, and crane flies. Grenouillet *et al*. (2001) highlighted that examining different life-history stages of macroinvertebrates can enhance understanding of the population dynamics of spatially distributed species and support conservation initiatives for ecologically important taxa. In the present study, stone flies, water penny beetles, mayflies, dobsonflies, alderflies, mussels, and riffle beetles were categorized as sensitive species. Damselflies, dragonflies, crayfish, amphipods, black flies, caddisflies, isopods, and crane flies were identified as moderately tolerant species, whereas midge flies, worms, leeches, and pouch snails were found to be pollution-tolerant.

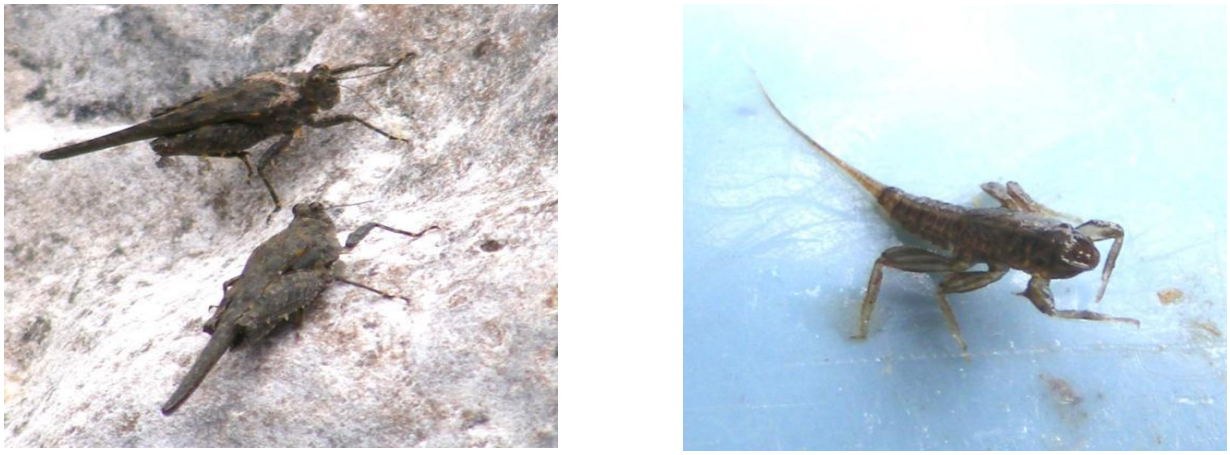

Figure 1. Cricket (nymphs).

Figure 3. Earwig

Figure 4. Dragonfly nymph

Figure 5. Shrimp

Figure 6. Cytilus

Figure 7. Nepacinerea

Figure 8. Stink bug

CONCLUSION

The pollution tolerant species were present only during monsoon and were scare while the sensitive species were abundant and found most of the times. This indicates that Wardha the rivers flow from Pulgaon has a good biological richness and not polluted yet.

ACKNOWLEDGMENT

The authors express sincere thanks to the Department of Zoology, Arts and Science College, Pulgaon, Wardha, India for the facilities provided to carry out this research work.

CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

FUNDING

This study received no specific funding from public, commercial, or not-for-profit funding agencies.

AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

REFERENCES

Ehrlich, P. R., & Wilson, O. W. (1991). Biodiversity studies: Science and policy. *Science, 253*(5021), 758–762. https://doi.org/10.1126/science.253.5021.758

Edmondson, W. T. (1959). *Freshwater biology* (2nd ed.). John Wiley & Sons.

Ghazvan, N. J., & Gunale, V. R. (2005). Water pollution monitoring of Mula and Pavana rivers from Pune urban area. *Asian Journal of Microbiology, Biotechnology and Environmental Sciences, 7*, 785–790.

Grenouillet, G., Hugueny, B., Carrel, G. A., Olivier, J. M., & Pont, D. (2001). Large-scale synchrony and inter-annual variability in roach recruitment in the Rhône River: The relative role of climatic factors and density-dependent processes. *Freshwater Biology, 46*, 661–671.

Pande, C. S., Gaikwad, R. B., Shelke, P. S., Wankhade, C., Waghmare, M. S., Talmale, S. S., & Patil, S. R. (2020). A preliminary report on the diversity of selected higher macroinvertebrate groups of some freshwater bodies from Western Maharashtra. *International Journal of Entomology Research, 5*(3), 147–151.

Sharma, K. K., & Choudhary, S. (2011). Macroinvertebrate assemblages as biological indicators of pollution in a Central Himalaya River, Tawi (J&K). *International Journal of Biodiversity and Conservation, 3*(5), 167–174.

Wallace, J. B., & Webster, J. R. (1996). The role of macroinvertebrates in stream ecosystem function. *Annual Review of Entomology, 41*, 115–139.