

Vol. 11. No.2. 2022.

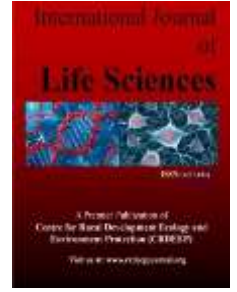
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DOI: [10.13140/RG.2.2.20961.38241](https://doi.org/10.13140/RG.2.2.20961.38241)

Contents available at:

<http://www.crdeepjournal.org>

*International Journal of Life Sciences* (ISSN: 2277-193x) CIF: 5.411; SJIF: 6.431  
A Peer Reviewed Journal



Full Length Research Paper

## Effect of Regulated Flow on Benthic Macroinvertebrates of the River Narmada at Mandleshwar, India

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**ARTICLE INFORMATION**

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**Article history:**

Received: 27-05-2022

Revised: 01-06-2022

Accepted: 10-06-2022

Published: 14-06-2022

**Key words:**

Regulated Flow, Benthic Macro invertebrates, Narmada river, diversity,

**ABSTRACT**

Regulation in the catchment's area of the River Narmada at Maheshwar Dam in Khargon district Mandleshwar increase during monsoon (700 to 2500 cubic feet per second,) and from 100 to 150 c cubic feet per second during lean period. Most pronounced effect of the regulation was seen on the macrobenthic insect fauna belonging to Trichoptera, Placoptera, Ephimeroptera and Chironomidae. The bigger animal species picked up by hand, whereas the smaller forms were isolated by sugar floatation method and studied them under low power (x50) microscope. They were preserved by narcotizing them by Methanol and Chloral hydrate and late 70% Alcohol. The benthic organisms were identified with the help of APHA (2005), William & Doris (1966), Pennak (1989), Tonapi (1980), Needham & Needham (1969), etc. The dominant forms are Hydropsyche sp, Parapsyche sp, Psychomyia sp, Polycentropus, Ephimerilla sp, Baetis, Lanthus sp, Chironomous pleumosus and Helius sp. Large particulate feeders (shredders) were reduced whereas the collectors were increased during this period. The predominant oligochaetes were Limnodrilus gracilis, L. profundicola, Tubifex tubifex and Dero forcata. The molluscans species were Thiara scabra, Vivipara bengalensis, Limnaea acuminata and Pisidium dubium. During lean period stone flies were not recorded. Most of the insect species were also reduced or absent. The oligochaetes, however, were present during lean period. The molluscan species such as Pisidium dubium, Thiara scabre and Vivipara bengalensis were present. The occurrence of species dominance is correlated to availability of food and reproductive habits of the macro invertebrates. The aim of the present study is to study the Effect of Regulated Flow on Benthic Macroinvertebrates of the River Narmada at Mandleshwar which are declining at an alarming rate.

**Introduction**

The rivers and streams have the most diversified benthic macroinvertebrate fauna due to their greatly diversified substrate type and permanence of life, giving better chance of continuity and evolutionary changes (Hynes 1979). The information on these taxa in tropical rivers is absent (Belsare 1982). Benzie (1984) studied the stream benthos of a tropical river of Sri Lanka. Recently Goswami *et al* (2002) attempted to make qualitative analysis of benthos of the river Subernrekah (Jharkhand, India), but this study is not related to the regulated flow on these animals. Belsare (2004) mentioned the importance of benthic invertebrates in river corridors. In temperate river system also such studies are few as compared to reservoirs (Lillehamer and Saltveit 1983). In this paper we present the general effects on the macrobenthic invertebrate communities of Narmada river at Maheshwar Dam the site locality at Madleshwar (dist Khargon, M.P.). This study has been done to find out the diversity of benthic macro-invertebrates and their relationship with different parameters of water because the physical, chemical and biological parameters are support the water body assessment. This study has been done to find out the Effect of Regulated Flow on Benthic Macroinvertebrates of the River Narmada at Mandleshwar

## Materials and methods

### Study area

The Narmada, also called Rewa is a river in central India and the fifth largest river in the Indian subcontinent. It is the third largest river that completely flows within India after Ganges and Godavari. It forms the traditional boundary between North India and South India and flows westwards over a length of 1,312 km before draining through the Gulf of Cambay (Khambhat) into the Arabian Sea, 30 km west of Bharuch city of Gujarat (NVDA). It is one of only three major rivers in peninsular India that runs from east to west (largest west flowing river) along with the Tapi River and the Mahi River. It is the only river in India that flows in a rift valley flowing west between the Satpura and Vindhya ranges although the Tapi River and Mahi River also flow through rift valleys but between different ranges. The Narmada basin, hemmed between Vindya and Satpuda ranges, extends over an area of 98,796 km<sup>2</sup> and lies between east longitudes 72 degrees 32' to 81 degrees 45' and north latitudes 21 degrees 20' to 23 degrees 45' lying on the northern extremity of the Deccan Plateau.

### Sampling method

The animals were collected from the bottom substrata with the help of hand-net sampler (25 cm X 25 cm) by placing it perpendicular to the substratum for 4 to 5 minutes. After disturbing the substratum, the animals were collected and were kept in white enamel tray. They were sorted out and preserved in 4% formalin in plastic bucket. Further sieving and washing were done in the laboratory. After sorting out them group wise they were preserved in 70% alcohol in plastic vials. Their identification up to group level was done with the help of key prepared by Belsare (2006) and to the species level with the help of published account in books by Pennak (1953), Hynes (1970), Okland (1964) and Brinkhurst & Jamieson (1971)

## Results and Discussion

The macroinvertebrate fauna of the study area is represented by chironomids (*Chironomus plumosus*, *Cryptochironomus sp.*, *Psilotanytus sp.*, *Tipula sp.*, *Helius sp.*, *Caradocladus sp.*), Coleoptera (*Gyrinus sp.*, *Dineustos sp.*, *Berosus sp.*), Odonata (*Lanthus sp.*, *Dramagomphus sp.*, *Agrion sp.*, *Hetaerina sp.*), Trichoptera (*Hydropsyche sp.*, *Parapsyche sp.*, *Arctopsyche sp.*, *Rhyacophila sp.*, *Polycentropus sp.* & *Chimarra sp.*), Placoptera (*Pteromarcella sp.*, *Peltoperia sp.*), Ephemeroptera (*Ephimerilla sp.*, *Baetis sp.*, *Caenis sp.*, *Ephoron sp.*), Mollusca; Gastropoda (*Thiara tuberculata*, *Thiara scabra*, *Vivipara bengalensis*, *Limnaea acuminata*, *Diagoniostoma pulchella*), Pelecypoda (*Corbicula striatella*, *C. regularis*, *Pisidium dubium*, *Anodonta dominate*); Oligochaeta (*Limnodrilus gracilis*, *L. profundicula*, *Branchyura soverbyi*, *Tubifex tubifex*, *Dero forcata*, *Dero digitata*, *Areolosoma hemprichi*, *A. variatum* and *Haplotaxis sp.*)

**Table1:** H' Shannon-Index of Narmada River.

S.no.	Month	Narmada river (h')
1.	August	0.274
2.	September	1.070
3.	October	1.082
4.	November	1.085
5.	December	1.089
6.	January	1.080
7.	February	1.055
8.	March	1.028
9.	April	1.065
10.	May	1.083
11.	June	1.065
12.	July	0.454

The value of Shannon and Weaver Index during the study period was found within the range between 0.274 in the month of August to 1.089 in the month of November. This indicates that river Narmada has heavily polluted or moderately polluted water quality except during monsoon season in which water gets polluted due to heavy floods.

During lean period most of the insect species were found absent. The only group observed during this period is Placoptera. The oligochaetes were confined to pools only, whereas the mollusks, especially gastropod species were dominant. During monsoon they reappear and the insects dominate macroinvertebrate fauna. It is evident from the present study that insects and mollusks are the most dominant group of the narmada river. The overwintering occurs in trichopteran insects and they are found during lean period also. Although it is difficult to generalize, but characteristic features of the soft substrata of pool during lean period when water is diverted by the underground tunnel of the river, is represented by taxa of Tubificidae, chironomids and burrowing may flies. The gastropod species are more predominant in rocky and stony area of streams. During monsoon the insect species dominate the taxa of macroinvertebrates. The most pronounced effect of regulation of river water was seen in the Trichoptera, Placoptera and chironomid taxa. Similar situation is reported in Sulalslagen river of West Norway (Lillehammer & Saltweit 1983).

## Conclusion

We studied Effect of Regulated Flow on Benthic Macroinvertebrates of the River Narmada at Mandleshwar. 26 species of Benthic macro-invertebrates were identified 10 species of Annelides, 09 species of Molluscans and 07 species of Arthropods have been found. Among them we observed the percentage of Benthic Macroinvertebrates found low. This indicates that river Narmada has heavily polluted or moderately polluted water quality during monsoon season in which water gets polluted due to heavy floods.

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