

# Study of Benthic Macro Invertebrates Communities of Narmada River in (M.P.)

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**Abstract:** *The Macrobenthos study is very useful tool for the assessment of water quality in a type of water body and also contributes to understanding of the basic nature and general economy of the lake (Pawar et al., 2006). The maintenance of a healthy aquatic ecosystem depends on the abiotic properties of water and the biological diversity of the ecosystem (Harikrishnan et al., 1999). Macrobenthos abundance in a water body reflects the average ecological condition and, therefore, it may be used as an indicator of water quality. In natural waters such as oceans, lakes, rivers and swamps, the greatest amount of biological production is due to the smallest organisms, namely the plankton. These microscopic plants comprise communities that drift aimlessly with tides and currents, yet they incorporate and transfer large amounts of energy that they pass on to higher trophic levels. Thus communities of plankton, as distinct from those of swamp, forest, or grassland, support other communities of aquatic species and man (Welch 1998). In the present study 33 species of Benthic macro-invertebrates belonging to 5 groups were recorded from Narmada River. The population of benthic macro-invertebrates fluctuated in different seasons and months. The Benthic macro-invertebrates diversity was maximum in post monsoon and summer and was very low in monsoon season.*

**Keywords:** Benthic macro-invertebrates, Narmada River and aquatic ecosystem

## 1. Introduction

The Narmada River is one of the important river of the India yet to be polluted. The water quality of river is decreasing day by day due to anthropogenic activities, domestic wastes, cattle grazing and other factors. The Narmada River has great religious importance and efforts should be made to conserve the biodiversity of this sacred river. The macrobenthos play important role in bio monitoring. On the basis of presence of macrobenthos we can designate the water quality of rivers. Water provides a suitable environment for the existence of large number of aquatic organisms. Among them the fishes are of prime importance as they not only offer rich protein for human dietary but also are an important link in the food chain operating in the ecosystem. The macrobenthos and benthos are the other components which besides having a trophic link are important environmental tools helping in maintenance of health of the concerned ecosystem. Macrobenthos thus become significant because they act as connecting link between abiotic and biotic components.

## 2. Material and Methods

The biological samples were collected from the selected sampling stations in the river Narmada which are namely-Punasa (S-1), Omkareshwar (S-2), Mandleshwar (S-3), Khalghat (S-4). Benthic macro-invertebrates from four sampling stations of Narmada river were collected and studied for a period of two years (April 2010 to March 2012). The Indira Sagar Dam (Punasa Dam) is a multipurpose key project of Madhya Pradesh on the Narmada river at Narmada Nagar in Khandwa (Tehsil of West Nimar district) Madhya Pradesh in India. Omkareshwar is a famous place of pilgrimages, situated 77 km from Indore in Khandwa District Madhya Pradesh. Omkareshwar is the important place in Madhya Pradesh where the Narmada flows descends with rapid speed, quickening in pace, rushes over a barrier of rocks.

Mandleshwar is a town and a Nagar Panchayat in Khargone district of Madhya Pradesh situated on the bank of Narmada river, 8 km east of Maheshwar and 99 km south of Indore. A good number of macro benthos species were observed. Khalghat is a small town and a Municipality of Dhar district in the state of Madhya Pradesh, India. It is located on the banks of Narmada river. It is 76 kilometer away from Indore.

**Collection of Samples:-**Samples were collected from the deeper profundal zone by using Ekman grab and at shallow profundal zone by using Surber sampler following Wetzel (2001).

**Identification of Samples:-**Samples were assigned to a family /species using taxonomic keys; APHA (2002), Pennak (1978), Tonapi (1962), Welch (1998).

## 3. Result and Discussions

The significance results are reported in the diagram -1, 2,3,4,5,6,7 and 8. In the present study, following species of Benthic macro-invertebrates are reported - WORMS- *Dero digitata*, *Tubifex tubifex*, *Hirudenia*, *Limnodrilus hoffmeisteri*, *Telmatodrilus multispinosus*, *Dero dorsalis*, *Stylaria fossularis*, *Branchiodrilus hortensis* and *Tubifex albicola*. CRUSTACIANS- *Daphnia cercinate*, *D. moina*, *Mogona*, *Foina dubia*, *Cypris*, *Cyclopes*, *Nauplius*. MOLLUSCS- *Vivipara bengalensis*, *Melanoides tuberculatus*, *M. lineatus*, *Digiostana pulchella*, *Gyraulco convexiculus*, *Vivipara bengalensis*, *Pissidium clarkeanum*, *Digonostoma punchella*, *Limnaea auricularia*, *Bellamva bebgalensis*, *Thira scabra*, *Unio* sp. And *Pila* sp. DIPTERIA- *Chironomus* sp. and *Chaoborus* sp.. EPHEMEROPTERA- *Baetis simplex*, *Heptagenia nubile*, *Caehis* sp. And *Ephemera Nadinac*.

Station I: Punasa (Indira Sagar Dam) --In the present study, 33 species of Benthic macro-invertebrates belonging to 5

groups were recorded from Narmada river at station I. The dominant group recorded was Molluscs followed by Worms. 12 species of molluscs, 9 species of worms, 6 species of Crustaceans, 4 species of Ephemeroptera and 2 species of Diptera were recorded from this sampling station. Diptera group was less dominant throughout the study period. The Benthic macro-invertebrates diversity was maximum in post monsoon and summer and was very low in monsoon season.

Station II: Omkareshwar --During the present study from April 2010 to March 2012, 33 species of Benthic macro-invertebrates belonging to 5 groups were recorded from Narmada river at station II. Maximum diversity was recorded in post monsoon and summer seasons and there was very low diversity in the month of July and August. The dominant group recorded was Molluscs followed by Worms. Diptera group was less dominant throughout the study period.

Station III: Mandleshwar --During the present study from April 2010 to March 2012, 33 species of Benthic macro-invertebrates belonging to 5 groups were recorded from Narmada river at station III. 12 species of molluscs, 9 species of worms, 6 species of Crustaceans, 4 species of Ephemeroptera and 2 species of Diptera were recorded from this sampling station. The dominant group recorded was Molluscs followed by Worms and Diptera group was less dominant throughout the study period. The abundance of Benthic macro-invertebrates was maximum in post monsoon and summer seasons and was very low in monsoon season.

Station IV: Khalghat --In the present study from April 2010 to March 2012, 33 species of Benthic macro-invertebrates belonging to 5 groups were recorded from Narmada River at station IV. Maximum diversity was recorded in post monsoon and summer seasons and there was very low diversity in the month of July and August. The dominant group recorded was Molluscs followed by Worms. Diptera group was less dominant throughout the study period.

In the present study 33 species of Benthic macro-invertebrates belonging to 5 groups were recorded from Narmada river. The population of benthic macro-invertebrates fluctuated in different seasons and months. Hiware and Pawar (2006) recorded 43 Benthic macro-invertebrates from Nath Sagar dam, Pathan, in Aurangabad district. In a study from state of Andhra Pradesh, Savalla Murli Krishna (2006) recorded 31 Benthic macro-invertebrates from secret lake Durgamcheruvu, Ranga Reddy district near Hyderabad. Sarma *et al.*, (2007) reported 70 commercially important Benthic macro-invertebrates from the lower reaches of Brahmaputra River. Saha and Bordoloi (2009) also reported 59 Benthic macro-invertebrates belonging to 40 genera, 19 families and 8 orders from two beels of Goalpara district, Assam.

Sarma *et al.*, (2012) studying ichthyofaunal diversity of lower reaches of the river Brahmaputra, Assam reported 97 species including exotic species belonging to 56 genera of 26 families from all the Benthic macro-invertebrates landing centers. Among these, according to IUCN status, 5 species

are endangered, 21 species vulnerable, 29 species lower risk-near threatened, 7 species lower risk-less concern and other 29 species are not evaluated. Gohil and Mankodi (2013) while studying diversity of Benthic macro-invertebrates fauna from downstream zone of river Mahisagar, Gujarat state, India reported 26 species from 03 orders and 12 families having diverse food habits and ecosystem.

#### **Correlation Coefficient between physico- chemical parameters and Benthic macro-invertebrates species**

During present study all the groups of Benthic macro-invertebrates showed low positive correlation with water temperature at Station I and Station III except Diptera which showed moderate positive correlation with water temperature at Station I and at Station II, Station IV temperature showed low negative correlation with all the Benthic macro-invertebrates. Francis and Muller (2010) observed low positive and moderate positive correlation between Benthic macro-invertebrates species and water temperature. Sharma and Chowdhary (2011) observed moderate negative correlation between temperature and molluscs.

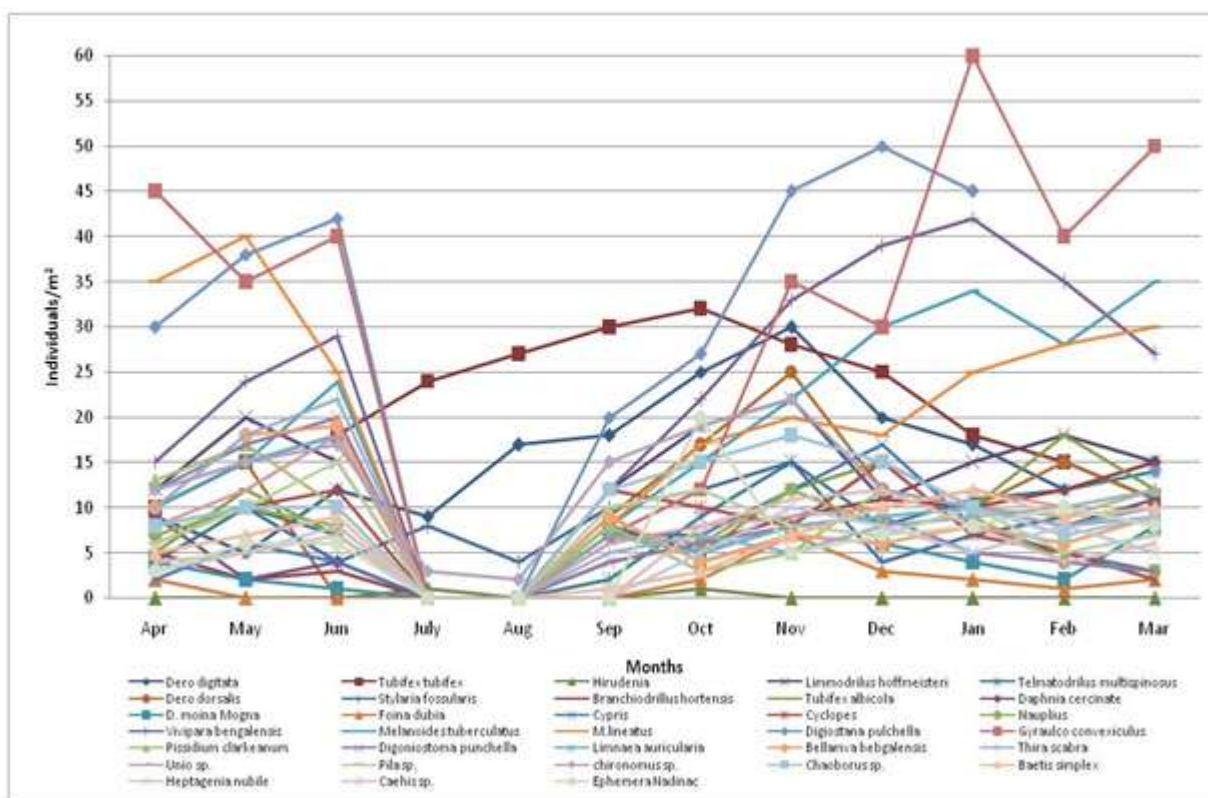
Transparency showed moderate and strong positive correlation with all the six families of Benthic macro-invertebrates at all sampling stations while as pH and Dissolved Oxygen showed strong positive as well as low positive with Benthic macro-invertebrates species. Francis and Muller (2010) observed low positive and moderate positive correlation between Benthic macro-invertebrates species and pH. Sharma and Chowdhary (2011) observed low negative correlation between Benthic macro-invertebrates species and transparency, low positive correlation between Benthic macro-invertebrates species and pH and low negative correlation between Benthic macro-invertebrates species and Dissolved Oxygen. Francis and Muller (2010) observed low positive and moderate positive correlation between Benthic macro-invertebrates species and Dissolved Oxygen. BOD, Chloride, Phosphate and Nitrate showed negative correlation with Benthic macro-invertebrates species.

Available nutrients such as nitrates and phosphates were negatively correlated with the macro benthos species. It seems that the fluctuations in these nutrients had a strong influence on abundance of population of the Benthic macro-invertebrates in the river Narmada. Some other factors such as organic matter, food, vegetation and silt might also play a significant role in the increase or decrease of Benthic macro-invertebrates population density. From above discussion it can be concluded that the physico-chemical parameters of water play a significant role in growth and survival of may fly population in river Narmada.

#### **References**

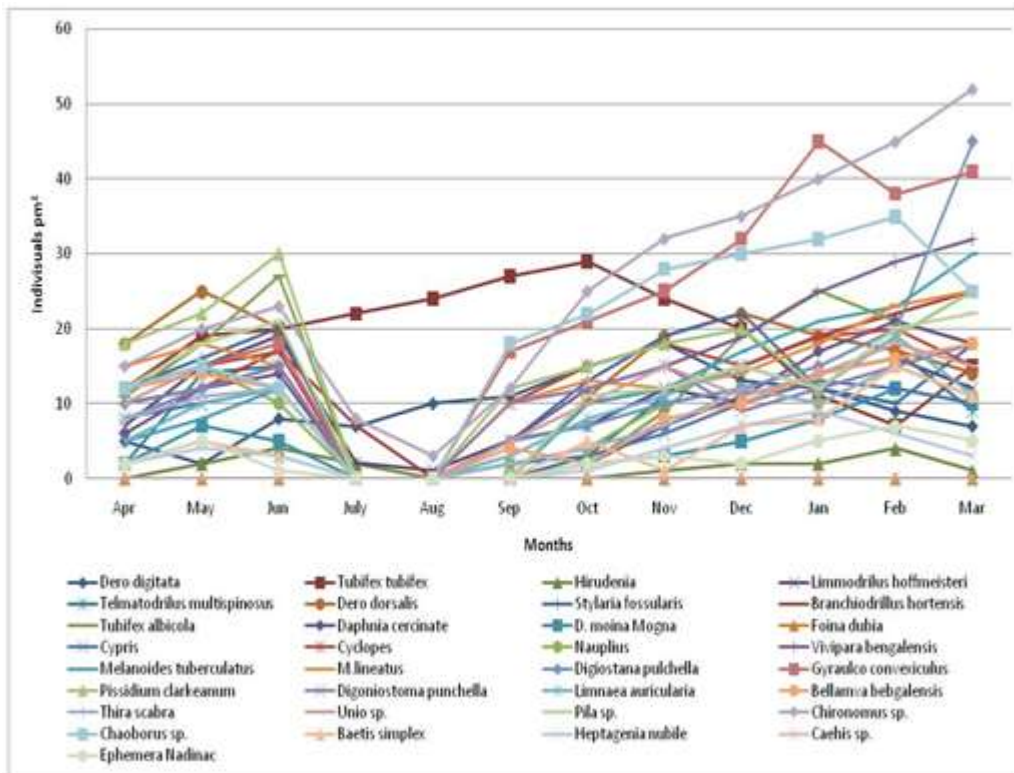
- [1] **APHA** (2005): Standard methods for the examination of water and wastewater, 21st Edn., Washington, D.C.
- [2] **Francis, O. A. and Muller, W. J.** (2010). Mayfly (Insecta: Ephemeroptera) community structure as an indicator of the ecological status of a stream in the

- Niger Delta area of Nigeria. Environ. Monit. Assess. 161: 581-594.
- [3] **Gohil, M. N. and Mankodi, P. C.** (2013). Diversity of Benthic macro-invertebrates Fauna from Downstream Zone of River Mahisagar, Gujarat State, India. Research Journal of Animal, Veterinary and Fishery Sciences,1(3):14-15.
- [4] **Harikrishnan K, Sabu T, Sanil G, Paul M, Sathish M, Das MR** (1999): A Study on the distribution and ecology of phyto-plankton in the Kuttanad wetland ecosystem, Kerala, India.
- [5] **Hiware, C. J. and Pawar, R. T.** (2006). Ichthyofauna of Paithan Reservoir (Nath Sagar dam) in Aurangabad district of Marathwada region Maharashtra. Ecology and Environment,APH Publishing Corporation New Delhi.
- [6] **Pawar, S K Palle J S and Shendge K M** (2006): "The Study on Phytoplankton of Pethwadaj Dam, Taluka Kandhar, District -Nanded, Maharashtra", J. Aqua, Biol.,Vol.21, No. 1, pp. 1-6.
- [7] **Pennak, RW** (1978): Freshwater invertebrates of the United States, 2nd Edn., John Wiley and Sons, New York 810.
- [8] **Saha and Bordoloi** (2009) Saha, S. and Bordoloi, S. 2009. Ichthyofaunal diversity of two beels of Goalpara District, Assam, India. Journal of Threatened Taxa. Vol.1 (4) 240-242.
- [9] **Sarma et al.,** (2007) Sarma, D.; Das, J.; Bhattacharyya, R. C. and Dutta, A.2007. In: Proceeding of National Seminar on Recent Advances and Rebuilding of Benthic macro-invertebrates and Fisheries in North East India. St. Anthony's College, Shillong.
- [10] **Sarma et al.,** (2012) Sharma Shailendra, Imtiyaz Tali, Zahoor Pir, Anis Siddique, L. K. Mudgal 2012.Evaluation of Physico- chemical parameters of Narmada river, MP, India.Researcher; 4(5): 13-19.
- [11] **Savalla, M. and Piska,** (2006). Aquatic ecosystem and their impacts. Journal of Aquatic Biology. 1: 77-79.
- [12] **Sharma, K. K. and Choudary, S.** ( 2011). Macro invertebrate assemblages as biological indicators of pollution in a central Himalayan river, Tawi (J and K). Int. J. of Bio. and Conser. 3(5): 167-174.
- [13] **Tonapi, G.T.**(1962): Freshwater animals of India an ecological approach. Head Department of Zoology, University of Poona. Ganeshkhind Poorna 411007.
- [14] **Welch, PS.** ( 1998): Liminological methods Mcgran Hill Book Co. New York.
- [15] **Wetzell, R. G.** (2001): Limnology: Lake and River Ecosystem, 3<sup>rd</sup> ed. Academic Press. ISBN –12-744760-1.

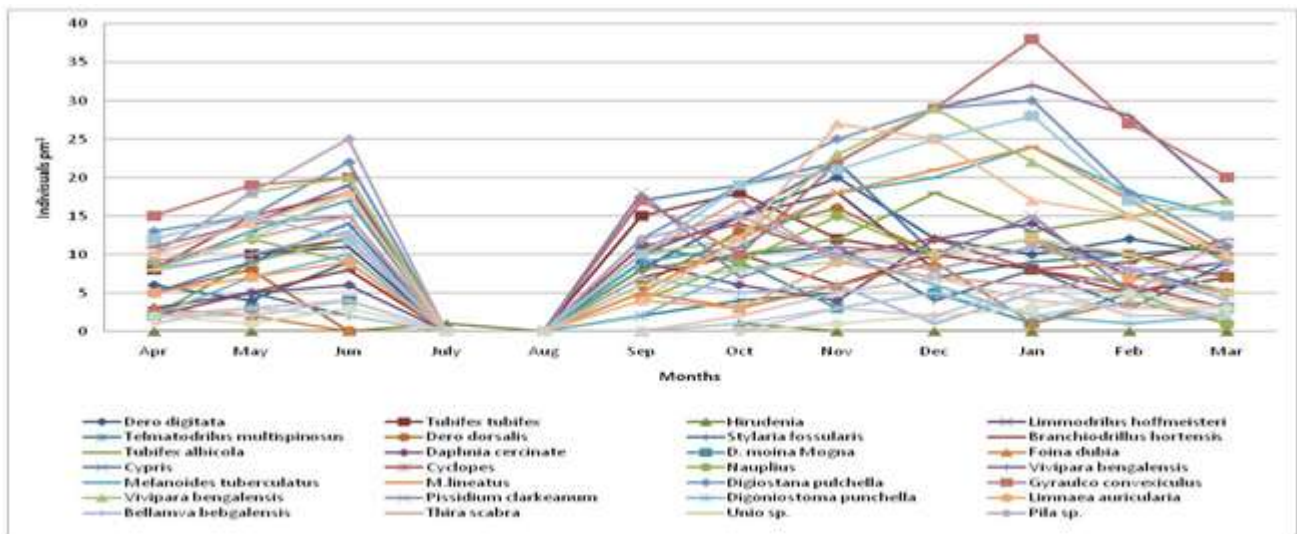


**Monthly distribution of macro benthic communities of Narmada river at Station -1(2010-11)**

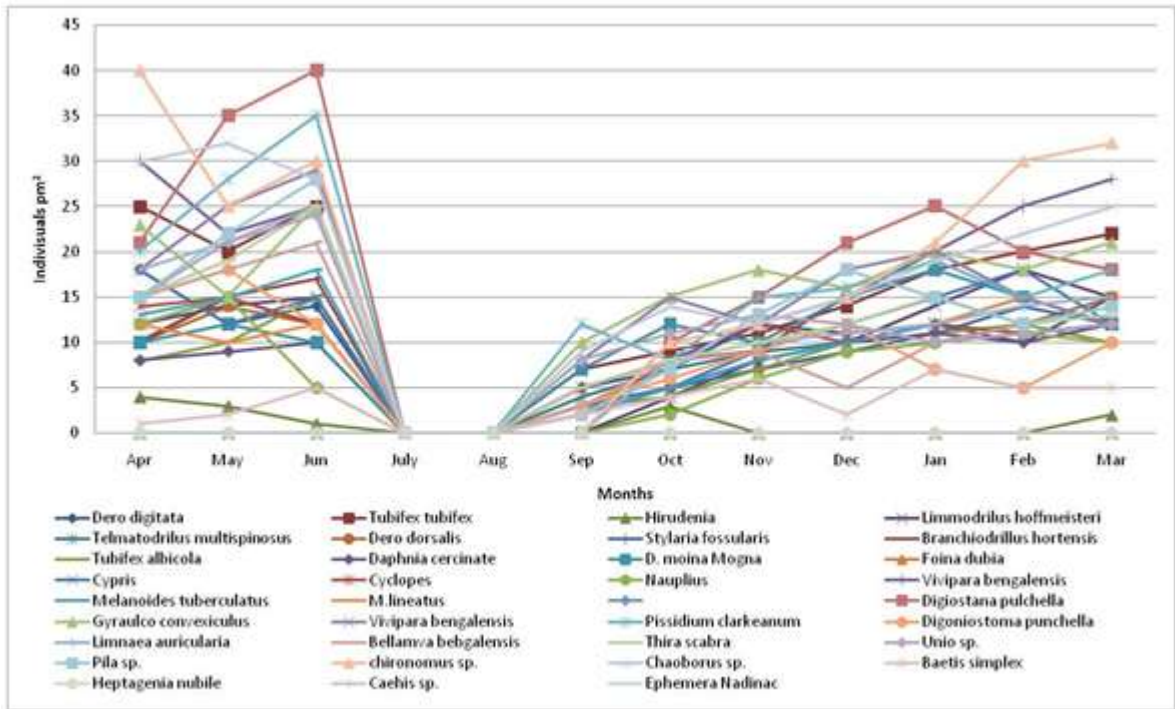




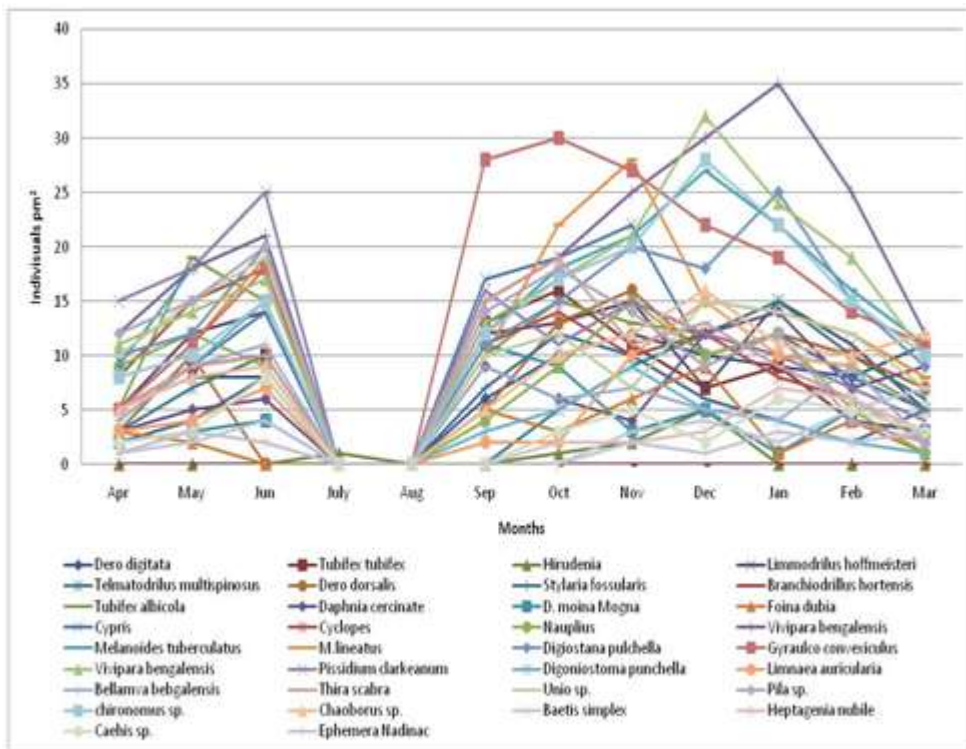
Monthly distribution of macro benthic communities of Narmada river at Station -1 (2011-12)



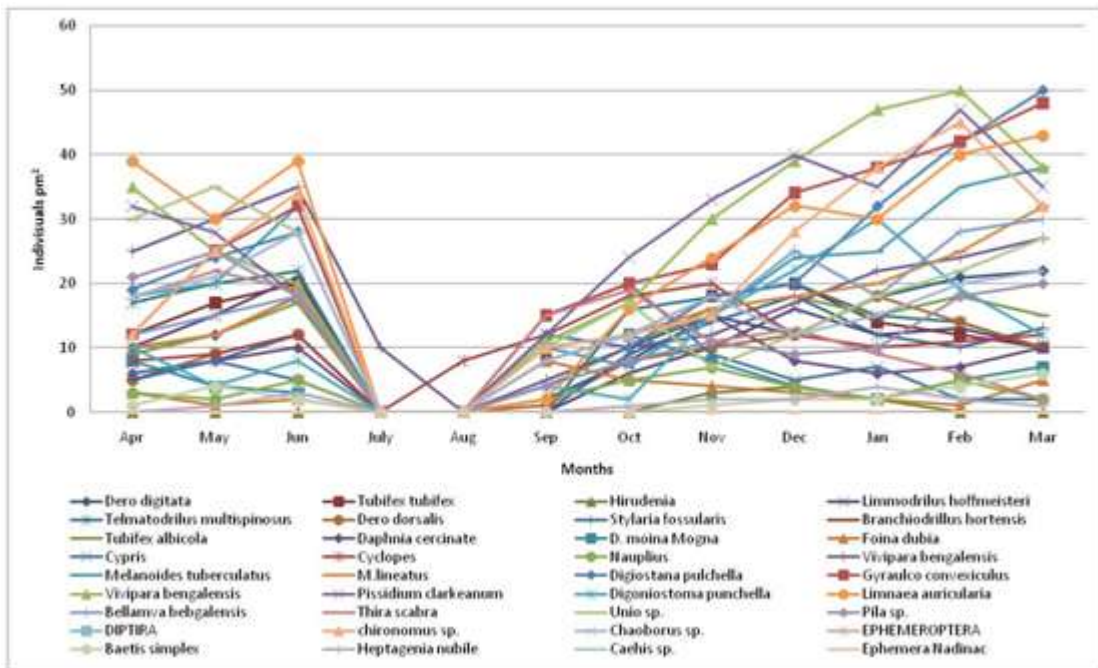
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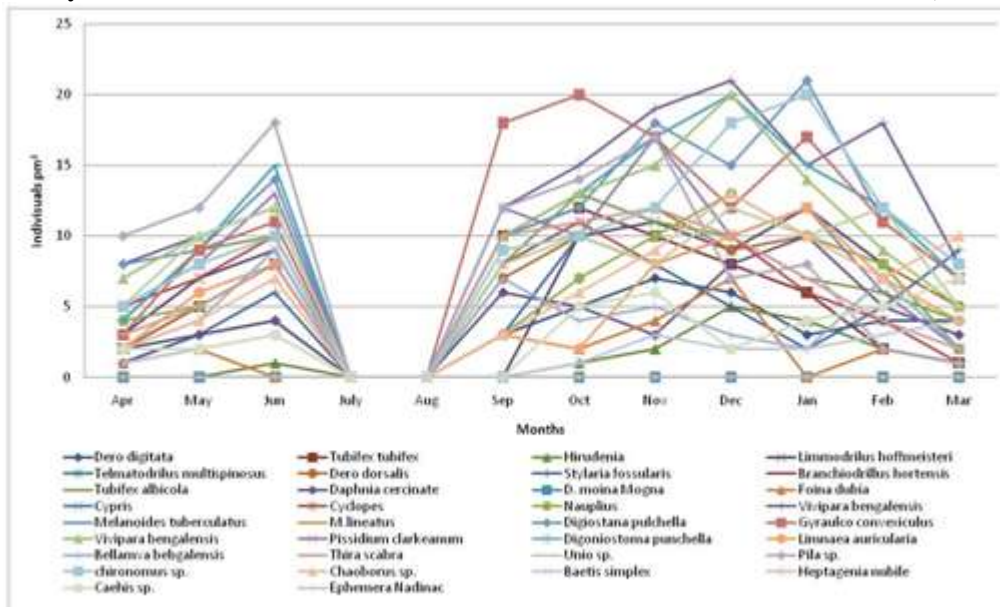
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Monthly distribution of macro benthic communities of Narmada river at Station -3(2010-11)

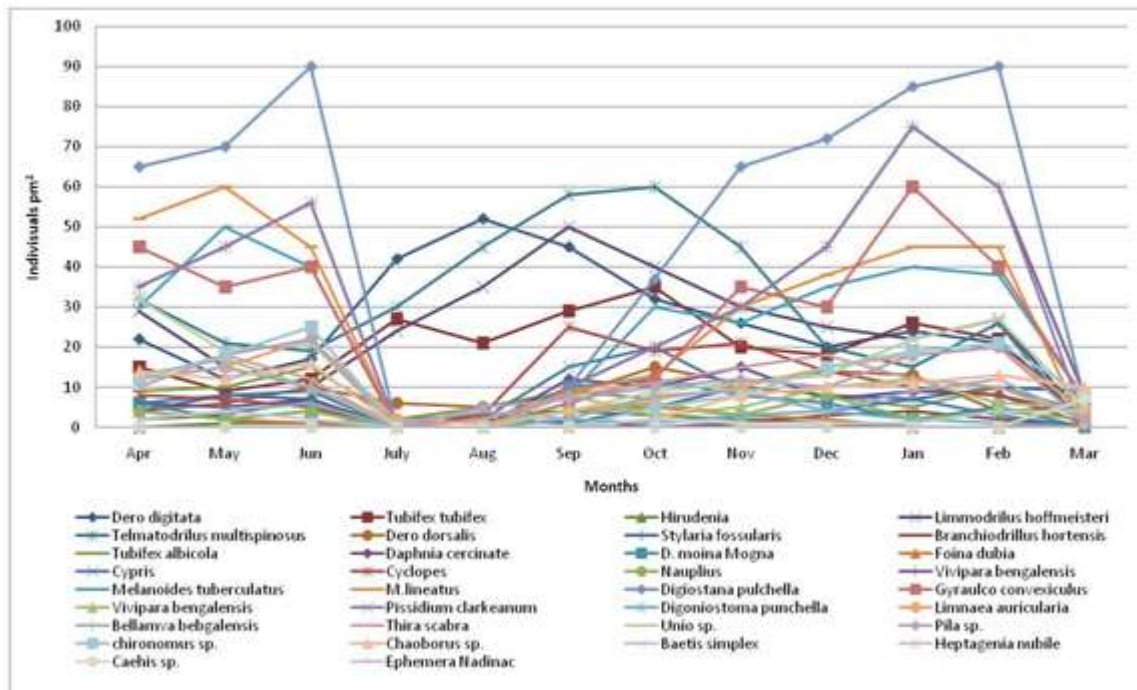


Monthly distribution of macro benthic communities of Narmada river at Station -3(2011-12)



Monthly distribution of macro benthic communities of Narmada river at Station -4(2010-11)





Monthly distribution of macro benthic communities of Narmada river at Station -4(2011-12)