

# Seasonal Variations of Benthic Fauna of Ottu Reservoir, Sirsa (Haryana), India

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## Abstract

The present study focused on the seasonal variations of benthic fauna of Ottu reservoir. Freshwater reservoir are inhabited by diverse benthic fauna of which Annelida, Arthropoda and Mollusca holds a great ecological importance. The benthic fauna of Ottu reservoir was represented by sixteen species belonging to three groups viz. Annelida (5 species), Arthropoda (7 species) and Mollusca (4 species). Arthropoda was the dominant group among all and it constitutes 59.11 % of the total benthic species collected. Annelida was the second dominant group and contributes 25.34% of benthic population. Whereas group Mollusca was the least abundant among all and it shared 15.55% of total benthic fauna of Ottu reservoir. Quantitative differences have been observed in benthos during different seasons. Summers and monsoon favoured the benthic fauna while winters witnessed less in the Ottu reservoir.

**Keywords:** Variations, benthic fauna, Ottu reservoir, Sirsa, dominant.

## Introduction:

Water resources are of critical importance to natural ecosystem, artificial or man made ecosystem and human development. In man made ecosystem reservoirs are provide water for irrigation, industries and drinking purpose. Human being can not make or generate either of these basic elements of life in a form in which those are needed. Good quality of water resources depends on a large number of physico-chemical parameters and biological characteristics. These characteristics can identify certain condition for the ecology of living organisms and suggest appropriate conservation and management strategies. Many researches are being carried out till present<sup>1-5</sup>.

Freshwater benthic species evolved from many phyla over millions of years and represent a rich fauna. The abiotic environment of the water body directly affect in the distribution, population density and diversity of the benthic community. Benthic fauna are especially of great significance for fisheries that they themselves act as food of bottom feeder fishes<sup>6</sup>. The studies on benthic communities of freshwater bodies of India are reported by several authors<sup>7-11</sup> reported energy content of benthic invertebrates and their seasonal changes in Indian freshwater reservoir which explains rich biodiversity of the region.

Benthic fauna are those organisms that live on or inside the deposit at the bottom of a water body<sup>12</sup>. In Benthos include several species of organisms, which cut across different phyla including annelids, arthropods and molluscs. These organisms play a vital role in the circulation and recirculation of nutrients in aquatic ecosystems. Most benthic organisms feed on debris that settle on the bottom of the water and in turn serve as food for a wide range of fishes<sup>13</sup>. The present study was proposed to investigate the seasonal variation of benthic fauna of Ottu reservoir district Sirsa in Haryana state.

## Study Area:

In order to present study we have carried out the seasonal variations of benthic fauna of Ottu reservoir near Sirsa, Haryana. The Ottu reservoir is situated at Ottu village (near Rania) of the mid south of Sirsa (Haryana) state between 29.29'21" North latitudes and 74.53' 38" East longitudes. Ottu reservoir is situated about 14 km. from centre east-west of Sirsa city. seasonal variations in benthic fauna of Ottu reservoir have been studied on monthly basis for a period of fifteen months.

## Materials and Methods:

The sample collection was made during the morning hours between 9.00 to 11.00 AM. The samples were collected every month for the period of 15 month i.e. April 2012 to June 2013 and calculate seasonal average value of all datas. The recorded data was yearly segregated in three seasons, Winter (November to February), Summer (March to June) and Monsoon (July to October).

For the study of benthos, the mud samples were collected with the help of a quadrat having dimensions 20 cm × 20 cm (400 cm<sup>2</sup>). The mud from this quadrat was taken out with the help of shovel and transferred to duly labeled polythene bags. The samples were transported to the laboratory for examination of benthic fauna. Some water was added with mud to prepare a suspension. This was filtered through a sieve having mesh size 2.0 mm. Residue was transferred to white plastic tray. For effective sorting moderate volume of water was added into the container to improve visibility. Forceps were used to pick large organisms while smaller ones were sorted out using soft brush. Again this residue was filtered through sieve of 0.5 mm mesh size. These were preserved in 4% formaldehydes for further observation and identification. The preserved benthos were later identified to their lowest taxonomic group under binocular microscope and bull lens. The forms were identified and counted. The result were expressed in terms of Org./m<sup>2</sup>. The benthic organisms were identification was done using the standard taxonomic key<sup>14-19</sup>.

## Result and Discussion:

In Ottu reservoir, A total of Sixteen (16) Benthic species in the present study were identified. The benthic fauna was represented by three phylum viz. Annelida, Arthropoda and Mollusca. During 15 months of study the total species of

Arthropoda were fluctuate between 84.17 to 300.48 org./m<sup>2</sup>. The Arthropods mainly represented by *Dragonfly nymph*, *chironomous sp.*, *Anopheles meigen*, *Baetis sp.*, *Macrobiotus sp.*, *Notonecta glauca* and *Hydrophilus olivacenus* seems as dominant species during the study period. Were recorded as highest during the study time period. In same reservoir, the second phylum Annelida from the 46.67 to 103.33 org./m<sup>2</sup>. It is mainly represented by *Tubifex tubifex*, *Dero dorsalis*, *Chaetogaster Sp.*, *Aeolosoma sp.* and *Erpobdella sp.* were recorded during the study time period. Mollusca were fluctuate between 14.17 to 81.43 Org./m<sup>2</sup> (Table-1). *Lymnaea acuminata*, *Digoniostoma sp.*, *Vivipara dissimilis* and *Physa acuta* were recorded in Mollusca. In total during study period the benthic fauna ranges from 166.67 to 485.24 org./m<sup>2</sup>.

These benthic species can be used to establish biological criteria to classify the freshwater ecosystem as being healthy or polluted. Arthropoda and Annelida species and percentage composition of respectively 59.11% and 25.34% occurred most and Molluscs species and percentage composition of 15.55% occurred least as shown in the table-1 and figure-2. Among Annelids, *Tubifex tubifex* was the dominant species represents 47.25% of the total species of Annelids collected from the study area. Seasonal variations in the total population of Annelids is shown in figure-3. Among Arthropods, *Anopheles meigen* was the dominant species and it contributed 33.29 % to the total Arthropods population. Arthropods population showed peak during summer season when the water level was lower and temperature was higher<sup>20-22</sup>. Among Molluscs, *Lymnaea acuminata* was the dominant species and it contributed 40.58% of total Molluscan fauna collected from the study area. Molluscan population was observed higher in the summer season (figure-1 and table-1) which may be due to soft and organically rich bottom and silt matter are known to support thriving populations of benthos<sup>23-25</sup>.

*Anopheles meigen*, *Chironomus sp.* and *Tubifex tubifex* indicate the effect of pollution. *Anopheles meigen*, *Chironomus sp.* showed its peak during summer season which could be attributed to low water level in the reservoir, less oxygen content along with sluggish movement of water during these months<sup>26-27</sup>. *Tubifex tubifex* dominated the total number of Oligochaetes and showed their peak in the summer season when air and water temperature was higher. It was studied that presence of good organic detritus content contributed the maximum quantity of Oligochaetes<sup>28-31</sup>. The peak of total benthic count remained high during summer season and low during winter season<sup>32</sup>.

**Table-1: Seasonal variation, Annual value and Percentage of Benthic fauna of Ottu reservoir during April 2012 to June 2013. Values are averages of all samples and expressed as Org./m<sup>2</sup>**

| S.N.                 | A. ANNELIDA                   | Summer        | Monsoon       | Winter        | Annual        | Percentage  |
|----------------------|-------------------------------|---------------|---------------|---------------|---------------|-------------|
| 1                    | <i>Tubifex tubifex</i>        | 36.19         | 32.5          | 32.5          | 33.73         | 25.34%      |
| 2                    | <i>Dero dorsalis</i>          | 15.24         | 15            | 0             | 10.08         |             |
| 3                    | <i>Chaetogaster sp.</i>       | 19.52         | 3.33          | 5             | 9.28          |             |
| 4                    | <i>Aeolosoma sp.</i>          | 22.86         | 13.33         | 7.5           | 14.56         |             |
| 5                    | <i>Erpobdella sp.</i>         | 9.52          | 0             | 1.67          | 3.73          |             |
| <b>TOTAL</b>         |                               | <b>103.33</b> | <b>64.17</b>  | <b>46.67</b>  | <b>71.39</b>  |             |
| <b>B. ARTHROPODA</b> |                               |               |               |               |               |             |
| 1                    | <i>Dragonfly nymph</i>        | 47.14         | 5.83          | 37.5          | 30.16         | 59.11%      |
| 2                    | <i>chironomous sp.</i>        | 85.24         | 56.67         | 14.17         | 52.02         |             |
| 3                    | <i>Anopheles meigen</i>       | 117.14        | 49.17         | 0             | 55.44         |             |
| 4                    | <i>Baetis sp.</i>             | 0             | 0.83          | 21.67         | 7.50          |             |
| 5                    | <i>Macrobiotus sp.</i>        | 28.57         | 0             | 0             | 9.52          |             |
| 6                    | <i>Notonecta glauca</i>       | 13.81         | 0             | 5.83          | 6.55          |             |
| 7                    | <i>Hydrophilus olivacenus</i> | 8.57          | 2.5           | 5             | 5.36          |             |
| <b>TOTAL</b>         |                               | <b>300.48</b> | <b>115</b>    | <b>84.17</b>  | <b>166.55</b> |             |
| <b>C. MOLLUSCA</b>   |                               |               |               |               |               |             |
| 1                    | <i>Lymnaea acuminata</i>      | 36.67         | 8.33          | 8.33          | 17.78         | 15.55%      |
| 2                    | <i>Digoniostoma sp.</i>       | 18.09         | 2.5           | 18.33         | 12.98         |             |
| 3                    | <i>Vivipara dissimilis</i>    | 18.09         | 0             | 6.67          | 8.25          |             |
| 4                    | <i>Physa acuta</i>            | 8.57          | 3.33          | 2.5           | 4.80          |             |
| <b>TOTAL</b>         |                               | <b>81.43</b>  | <b>14.17</b>  | <b>35.83</b>  | <b>43.81</b>  |             |
| <b>GRANT TOTAL</b>   |                               | <b>485.24</b> | <b>193.34</b> | <b>166.67</b> | <b>281.75</b> | <b>100%</b> |

Figure -1 : Seasonal Variations of benthic fauna of Ottu reservoir during April 2012 to June 2013. Values are averages of all samples and expressed as Org./m<sup>2</sup>

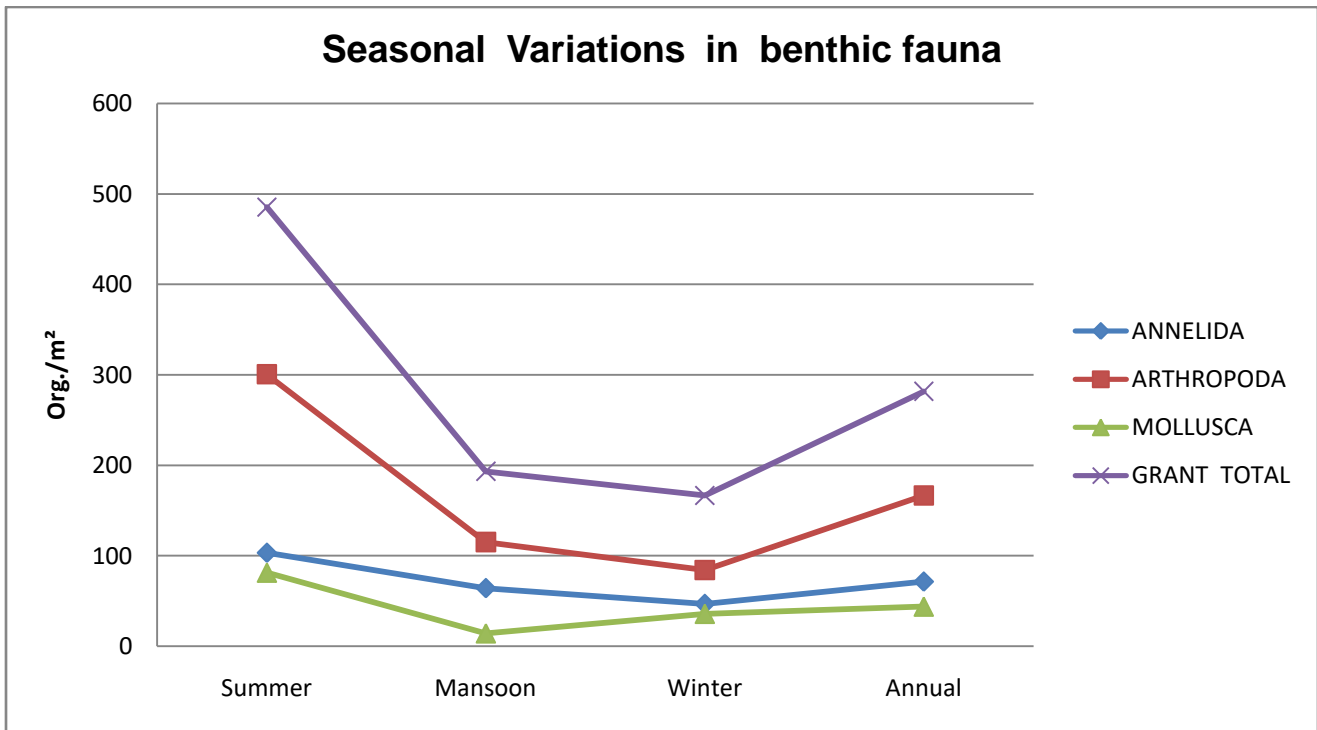


Figure -2 : Pie diagram showing the percentage of different groups of benthic fauna of Ottu reservoir during April 2012 to June 2013.

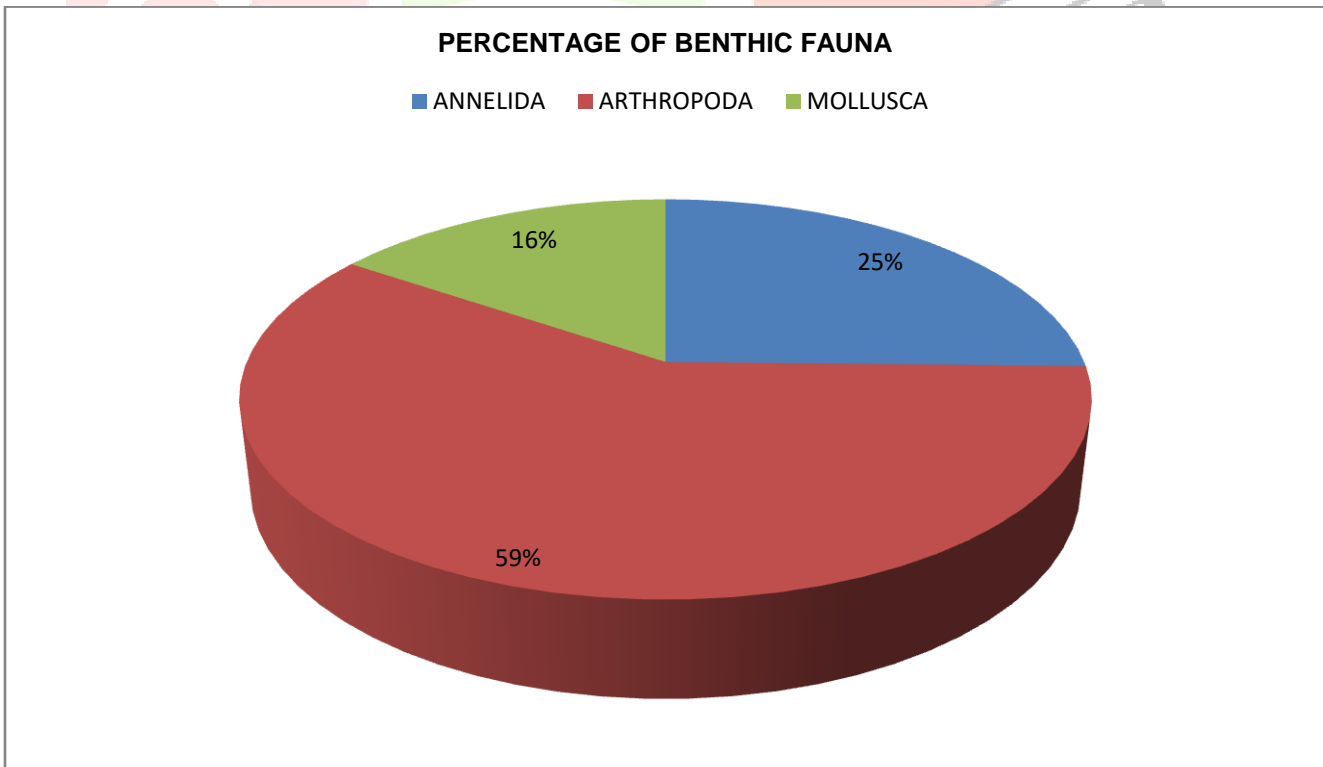
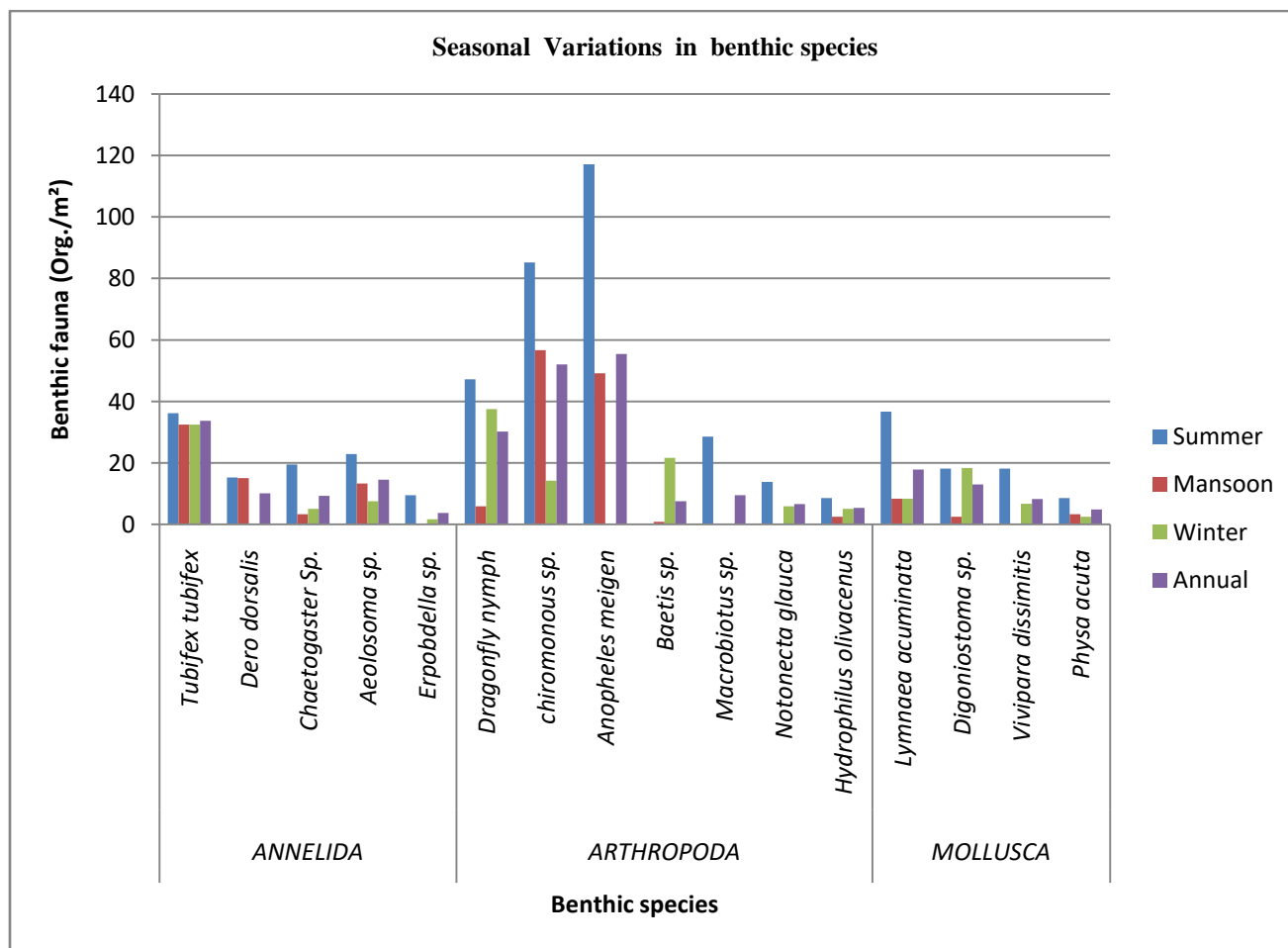


Figure -3 : Total benthic species at Ottu reservoir during April 2012 to June 2013.  
Values are averages of all samples and expressed as Org./m<sup>2</sup>



### Conclusion:

Our study provides the first inventory of the benthic fauna species in Ottu reservoir. Sixteen species were collected in reservoir during the study period. The monitoring of the benthic fauna assemblages carried out in Ottu reservoir showed large seasonal variations in quantitatively terms the composition and structure of benthic fauna communities reveal changes in water quality, especially with regard to organic matter inputs. The abiotic environment of the water body directly affect in the distribution and diversity of the benthic fauna community. The most common benthic fauna organisms belong to Oligochaeta, Ephemeroptera, Odonata, Tardigrada, Hirudinea, Diptera and mollusca during throughout the study period.

It is concluded that the during this study it is observed that an increase in the decaying matter during summer enhances the growth of benthic fauna. Also the pollution indicator species like *Chironomus sp.*, *Anopheles meigen* and *Tubifextubifex* showed water is polluted but not to much extent because of their low number in the study area.

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