



## **Diversity in Zooplankton at Sagra Talab of District Gonda, Uttar Pradesh, India**

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### **Abstract**

The zooplankton constitute is an important component of freshwater talab biodiversity in which a large number of organisms depend throughout the year. Freshwater zooplankton is an important component in aquatic ecosystem whose main function is to act as primary and secondary link in the food chain.

In the present study samples were collected from the littoral, pelagic and polluted region at Sagra talab of district Gonda, Uttar Pradesh State from October 2019 to September 2020 on the monthly basis for the study of diversity in zooplankton. During the present investigation, a total of 24 genera and 23 families of zooplankton belonging to four major groups viz. Protozoan, Rotifers, Crustacean and Meroplanktonic organisms. The maximum Heterogeneity index of zooplankton was recorded in the month of May ('H': 0.94) and minimum in the month of February ('H': 0.14). Zooplankton showed distinct qualitative and quantitative variations. Number of zooplankton increased in the summer months while decreased in the winter months. Different groups of zooplankton exhibited their distinct peaks in different months of the year. In Sagra talab, meroplanktonic organisms have been found to be dominant among zooplankton, generally Anopheles larvae, Culex larvae, Eristalis larvae and Ptychoptera larvae present in water body, which indicate the polluted nature of the talab. Thus keeping in view the importance of study, steps should be taken for conservation and maintenance of Sagra talab.

**Keywords:** Zooplankton, diversity and Sagra talab.

### **Introduction**

Lakes and talabs are freshwater habitats for aquatic plants and animals which play a key role in maintaining regional biodiversity. The important component of the ecological pyramid of the freshwater ecosystem is plankton. Planktonic communities in natural aquatic ecosystem serve as a key group for energy production (Mishra, 1968).

All aquatic animals depend directly or indirectly on the plankton and a healthy zooplankton community in aquatic ecosystem is necessary for productivity of the system. Zooplankton form a component of grazing

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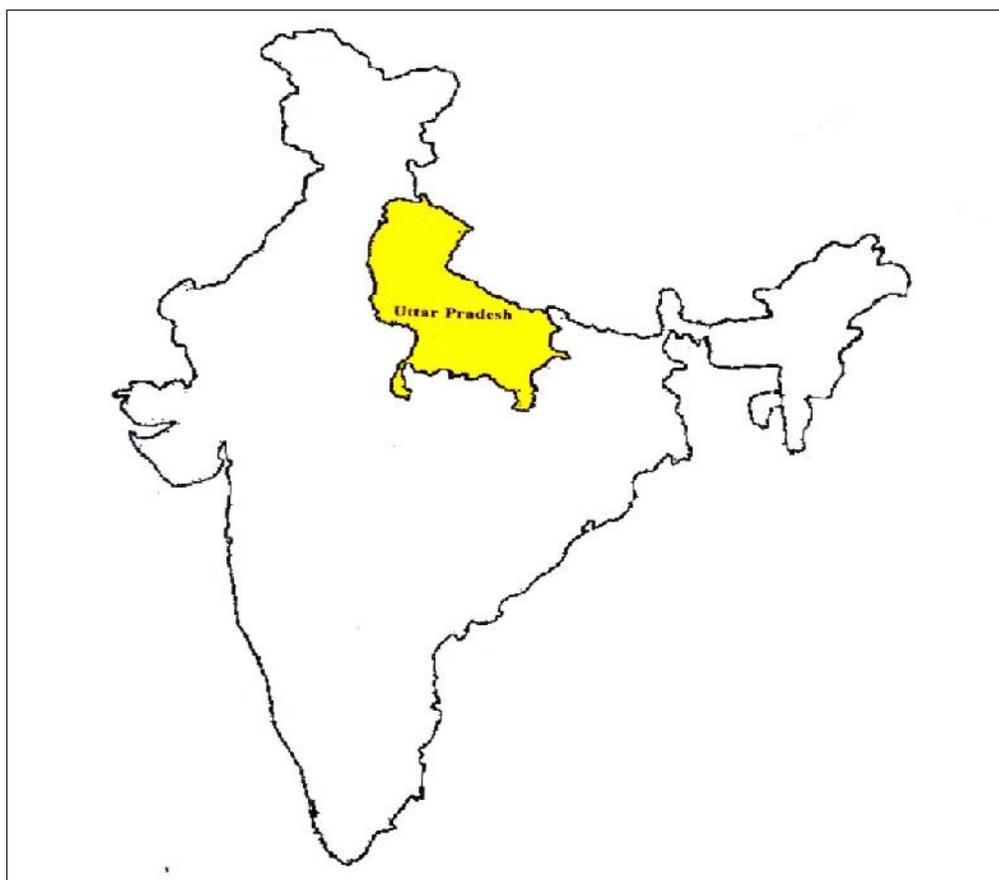
food chain in aquatic ecosystem and these are useful in cycling the organic matter in an aquatic ecosystem. Zooplankton are present in each and every water body of the world with different characteristics and different trends in their diversity and density associated with the fluctuating water parameters. Every lake and pond has unique kind of zooplankton which fluctuate monthly as well as seasonally with respect to seasonal water parameters of the talab basin. The studies of zooplankton in our country were undertaken by investigators like Jha (1968), Mishra (1968), Sahai (1969), Chaturvedi (1999), Sharma and Hussain (2001), Tripathi (2006,a), Lalita Sukhija (2007), Ahmad (2012), Tripathi (2016), Singh (2019) and Tripathi (2019).

But still the studies on qualitative and quantitative assessment of a Sagra talab ecosystem in city of district Gonda, Uttar Pradesh state region are not taken for research by any investigator. Looking from this point of view the diversity in zooplankton at Sagra talab studies were undertaken to know the types of zooplankton present during the study period.

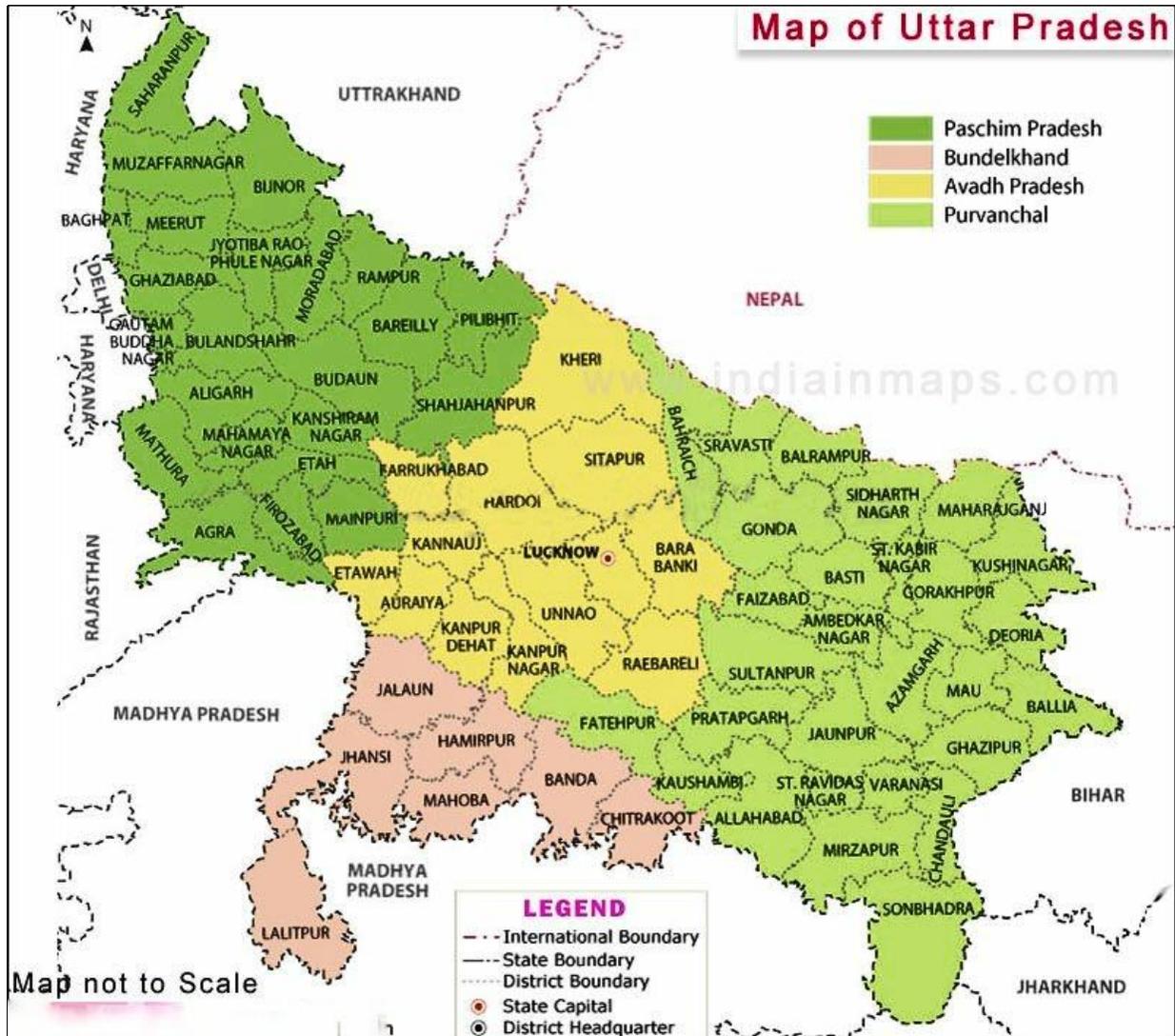
## Materials and Methods

**Location of study area:** Gonda district is located in Devipatan commissionerary in Puravanchal of Uttar Pradesh state. District Basti on the eastern boundary, Bahraich district in the west, Balrampur district in the north and Faizabad and Barabanki district in the south. In the map of the world, the district Gonda is situated between 26°41' to 27°51' degrees north latitude and 81°30' to 82°06' east in the middle of the longitude. The total area of district is 4003 Sq km, which is 28.13% of area of the Devipatan commissionerary (Map-1, 2 & 3).

Sagra talab is located in city at the bus station road, Jhanjhari block of district Gonda. The Sagra talab constructed by Maharaja Devi Bakash Singh's ancestor is still increasing the beauty of the city and covers the area about 12 acres (Fig.-1).



Map -1: Location of study area in India



Map -2: Location of study area in Uttar Pradesh



Map-3: Location of district Gonda ( U.P.), India



Fig.-1: Sagra talab in city of district Gonda

### Sampling and preservation:

Zooplankton samples at Sagra talab were collected during first week of each month between 09.00 AM to 11.00 AM. They were taken from different sampling stations fixed up in littoral region (Site-I, Site-II), pelagic region (Site-III, Site-IV) and polluted region (Site-V, Site-VI, Site-VII) and were transported to the laboratory of P.G. Department of Zoology, M.L.K.P.G. College, Balrampur, Uttar Pradesh.

For the collection of zooplankton, plankton net which is a ring type terricot net (24 mesh /mm<sup>2</sup>) was used. Total of 10 liters of water was filtered through plankton net and the filter water was collected in 125 ml reagent bottle. The zooplankton were preserved in 5% formaldehyde solution on the spot and were brought to the laboratory for identification. For the identification of zooplankton using standard taxonomic literatures (Ward and Whipple, 1959). Zooplankton community composition, percentage abundance and heterogeneity index worked out according to Mishra (1968).

### Results and Discussion

During present investigation, total of 24 genera and 23 families of zooplankton belonging to four major groups viz. Protozoan, Rotifers, Crustacean and Meroplanktonic organisms have been reported from seventh selected site at

Sagra talab for a period of one year October 2019 to September 2020. Monthly variation of zooplankton community is documented in Table-1 and zooplankton diversity Heterogeneity index is documented in Table-2. The maximum zooplankton genera recorded at polluted region followed by littoral and pelagic region respectively. In Sagra talab among Protozoan: *Amoeba* sp. (Amoebidae), *Arcella* sp. (Arcellidae), *Diffugia* sp. (Diffugiidae), *Euglena* sp. (Euglenaceae), *Loxodes* sp. (Loxodidae) and *Trichodina* sp. (Trichodinidae) recorded from all sites. Among Rotifers: *Brachionus* sp. (Brachionidae), *Euchlanis* sp. (Euchlanidae), *Filinia* sp. (Filinidae), *Lecane* sp. (Lecanidae), *Lepadella* sp. (Colurellidae) and *Trichocerca* sp. (Trichocercidae) recorded from all sites. Among Crustacean: *Bosmina* sp. (Bosminidae), *Daphnia* sp. (Daphniidae), *Diaptomus* sp. (Diaptomidae), *Moina* sp. (Moinidae), *Polyphemus* sp. (Polyphemidae) and *Sida* sp. (Sididae) recorded from all sites. Among Meroplanktonic organisms: *Anopheles* larvae (Culicidae), *Culex* larvae (Culicidae), *Eristalis* larvae (Syrphidae), *Ptychoptera* larvae (Ptychopteridae), *Tabanus* larvae (Tabanidae) and *Hydroporus* larvae (Dytiscidae) recorded from all sites. The maximum heterogeneity index of zooplankton was recorded in the month of May ('H'-0.94) and minimum in the month of February ('H'-0.14) is documented in Table-2.

**Table-1: Monthly variation of zooplankton community recorded from Sagra talab of district Gonda, Uttar Pradesh, India**  
(Data of October 2019 to September 2020)

| S.No | Zooplankton                              | Months |     |     |     |     |     |     |     |     |     |     |     |
|------|--|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|      |  | Oct    | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|      | Genera                                   |        |     |     |     |     |     |     |     |     |     |     |     |
|      | Protozoa                                 |        |     |     |     |     |     |     |     |     |     |     |     |
| 1    | Amoeba sp.<br>Family-Amoebidae           | +      | +   | -   | +   | +   | +   | +   | +   | +   | +   | +   | +   |
| 2    | Arcella sp.<br>Family-Arcellidae         | +      | +   | +   | -   | -   | +   | +   | +   | +   | +   | +   | +   |
| 3    | Diffflugia sp.<br>Family-Difflogiidae    | +      | +   | -   | +   | +   | -   | +   | +   | +   | +   | +   | +   |
| 4    | Euglena sp.<br>Family-Euglenaceae        | +      | +   | +   | -   | +   | +   | +   | +   | +   | -   | +   | +   |
| 5    | Loxodes sp .<br>Family-Loxodidae         | +      | +   | -   | +   | -   | -   | +   | +   | +   | +   | +   | -   |
| 6    | Trichodina sp.<br>Family-Trichodinidae   | +      | -   | -   | +   | -   | +   | +   | +   | +   | +   | +   | +   |
|      | Rotifera                                 |        |     |     |     |     |     |     |     |     |     |     |     |
| 7    | Brachionus sp.<br>Family-Brachionidae    | -      | -   | -   | +   | +   | -   | +   | +   | -   | +   | -   | -   |
| 8    | Euchlanis sp.<br>Family-Euchlanidae      | +      | +   | +   | -   | -   | +   | -   | +   | +   | +   | +   | +   |
| 9    | Filinia sp.<br>Family-Filiniidae         | +      | -   | +   | -   | -   | +   | +   | +   | +   | +   | +   | +   |
| 10   | Lecane sp.<br>Family-Lecanidae           | +      | +   | -   | -   | -   | -   | -   | +   | +   | +   | +   | +   |
| 11   | Lepadella sp.<br>Family-Colurellidae     | +      | -   | +   | -   | -   | -   | -   | +   | +   | +   | +   | +   |
| 12   | Trichocerca sp.<br>Family-Trichocercidae | +      | -   | -   | +   | -   | +   | +   | +   | -   | +   | -   | +   |
|      | Crustacea                                |        |     |     |     |     |     |     |     |     |     |     |     |
| 13   | Bosmina sp.<br>Family-Bosminidae         | +      | -   | -   | -   | -   | -   | +   | +   | +   | -   | -   | +   |
| 14   | Daphnia sp.<br>Family-Daphniidae         | +      | -   | -   | -   | -   | -   | -   | +   | +   | -   | -   | +   |
| 15   | Diaptomus sp.<br>Family-Diaptomidae      | +      | -   | +   | -   | -   | -   | -   | +   | +   | -   | +   | -   |
| 16   | Moina sp.<br>Family-Moinidae             | -      | +   | -   | -   | -   | +   | +   | +   | -   | +   | +   | -   |
| 17   | Polyphemus sp.<br>Family-Polyphemidae    | -      | -   | +   | +   | -   | +   | -   | +   | -   | +   | -   | +   |
| 18   | Sida sp.<br>Family-Sididae               | +      | +   | +   | -   | -   | +   | +   | +   | +   | -   | -   | +   |
|      | Meroplankton                             |        |     |     |     |     |     |     |     |     |     |     |     |
| 19   | Anopheles larvae<br>Family-Culicidae     | +      | +   | +   | +   | +   | +   | +   | +   | +   | +   | +   | +   |

|    |   |    |    |    |    |    |    |    |    |    |    |    |    |
|----|---|----|----|----|----|----|----|----|----|----|----|----|----|
| 20 | Culex larvae<br>Family-Culicidae            | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  |
| 21 | Eristalis larvae<br>Family-Syrphidae        | +  | +  | +  | +  | -  | +  | +  | +  | +  | +  | +  | +  |
| 22 | Ptychoptera larvae<br>Family-Ptychopteridae | +  | +  | +  | -  | -  | +  | +  | +  | +  | +  | +  | +  |
| 23 | Tabanus larvae<br>Family-Tabanidae          | +  | +  | +  | -  | -  | +  | +  | +  | +  | +  | +  | +  |
| 24 | Hydroporus larvae<br>Family-Dytiscidae      | +  | +  | +  | -  | -  | +  | +  | +  | +  | +  | +  | +  |
|    | Total Zooplankton                           | 21 | 15 | 14 | 10 | 06 | 16 | 18 | 24 | 20 | 19 | 18 | 20 |

Note : + = Present  
- = Absent

**Table 2: Heterogeneity index of Zooplankton in different months at Sagra talab of district Gonda (U.P.), India (Data of October 2019 to September 2020)**

| Months | Oct  | Nov  | Dec  | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| 'H'    | 0.28 | 0.22 | 0.19 | 0.17 | 0.14 | 0.45 | 0.64 | 0.94 | 0.90 | 0.77 | 0.80 | 0.70 |

During the presence of zooplankton was maximum in the summer month (May) and minimum in the spring month (February). This is not conformity to the finding of Eggleton (1931) and Devey (1945) who observed the maximum zooplankton in the month of April and minimum in the month of September in an American lake, while Srivastava (1956) and Tripathi (2006,b) observed maximum in the month of May and minimum in the month of February from lake of Lucknow (U.P) and Seetadwar lake of district Shravasti, Uttar Pradesh state, India, Michael (1969) concluded the peak period in the month of January and April but Mandal and Moitra (1975), Jana and Manna (1975) and Bose & Lakara (1994) found maximum peak during summer months which is quite in conformity to the findings of this investigation. The differences in the occurrence of peak in zooplankton might be due to different nature of the water bodies, difference in the composition of abiotic factors of water, soil and variation in productivity of water bodies. Some workers such as Bhati and Rana(1987), Chaurasia (1996) and Singh (2000) correlated bottom community with the fish productivity and accordingly this water body is most suitable for the pisciculture.

## Conclusion

The present contribution is the result of the extensive and intensive studies on diversity in zooplankton at Sagra talab carried out during October 2019 to September 2020. During

present investigation in Sagra talab, meroplanktonic organisms have been found to be dominant among zooplankton and generally Anopheles larvae, Culex larvae, Eristalis larvae and Ptychoptera larvae present in Sagra talab which indicate the polluted nature of talab. Thus keeping in view the importance of study, steps should be taken for conservation and maintenance of Sagra talab. It is the necessarily step which have to be followed for the safety of Sagra talab.

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