Biodiversity Assessment of Balapur Pond of District Prayagraj (U.P.) with Special Reference to Vertebrates and Angiosperms

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Abstract
The present study was undertaken to record the diversity of Balapur pond of the Prayagraj district of Uttar Pradesh with special reference to vertebrates and angiosperms. The Balapur pond was surveyed in detail once in a month for a period of one year from January 2018 to December 2018. The survey reflects a rich and flourishing biodiversity of the pond studied including 40 chordate species and 38 species of angiosperms. The notable chordate diversity includes 12 species of fishes, 2 species of amphibians, 7 species of reptiles, 11 species of birds and 8 species of mammals. Besides, several species of annelids, crabs, butterflies, moths, grasshoppers, ants, termites, lobsters, snails, other gastropods, planktons, algae, bryophytes and pteridophytes have also been observed.

Introduction
A vertebrate has notochord during its embryonic development which is replaced by a cartilaginous or bony vertebral column or backbone in adults. The subphylum Vertebrata comprises seven classes of living animals namely Cyclostomata, Chondrichthyes, Osteichthyes, Amphibia, Reptilia, Aves and Mammalia. First four are popularly known as Anamniota and last three as Amniota (Verma and Praksh, 2020a). The angiosperms are well developed and highly evolved group of plants in which there is seeds enclosed within the fruit. They have well differentiated root, stem and leaves and also have well developed vascular tissue.

India is a developing and agriculture dominating country. Most of its population depends upon agriculture. In India, a large number of ponds, lakes and reservoirs occur naturally but most of them are not being utilized properly due to their improper and insufficient hydrobiological studies. A proper and systematic hydrobiological study is very important
to understand the metabolic activities in the aquatic ecosystem especially pond. The pond contains standing water that provides habitat for wetland biota i.e. plants and animals.

Wetlands constitute one of the most productive ecosystems and play a significant role in the regional ecological sustainability. They have been an essential part of human civilization meeting many crucial needs for life such as drinking water, food, fodder, energy supply, flood storage, transport, recreation, biodiversity, and climate stabilization. The cross cultural, economic and ecological values of wetlands provide a fine blend of past, present and future of human descend, existence, and future perspectives of sustainability.

Prakash et al., (2015), Prakash and Verma (2015, 2016), Verma and Prakash (2016) performed the limnological and ichthyological studies of Alwara Lake of Kaushambi (U.P.). Verma (2016, 2017, 2019a, 2019b, 2020a), Verma and Prakash (2017, 2020b), Sugumaran et al., (2020) and Bhagde et al., (2020) studied the limnological parameters as well as distribution and conservation status of fishes in the various lentic fresh water bodies of Uttar Pradesh. The present exploration was undertaken to assess the biodiversity of Balapur pond of the Prayagraj district of Uttar Pradesh with special reference to vertebrates and angiosperms. This study was conducted during a period of one year from January 2018 to December 2018. The pond studied has rich and flourished biodiversity.

**Materials and Methods**

The pond studied is natural and perennial, located on south side of the village Balapur. It is located in Koraon block and tahsil of Prayagraj district of Uttar Pradesh (image 1). The pond studied is situated at a distance of approximately 62 kilometers from Prayagraj district HQ. Balapur is a small village of about 800 population size, surrounded by Janakpur in east, Paitiha in south west, Banshipur in north east and Murlipur in south. Generally summer begins in the month of March and continues till mid July. In and around this Balapur village, monsoon begins mostly in last July and more or less continues till mid September. Winter season normally starts in mid November and continues till mid February. Minimum temperature was recorded as 14.2 in January and maximum in July as 35.5°C. This pond (photo 1) is extended in more than two hectares, not only used for irrigation, fish culture but also used as a source of drinking water for animals.

Balapur pond was surveyed and studied in detail to record the vertebrates and angiosperms diversity once for a month along the period of one year from January 2018 to December 2018. The fishes and amphibians were caught and collected for the present survey by hand-nets, gill nets, cast nets, hooks, drag nets with the help of local people and animal catchers. The survey was conducted during
daytime from 7 am to 7 pm and all caught animals were released into the pond after identification. Author did not need to collect the reptiles, birds and mammals as they were easily recognisable even from a long distance. People of local communities of adjoining areas also helped the author in several ways including hospitality; collection and identification of vertebrates and angiosperms.

A standard survey method of Burbridge (1994) was followed for field work. Fishes were identified by using the standard keys of Mishra (1959), Day (1989), Jhingran (1991), Jayaram (1999) and Srivastava (1998). Dutta (1997) and Dinesh et al., (2019) helped to identify amphibians while reptiles with the help of Aengals et al., (2012). Birds were identified with the help of Ali (1988) while angiosperms were identified with the help of Sambamurty (2010).

Results and Discussion
The author recorded (a) 40 species of vertebrates: amphibians, 7 species of reptiles, 11 species of birds, 8 species of mammals and (b) 38 species of angiosperms from Balapur pond (table 1).

Table 1: List of Vertebrates and Angiosperms Recorded from Balapur Pond in the year 2018.

| S.No. | Biological name            | Common name | Family          |
|-------|---------------------------|-------------|-----------------|
| 1.    | *Catla catla*             | Bhakur      | Cyprinidae      |
| 2.    | *Labeo rohita*            | Rohita      | Cyprinidae      |
| 3.    | *Labeo calbasu*           | Karaunchh   | Cyprinidae      |
| 4.    | *Cyprinus carpio*         | Common carp | Cyprinidae      |
| 5.    | *Cirrhinus mrigala*       | Naini       | Cyprinidae      |
| 6.    | *Mystus seenghala*        | Tengara     | Bagridae        |
| 7.    | *Rita rita*               | Rita        | Bagridae        |
| 8.    | *Wallago attu*             | Pardni      | Siluridae       |
| 9.    | *Clarias batrachus*       | Mangur      | Claridae        |
| 10.   | *Heteropneustes fossilis* | Singh        | Saccobranchidae |

Photograph 1: A view of Balapur pond in Prayagraj district
| No. | Species                                      | Order            | Family            |
|-----|---------------------------------------------|------------------|-------------------|
| 11. | Channa punctatus                            | Saura            | Ophiocephalidae   |
| 12. | Gudusia chapra                              | Suhia            | Clupeidae         |
|     | **AMPHIBIANS**                              |                  |                   |
| 13. | Hoplobatrachus tigerinus                    | Indian bullfrog  | Dicroglossidae    |
| 14. | Duttaphrynus melanostictus                  | Common Indian toad | Bufonidae      |
|     | **REPTILES**                                |                  |                   |
| 15. | Calotes versicolor                          | Garden lizard    | Agamidae          |
| 16. | Uromastix hardwickii                       | Spiny tailed lizard | Agamidae      |
| 17. | Hemidactylus flaviviridis                  | House gecko      | Gekkonida         |
| 18. | Naja naja                                   | Indian Cobra     | Elapidae          |
| 19. | Bungarus caeruleus                          | Krait            | Elapidae          |
| 20. | Eryx johnii                                 | Red Sand Boa     | Boidae            |
| 21. | Varanus bengalensis                         | Indian Monitor lizard | Varanidae |
|     | **BIRDS**                                   |                  |                   |
| 22. | Pavo cristatus                              | Peacock          | Phasianidae       |
| 23. | Eudynamis scolopaceus                       | Koel             | Cuculidae         |
| 24. | Acridotheres tristis                        | Common myna      | Sturnidae         |
| 25. | Passer domesticus                           | House Sparrow    | Passeridae        |
| 26. | Corvus splendens                            | House Crow       | Corvidae          |
| 27. | Pycnonotus cafer                            | Red-vented Bulbul | Pycnonidae      |
| 28. | Psittacula eupatria                         | Parrot           | Psittaculidae     |
| 29. | Columba livia                               | Common Rock Pigeon | Columbidae     |
| 30. | Bubo bubo                                   | Owl              | Strigidae         |
| 31. | Gyps indicus                                | Indian Vulture   | Accipitridae      |
| 32. | Egretta garzetta                            | Indian Egret     | Ardeidae          |
|     | **MAMMALS**                                 |                  |                   |
| 33. | Oryctolagus cuniculus                       | Rabbit           | Leporidae         |
| 34. | Sorex araneus                               | Shrew            | Soricidae         |
| 35. | Rattus rattus                               | Rat              | Muridae           |
| 36. | Mus musculus                                | House mouse      | Muridae           |
| 37. | Funambulus palmarum                        | Squirrel         | Sciuridae         |
| 38. | Sus scrofa                                  | Pig              | Suidae            |
| 39. | Boselaphus tragocamelus                     | Nilgai           | Bovidae           |
| 40. | Lutrogale perspicillata                     | Smooth-coated Otter | Mustelidae     |
|     | **ANGIOSPERMS**                             |                  |                   |
| 41. | Eichhornia crassipes                        | Common water hyacinth | Pontederiaceae |
| 42. | Monochoria vaginalis                        | Pickerel weed    | Pontederiaceae    |
| 43. | Hygoryza aristata                           | Asian water grass | Poaceae           |
| 44. | Vetiveria zizanioides                       | Vetiver          | Poaceae           |
| 45. | Apluda mutica                               | Mauritian grass  | Poaceae           |
| 46. | Pistia stratiotes                           | Water cabbage    | Araceae           |
| 47. | Spirodela polyrhiza                         | Common duckweed  | Araceae           |
| 48. | Wolffia arrhiza                             | Rootless duckweed | Araceae          |
| 49. | Lemna perpusilla                            | Minute duckweed  | Araceae           |
| 50. | Ludwigia adscendens                         | Water primrose   | Onagraceae        |
| 51. | Nelumbo nucifera                            | Indian lotus     | Nelumbonaceae     |
| 52. | Nymphaea stillata                           | Water lily       | Nymphaeaceae      |
| 53. | Hydrilla verticillata                       | Water thyme      | Hydrocharitaceae  |
| 54. | Najas graminea                              | Ricefield water-nymph | Najadaceae    |
| 55. | Potamogeton crassipes                       | Clasping leaf pondweed | Potamogetonaceae |
56. **Vallisnaria spiralis**  
57. **Ceratophyllum demersum**  
58. **Alternanthera sessilis**  
59. **Glinus lotoides**  
60. **Boerhavia diffusa**  
61. **Canscora decurrens**  
62. **Centella asiatica**  
63. **Eleocharis dulcis**  
64. **Cyperus spp.**  
65. **Fimbristylis littoralis**  
66. **Ipomoea aquatica**  
67. **Evolvulus assenoides**  
68. **Peristerpoe bicalyculata**  
69. **Hygrophila auriculata**  
70. **Juncus bufonius**  
71. **Limnophila indica**  
72. **Nymphoides cristata**  
73. **Heliotropium spp.**  
74. **Polygonum spp.**  
75. **Sonchus arvensis**  
76. **Tephrosia pumila**  
77. **Trianthema portulacastrum**  
78. **Typha angustifolia**

All the 12 species of fishes recorded are edible. People of the Balapur and adjoining areas hunt some birds and rabbit for flesh. Indian cobra and krait are poisonous reptiles. Most of the species of birds and few species of mammals are hunted for food. On the basis of rate of decline, population size, area of geographic distribution and degree of population, distribution fragmentation etc., most of the above species has already been evaluated by IUCN (International Union for Conservation of Nature) Red List. Most of the species recorded during exploration belong to least concern (LC) to critically endangered (CR) categories (Verma, 2020b, 2020c). Out of the 38 species of angiosperms recorded; 22 species are rooted amphibians, 7 free floating, 4 rooted floated, 4 rooted submerged and 1 suspended hydrophytes. Besides, pteridophytes, bryophytes, algae, several species of annelids, crabs, butterflies, moths, grasshoppers, ants, termites, lobsters, snails, other gastropods and a number of diatoms and planktons have also been observed in and around the pond.

**Conclusion**

The author thus, recorded a total of 40 species of chordates including 12 species of fishes, 2 species of amphibians, 7 species of reptiles, 11 species of birds, 8 species of mammals and 38 species of angiosperms in and around the Balapur pond. Moreover, a number of species of annelids, crabs, butterflies, moths, grasshoppers, ants, termites, lobsters, snails, other gastropods and pteridophytes, bryophytes, algae, planktons, diatoms have also been observed. Considering the importance of rich biodiversity and highly productive ecosystem, the author suggests and strongly recommends for a complete study of the said pond both for diversity of plants and animals on large scale so as to offer a natural abode to the animals, a beautiful habitat to the plants and ecological gift to the environment.

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Conflict of Interest
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