

# Status of Limnological Research in India



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## Opinion

Hydrobiology and limnology are the branches of ecology mainly developed over last century. While Forel [1] is regarded as the founder of limnology for his pioneering, classic and continued work, in India this credit goes to Ganapati besides some early workers like Hora, Alikunhi and Srinivasan. Today hydrobiological/limnological research is prolific all over the world, including India. The subject over the period of time has become more and more elaborate and intensive with the development of advance techniques, instrumentation, faster communication, data analysis and information retrieval.

India, with her unique geological history, highly diverse physiography, monsoon climate with extremes of temporal and spatial variability, and high biotic diversity, is endowed with equally diverse aquatic habitats. In India, although stray ecological notes are found in different early studies on aquatic fauna and flora in early twentieth century, the credit of pioneering limnological work goes to Ganapati [2-4]. Later, the studies proliferated in southern India [5-8] and then in rest of the country right up to the north [9-11], the east [12], the central India [13] and in the west up to Rajasthan desert [14-17]. George [18] made a comprehensive review of the history of limnology in India as on the date. Further, a fairly detailed review of limnological investigations in all kinds of inland aquatic ecosystems with focus on their physical and chemical environment, biological communities and ecosystem processes was made by Gopal & Zutshi [19].

The interest in inland aquatic environments grew rather rapidly. Several thousand of publications during the past fifty years reflect the widespread interest in hydrobiological research in the country which in the present short resume obviously cannot be covered. The areas that are mainly covered in such Indian studies include physical-chemical limnology, flora and

fauna (taxonomy, distribution, ecology, community structure and dynamics), primary and secondary productivity, nutrient dynamics, toxicology and pollution.

I engaged myself in limnological research in 1978 when I started with work on macrobenthic fauna of a desert pond and published a short note thereon [20]. My journey continued since then and it was almost exhausted lately with the publication of my book 'Wetlands of the Indian desert: Ecology and Biodiversity' [21] encompassing almost all work of mine and others in this field. Over this period of about four decades I have minutely observed the trend of limnological research as a researcher, reviewer, editor, and teacher. Unfortunately, in recent past, the Indian limnological research has developed certain dark spots damaging the credibility of research output. This is more so because to many it appeared as an easy subject for the degree without much scientific accountability. As a result many a limnological findings appeared as non-serious repetitive works on X lake, Y pond or Z river etc. While many of such studies, if not all, lacked an intense interpretation of the facts, the over-generalization and under-specialization has left them to just a status of report on some physical, chemical and biological factors monitored over a given period. Furthermore, many of the studies are badly deficient in taxonomic substance of the community studied. Identification of flora and fauna is often inadequate, reached only up to generic level, and at times appear to be erroneous too as been based upon guides on foreign flora and fauna. Many a times some species are quoted which have no distribution in Indian waters. Mediocrity, shortcut and casual approach are the reasons for overall deterioration of the subject in the country wherein quantity of research is overshadowing the quality. This has further been worsened by paid journals accepting manuscripts without expert review.

It is the time to introspect the whole situation and find some new thrust areas to explore the hydrobiological facts with due sincerity. Following few areas in the subject may be identified for research:

- a) Specific aquatic communities like periphyton, neuston, benthos, plankton and nekton of a system.
- b) Biodiversity studies like those on different animal and plant groups.
- c) Population ecology including temporal and spatial trends of dynamics.
- d) Pollution ecology of an aquatic ecosystem or of a particular community in relation to specific pollutants (of point or non-point origin).
- e) Eutrophication and senescence studies on an ecosystem studied over a considerably long period. Trends in alterations in community composition and functional attributes could be the subjects of interest.
- f) Bioindicators and indices of water quality.
- g) Nutrient budget, particularly of phosphorus and nitrogen, and its dynamics in a system.
- h) Carbon budget in terms of carbonates, bicarbonates, free carbon dioxide and organic carbon.
- i) Energy flow within an ecosystem through different trophic levels.
- j) Ionic regime of the system, taking into account the major cations and anions in relation to the biota.

Instead of generalized physical and chemical parameters, specific parameters relating to the problem concerned should be given due weightage. For example in periphytonic and benthic studies substrate and sediment respectively deserve prime attention. Application of appropriate statistical tool to the procured data is also of great importance to add to the scientific moiety of the work.

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