

**ECOLOGICAL BIOGEOGRAPHY OF FRESHWATER FISHES IN THE
NORTH-EAST REGIONS OF INDIA**

ABSTRACT

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A B S T R A C T

The present work was undertaken to gain an insight into an ecosystem so rich and diverse in its complexity as the North-Eastern Hill Regions of India. Fish as the study fauna was undertaken to help in understanding their present dynamic status, temporal and spatial distinction and their occupation in the vast ecological niches available in the lotic systems of these regions. The anticipated outcome was not only cataloguing of the different species available, but also to make an observation on their ecological zoogeography and the possibility of the identification of the origin, evolution and radiation of these North-East Indian fish fauna.

The present investigation was confined to the states of Assam, Meghalaya, Nagaland and the two main union territories of Arunachal Pradesh and Mizoram. Collections were made representative of these areas and as far as possible extensive, representative of the total area. However, intensive observations were made in five lotic systems where both population dynamics and community level interactions were observed seasonally. The analysis were made as far as possible from the origin (Headwaters) to the mouth of these rivers/streams.

For both extensive and intensive collections and observations done, cataloguing was made in the form of

checklists and various distribution maps drawn. The former was done for the political entities undertaken and the latter for the drainage of the region. Subsequently, a number of statistical analyses incorporated to highlight the ecological aspects of the distribution of fish, their occurrence, co-occurrence and other related phenomena. Those which were used for this purpose were the Shannon-Weiner Index, the Species Richness Index, Hmax. the evenness and the Redundance Values. All these indicated not only the occurrence of species but their dynamic status during the period of investigation. Further, they also revealed the combination of species and groups of species interacting in the various ecological niches undertaken. In addition, Poisson Distribution and Morisita's Index were done to reveal the randomness, nonrandomness and aggregate behaviour in these fishes. Moreover, the different species of fish and their presence and absence in these major systems were calculated after the Average Faunal Resemblance Index, and this was further substantiated by the incorporation of Sørensen's Quotient of similarity between the systems undertaken.

All the above though confined to the fauna itself, an understanding into their occupation was analysed by the incorporation of habitat diversity indices, measured by the use of three criteria of depth, substrate and current and the correlation between these habitat diversities and species diversities worked out.

The present investigation was representative of all the the superorders, orders, families and genera recorded earlier though they fell short by 30 species. It was seen that the largest group was Cypriniformes with Cyprinidae dominating. It was also seen that 21 species were found commonly occurring in different states and union territories. In general, the present study also revealed that the North-East possessed 1 family, 5 genera and 22 species endemic. The state of Assam had the largest number of 146 species followed by Nagaland and Meghalaya with 85 and 82 species respectively. The Union Territories of Mizoram and Arunachal Pradesh recorded nearly 50 species each.

The occurrence of fish in different drainages as seen in the distributional maps were found to be a maximum of 162 in the Brahmaputra drainage followed by the Meghna with 111 and the Chindwin with 67. Meghna drainage does not possess a unique fauna of its own but harboured some species that were obstructed by the Brahmaputra. The Chindwin drainage contained quite a few endemics in Naga Hills and Manipur while Mizo Hills did not possess a unique fish fauna of its own. Of the different rivers in the Brahmaputra drainage understandably the River Brahmaputra harboured the maximum number of species. This river also was seen to be a barrier in the dispersal of species as was clearly seen by their difference in the species number and composition on the northern and southern sides of this river. Detailed

discussions on the presence and absence of different species in the different drainages have been incorporated.

The intensive collections revealed that a clearcut dominance of Cyprinidae in the summer months and Cobitidae in the winter months existed. Discussion on population dynamics and community analysis using different statistical formulae have been discussed. The higher altitudes harboured highly specialized hill stream fishes like Garra, Psilorhynchus, Balitora, Pseudechensis, Glyptothorax and Semiplotus, etc., while Schizothorax and Schizothoraichthys were confined to near alpine conditions in Arunachal Pradesh. Universal species like Danio, Barilius, Badis, Mastacembelus and Puntius were seen to be distributed upto moderately high elevations though with varied ecological requirements. Species of Barridae, Cyprinidae, Channidae and Anabantidae preferred the lowlands while Cobitids revealed an enormous range of adaptability. The species which showed remarkable patchyness in distribution were Noeucirrhichthys, Noemacheilus kangjupkhulensis, N. sikmaiensis and N. subfusca. Species like Pillaia indica had very narrow distributional range while P. khajuriae with discontinuity.

The North-East Indian fish fauna represented predominantly South Asian with few endemics, and a high degree of speciation. The richness and species composition in the North-East and its importance in the migrational routes have

been discussed. Both ecological and geological interpretation, as far as possible have been outlined, to enable the understanding of communities and the associations of species.

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