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Ecology of Dhansiri River, Nagaland, India

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ABSTRACT

Nagaland has 68 fish species, During the study period 15 no. of fish species were collected from the river belonging to 4 orders and 8 families. Different phytoplankton genera observed during investigation are - Myxophyceae: *Phormidium*, *Spirulina*, *Anabaena*, *Oscillatoria*. Chlorophyceae: *Spirogyra*, *Chlorococcum*, *Cladophora*, *Ulothrix*, *Cosmarium*, *Chaetophora*, *Triplocera*. Rhodophyceae: *Lemnaea*. Bacillariophyceae: *Cymbella*, *Navicula*, *Anomonies*, *Denticula*, *Synedra*, *Flagilaria*, *Gomphonema*, *Ceratonies*, *Tubellaria*, *Pinnularia*, *Melosira*, *Calonies*, *Gomphonies*, *Nitzschia*, *Coconies*, *Frustulia* and *Amphora*. The bottom fauna of the river is represented by the following benthic groups Ephemeroptera: *Cinygmula*, *Siplonurus*. Coleoptera: Beetle larvae Plecoptera: Stoneflies nymph. Annelida: *Pheritima postuma*. Arthropoda: Crab, Diptera: *Culex*, *Eulalia*, *Chironomus* larvae. Mollusca: *Lymnea*, *Pila*, *Bellamyia*.

Keywords: Ecology, Dhansiri, Plankton, Periphyton, Benthos, Phytoplankton, Zooplankton

1. INTRODUCTION

Ecology is the study of relationship between the living organism and its surroundings that include both, biotic and abiotic factors. The study of aquatic ecology determines the quality of water which is very important for the continuity of fish and other aquatic organisms. Limnological study of various rivers of India have been done by many workers (Singh, 1982, 1999; Khan *et al.*, 1998; Nath, 2001; Pathak *et al.*, 2001). But the information regarding the ecology of rivers of Nagaland is very scarce. So an attempt has been made to study the ecology of Dhansiri river of Nagaland. Dhansiri is the major river of Dimapur district. It is also a perennial source of water for Dimapur city. It originates from Laisang peak of Nagaland.

It flows from south to the north as a boundary between Karbi Anglong and Nagaland and enters the Golaghat district of Assam. On its journey, before joining the river Brahmaputra on the south bank, it joins with several rivers and rivulets. The present study is carried out to access the ecological status of Dhansisri river at Dimapur stretch.

2. MATERIALS AND METHODS

Water samples were collected from the river in the month of January 2020. Some parameters, like temperature, pH, turbidity, dissolved oxygen (DO), free carbon dioxide (CO₂), specific conductivity, total dissolved solids (TDS), and alkalinity were estimated on the spot by using water and soil analysis kit model no. 160. There, the water samples were collected in a DO bottles to determine the other parameters, like total hardness, nitrate, silicate, iron, phosphate, chloride, magnesium, and dissolved organic matters. Soil texture and pH were also analysed. The analytical procedure for above mention parameters was followed, as described by APHA (1989), Welch (1948), and Jhingran *et al.* (1969). Plankton samples were collected by filtering 100-200 litres of river water from different areas using no. 28 mm mesh nylobolt plankton net and preserved in 4% formaline in the plankton tube. Periphyton samples were collected by scraping one to two square centimetre area from the submerged substrata, like wood or stones. Counting was done by drop method taking one drop in each slide at least for five times. Planktons and Periphytons were identified by following the books of Edmondson (1959), Needham and Needham (1966) and Philipose (1967). The benthic organisms on the bed of the river were picked up by using a pipette or forceps and preserved in separate containers.

3. RESULTS AND DISCUSSION

3. 1. Physico-chemical parameters

The river substratum is mainly composed of sand and stones, it is also marked by the absence of rooted plants. River water was found turbid and it may be due to several human activities on the upper stretches of the river. The different parameters of water observed during the time of investigation are: Air temperature 16 °C, Water temperature 7 °C, pH 5, Free CO₂ (1.9 mg·L⁻¹), Dissolved Oxygen (7.0 mg·L⁻¹), Chloride (15.4 mg·L⁻¹), Total hardness (30.2 mg·L⁻¹), Calcium (8.1 mg·L⁻¹), Magnesium (4.1 mg·L⁻¹), Silicate (5 mg·L⁻¹), Iron (0.32 mg·L⁻¹), DOM (1.51 mg·L⁻¹), Nitrate (0.04 mg·L⁻¹), Phosphate (0.003 mg·L⁻¹), Sp. Conductivity (90.3 mhos·cm⁻¹), TDS (45.8 mg·L⁻¹). Similar types of water parameters are observed by many workers in different water bodies.

3. 2. Biotic communities

3. 2. 1. Planktons

Plankton population in the river water is mainly influenced by the water bed, turbidity, human activities and various physic-chemical factors. The plankton population counted during the study period was 12 u/L⁻¹. The phytoplankton dominated over the zooplankton.

The Phytoplankton groups belong to Myxophyceae, Chlorophyceae, Xanthophyceae, Rhodophyceae, and Bacillariophyceae, dominated over the zooplankton.

Zooplankton is represented by only three groups, Protozoa (Dinoflagia), Rotatoria (Rotatorai spp.) and Cladocera (Daphnia). Different phytoplankton genera observed during investigation are: Myxophyceae: *Phormidium*, *Spirulina*, *Anabaena*, *Oscillatoria*; Chlorophyceae: *Spirogyra*, *Chlorococcum*, *Cladophora*, *Ulothrix*, *Cosmarium*, *Chaetophora*, *Triplocera*; Rhodophyceae: *Lemnaea*; Bacillariophyceae: *Cymbella*, *Navicula*, *Anomonies*, *Denticula*, *Synedra*, *Flagilaria*, *Gomphonema*, *Ceratonies*, *Tubellaria*, *Pinnularia*, *Melosira*, *Colonies*, *Gomphonies*, *Nitzchia*, *Coconies*, *Frustulia* and *Amphora*.

3. 2. 2. Periphyton

Periphyton population was observed $3,260 \text{ u/cm}^{-1}$. The occurrence of periphyton observed by earlier workers in different rivers, reservoirs, ponds and lakes were $2,200 - 85,600 \text{ u/cm}^{-1}$, and much lower value was observed by Laal *et al.* (7) from different stretches of river Ganga. This may be due to the fact that periphytic growth is usually more in the lentic sector of the rivers. Hill stream the least disturbed zone of eco system could also provide wider area of stone, boulders for its attachment. The different groups of periphyton observed under this study were belonging to Myxophyceae, Chlorophyceae and Bacillariophyceae. Diatoms are the dominant group both, in the plankton and periphyton. Almost the same genera of diatoms are represented both, in plankton and periphyton count.

3. 2. 3. Macrobenthos

The bottom fauna of the river is represented by the following benthic groups Ephemeroptera: *Cinygmula*, *Siplonurus*. Coleoptera: Beetle larvae Plecoptera: Stoneflies nymph. Annelida: *Pheritima postuma*. Arthropoda: Crab, Diptera: *Culex*, *Eulalia*, *Chironomus* larvae. Mollusca: *Lymnea*, *Pila*, *Bellamya*.

The density of macro-invertebrate benthos was 50 u/m^{-1} . Pathak *et al.* (3) also made such an observation of low benthos density ($62-290 \text{ u/m}^{-1}$) in the different tributaries of river Brahmaputra. So it can be inferred that this river is poor in the macro-benthos. Benthos observed by Choudhury (10) in different rivers of northeastern region of India are ranged ($64-350 \text{ u/m}^{-1}$) in Arunachal Pradesh, ($7-225 \text{ u/m}^{-1}$) in Manipur, ($225-329 \text{ u/m}^{-1}$) in Meghalaya and ($104-212 \text{ u/m}^{-1}$) in Nagaland.

3. 2. 4. Fishery

North eastern region harbours is valuable in fish germplasm resources. So far, 267 fish species belong to 114 genera under 38 families and 10 orders have been reported from the region. Assam has the largest number of fish species (200), followed by Arunachal Pradesh (167), and Nagaland has 68 fish species. During the study period, 15 no. of fish species were collected from the river belonging to 4 orders and 8 families. The collected fish species, according to their systematic position, are as follows:

1) Order - Cypriniformes

Family - Cyprinidae: *Barilius bendelisis* Hamilton, 1807; *Puntius sophore* (Hamilton, 1822); *Pethia ticto* (Hamilton, 1822)

Family - Psilorhynchidae: *Psilorhynchus balitora* Hamilton, 1822

Family - Balitoridae: *Acanthocobitis (Paracanthocobitis) botia* (Hamilton, 1822)

Family - Botiidae: *Botia dario* (Hamilton, 1822)

2) **Order** - Beloniformes

Family - Belonidae: *Xenentodon cancila* (Hamilton, 1822)

3) **Order** - Mastacembiformes

Family - Mastacembelidae: *Mastacembelus armatus* (Lacepède, 1800)

4) **Order** - Perciformes

Family - Belontiidae: *Colisa fasciatus* (Bloch & Schneider, 1801)

Family - Channidae: *Channa punctate* (Bloch, 1793); *Channa striata* (Bloch, 1793)

4. CONCLUSIONS

There are numerous sorts of important timber bearing trees alongside its bank like, Intanki Forest Dhansari river at the side of Kapili by headward erosion and has absolutely isolated the Mikir hills from the Peninsular plateau. Here are numerous perennially waterlogged swampy area domestically called bils related to this river. Dhansiri is a vital river of Dimapur District of Nagaland, India, which flows through Nagaland - Assam border harbouring wealthy aquatic plant life and fauna. Very little studies were finished to document the fauna biodiversity of the Dhansiri river till date. It is necessary to conserve the biodiversity as it gives an improvement to the environment.

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