

INVENTORIZE THE DIVERSITY, SEASONALITY AND DISTRIBUTIONAL PATTERN OF FRESHWATER FISHES IN PALANI HILLS

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Highlights

- The paper provides the readers an understanding about the ecology in Palani hills.
- The hydrological nature can be predicted by following the circumstances.
- It also provides a detail description regarding the fishes and its accompanying eco balance to survive.

Abstract

Species richness, habitat, and assemblages structure was studied across 10 streams inside the southern Western Ghats. The study region yielded sixty kinds of primary freshwater fish, split into 4 order, 13 families, and 27 genera. The water quality evaluation was conducted to understand the living bio-ecological situation of fresh - water streams sea creatures. The Moolayar stream used to have a major anthropogenic effect, but the Kurusedi stream was unaffected. As a consequence, diatoms were discovered at larger numbers in rivers that were impacted by humans. Moreover, the study shows how din flagellates aid in the filtering of organic materials in contaminated rivers but also have a lesser role in uncontaminated rivers. As according real - world examples, the distribution of din flagellates were clearly connected to a PH.

I. INTRODUCTION

Clean water is home to approximately 50% of all species of fish, that implies that float in streams, lakes, and marshes that make for much less than 3% of a world's largest water system. Palani Mountains are host to even more than 800 freshwater fish. There really are approximately 10,000 animal on the planet. Certain aquatic species, including such salmon and tuna, are classified as pelagic. They are born in freshwater resources and afterwards move to an ocean, wherever they live till they are prepared for breed. There are highly migratory species, including such water eel, that swim backward. These animals were hatched at ocean, live the majority of time in freshwater, and afterwards go to a sea to breed. Overexploitation, water contamination, habitat loss, dams, and the invasion of invasive species all are risks for freshwater fish. In past few decades, approximately 40percent of freshwater fish are becoming endangered. This Western Ghats Part of India stretches 1,490 kilometres from Tapi River inside the north to Kanyakumari inside the south, cover an area of roughly 1,29,037 square kilometres with a breadth of 210 kilometres in Tamil Nadu and as little as 48 kilometres in Maharashtra (leaving the Palghat gap) (Anon, 2011). This region was just classified a no-go zone by MOEF, with development and construction restrictions, as an Environmentally Sensitive Place (ESA) (Molur et al, 2011; Anon, 2013). This area, called as Sahyadri and is one of the country's wealthiest concentrations of bio diversity, has 38 east-flowing and 27 west-flowing rivers which flood the whole catchment area as well as other marshes, providing a good home for just a wide range of marine animals, notably fish. In 1988, this area is classified as just environmental hotspots since it is environmentally sensitive to expansion.

II. REVIEW OF LITERATURE

1. The Ecology of The Diatom Genus *Tabellaria* In The English Lake District

BY BRENDA M. KNUDSON

The taxonomy of this genus has been' described earlier (Knudson, 1952, 1953a, b). Reinvestigation of material on which existing records (e.g. W. & G. S. West, 1909; Pearsall & Pearsall, 1925; Pennington, 1943) of *Tabellaria* in the English Lake District are based shows them to be unreliable, owing to the confusion of *T. fenestrata* with *T. flocculosa*. The vague or contradictory statements in the literature concerning the ecology of *Tabellaria* spp. can also be attributed to wrong identifications. it should be pointed out that although *T. flocculosa* so frequently occurs in the English Lake District, there is no evidence that the same genotype exists in each body of water.

2. A Pilot Study of Leaf Litter Associated Diatoms in Five Streams of Southern Western Ghats, India.

M. S. ARULRAJ, S. VIJAYAN AND S. ANBALAGAN

A total of 2488 individual of diatoms were collected under five genera, three families and four orders in five streams of Palani hills, Southern Western Ghats, India. Of five genera observed, *Tabellaria* was occupied the highest percentage (86.4%). Diversity indices showed

that the mid elevational stream of Moolayar had the highest diversity value. The correlation coefficient analysis revealed that pH and elevation were positively correlated with abundance of diatoms. five species observed, the individuals from *Tabellaria* was dominated over the other streams. It may be due to the change of water pH into acidic in nature. This result is supported by the report The present study suggests that diatoms may be used to analyze the integrity stream with less energy.

3. Temperature Tolerances of North American Freshwater Fishes Exposed To Dynamic Changes In Temperature

THOMAS L. BEITINGER, WAYNE A. BENNETT & ROBERT W. MCCAULEY

Traditionally lower and upper temperature tolerances of fishes have been quantified in the laboratory via three different experimental approaches: the Fry or incipient lethal temperature (ILT), critical thermal (CTM) and chronic lethal (CLM) methodologies. Although these three experimental laboratory approaches generate endpoints which are quantitatively expressed as a temperature, are determined experimentally with random samples of fish acclimated to specific temperatures, and involve both time and temperature as major test variables, Acclimation temperature exerts a major effect on the temperature tolerance of most North American fish species and it is usually strongly linearly related to both CTmaxima and CTminima. Although we uncovered dynamic temperature tolerance data for 130 fishes, only a single dynamic, temperature tolerance polygon has been published, that for the sheep's head minnow, *Cyprinodon variegatus*

III. METHODOLOGY

Study Area

The Southern Western Ghats are located between 8° and 12° north latitudes and 76° and 78° east latitudes. In Tamil Nadu and Kerala, the area has around 500 kilometres of mountain valleys. Agasthyamalai, Anamalai, Cardamom Hills, and Nilgiris Hills are among the key eco-regions. The Anamalai Range of Hills, with its highest peak at Anaimudi 2695 mMSL, is interrupted in the north by the 30 km wide Palghat Gap at approximately 110° N, while the Anamalai Range of Hills is interrupted in the south by the 30 km wide Palghat Gap at roughly 110° N. The South-West (Jun-Sep) and North-East (Oct-Nov) monsoons both provide rain to this region, and the average annual precipitation (AAP) surpasses 2,800 mm. In this study, fifteen streams in the Palani highlands of the Western Ghats were surveyed: Moolayar stream, Kurusedi stream, Silver cascade stream, Pillar-rock stream, Kumbakkarai stream, Adukkam stream, Samakkadu stream, Kozhikottu stream, Rat tail falls, Guntar stream, Bear shoal falls, Thalakuthu falls, Pachalur stream Poolathur Stream.

Collection & Identification

All research streams were sampled for fish within a 100-meter radius. Monofilament gill nets of various mesh sizes (10 to 34 mm), drag, scoop, and cast nets were used to collect samples in various habitats such as pools, riffles, runs, and cascades in each stream. The Arunachalam technique was used to sample the fish (2000). The fish were checked, numbered, and released after collecting. A small number of undetermined species specimens (5-10) were preserved in

10% buffered formalin and transferred to the lab for examination. Standard fish taxonomy textbooks were used for species identification and confirmation [8,10]. The present conservation status of India's freshwater fishes was determined using findings from the Conservation Assessment and Management Plan workshop [9].

Data Analysis

The collected data was analyzed by using MS-Excel and statistical software (Past version 3.5). The alpha diversity indices of Shannon, Simpson, Evenness and Margalef were calculated for diatoms distribution in five streams. The Pearson correlation-coefficient was measured to find the relationship between environmental variables and abundance of diatoms. The graphical plots were drawn by using Ms-Excel application.

IV. RESULT & DISCUSSION

Fish Assemblage Structure, Species Diversity and Similarity:

From the study streams, a total of 60 species of primary freshwater fish belonging to four orders, 13 families, and 27 genera were identified. Table 3 shows the number of species, overall abundance, cyprinid abundance and percentage, richness index, Shannon diversity, and evenness index for research streams. In Thalayanai stream, the most species and individuals were recorded, whereas in Hanumannadhi stream, the least number of species and persons were documented. Cyprinids dominated the assemblage structure (72.6 to 92.3 percent), and cyprinids dominated the assemblage structure. Cyprinids dominated the assemblage structure (72.6 to 92.3 percent), and the cyprinids *Danio aequipinnatus*, *Garra mullya*, and *Rasbora daniconius* were found in all study streams. Thalayanai stream has the highest number of cyprinid individuals, which included a number of large barbs such as *Hypselobarbus curmuca*, *H. kolus*, *H. dubius*, *H. dobsoni*, *Tor khudree*, and *Barbodes sarana*. Low cyprinid populations were found in

Bhavalipuzha, followed by Panniyar stream, and these streams contained some specialised forms such as *Homaloptera santhamparaiensis*, *Glyptothorax madraspatanum*, *Noemacheilus guentheri*, *Noemacheilus keralensis*, *Noemacheilus semiarmatus*, and *Noemacheilus triangularis*. In the Achankoil, Kallar, and Bhavalipuzha streams, the Shannon diversity index was high. Except in the Thalayanai stream, where species equitability was low, the evenness index of species distribution was universally comparable in all studied streams. Fishes such as *Puntius conchonus*, *Danio (Brachydanio) rerio*, *Garra gotyla stenorrhynchus*, *Mystus armatus*, and *Pseudambassis ranga*, which were restricted to east flowing streams, and *Puntius denisonii* and *Etroplus maculatus*, which were restricted to west flowing streams, showed a pattern similar to that observed by Easa (1997). *Barbodes carnaticus*, *Horalabiosa joshuai*, *Hypselobarbus curmuca*, *Hypselobarbus dubius*, *Hypselobarbus kolus*, *Hypselobarbus micropogon*, *Puntius kannikattensis*, *P. parrah*, *Rasbora caverii*, and *Salmostoma clupeoides* were among the fish species restricted to east-flowing streams. 39 species are indigenous to the Western Ghats of Peninsular India, out of a total of 60. Nine of the endemic species are strictly endemic to the west flowing systems of the southern Western Ghats (*Barilius bakeri*, *Batasio travancoria*, *Gara hughi*, *Horalabiosa arunachalami*, *Homaloptera santhamparaiensis*, *Hypselobarbus kurali*, *Puntius denisonii*, *Noemacheilus*

guentheri, and N. Three species, *Puntius tambraparniei*, *Puntius narayani*, and *Silurus wynaadensis*, are Critically Endangered; 14 species (*Garra gotyla stenorhynchus*, *Bhavana australis*, *Garra hughi*, *Puntius denisonii*, *Puntius denisonii*, *Puntius denisonii*, *Puntius denisonii*,

Order	Class	Family	Genus	Sites				
				1	2	3	4	5
Fragilariales	Fragilariophyceae	Fragilariaceae	<i>Synedra</i>					
Pennales	Bacillariophyceae	Fragilariaceae	<i>Fragilaria</i>					
Pennales	Bacillariophyceae	Fragilariaceae	<i>Asterionella</i>					
Zygnematales	Zygnematophyceae	Zygnemataceae	<i>Spirogyra</i>					
Tabellariales	Bacillariophyceae	Tabellariaceae	<i>Tabellaria</i>					

Table.1: Variation in species, individuals, cyprinid abundance & index of the Shannon, Margalef’s, evenness

Study sites	S1*	S2	S3	S4	S5	S6	S7	S8	S9	S10
Species	12	19	10	6	15	17	17	13	11	15
Individuals	354	609	278	239	407	521	568	314	267	330
Cyprinid abundance	330	562	251	201	335	396	520	228	226	237
Cyprinids Percentage (%)	93.2	92.3	90.3	84.1	82.3	80.0	91.6	72.6	84.6	72.0
Shannon index	2.38	2.61	2.17	1.64	2.63	2.64	2.66	2.36	2.24	2.64
Margalef’s index	1.87	2.81	1.60	0.91	2.33	2.56	2.52	2.09	1.80	2.41
Evenness index	0.96	0.88	0.94	0.91	0.97	0.93	0.94	0.92	0.93	0.97

*Stream numbers

Table.2: Diversity of diatoms in five streams of Palani hills.

	Kumbakkarai	Moolayar	Pambar	Silver cascade	Kurusedai
Taxa_S	2	3	2	1	0
Simpson	0.1244	0.4243	0.002783	0	0
Shannon	0.2449	0.6437	0.01056	0	0
Evenness	0.6388	0.6345	0.5053	1	0
Margalef	0.3693	0.3521	0.1303	0	0

<1-25: Red, 25-50: Blue, 50-100: Yellow, 100-1000: Black, >1000: Green

Table.3: Alpha diversity indices for diatoms associated with leaf litter in streams of Palani hills.

A total of 2488 diatoms were collected, which were divided into five genera, three families, and four orders (Table 2). There were three genera in the Moolaiyar stream, hence there were no species in the Kurusedai stream. In Pambar stream, the *Tabellaria* genus was heavily connected with leaf litter. Only the *Asterionella* genus was discovered in the Kumbakkarai

stream. The alpha diversity indices for leaf litter related Diatoms were computed in five locations (Table 3).

The Shannon and Simpson indices were highest in Moolaiyar and lowest in Pambar. In the Silver Cascade and Kurusedai streams, there are no species. Kumbakarai and Moolaiyar displayed high species richness of diatoms linked with leaf litter, according to the evenness and Margalef indices. Synedra were found in three locations, with Silver Cascade having the highest concentration. Only one location had Fragilaria, Asterionella, and Tabellaria. Spirogyra was discovered in two locations, and they are plentiful in Moolaiyar. Fish assemblages in the Western Ghats streams are very variable, and the makeup of the assemblage is governed by unique ecological circumstances. The maximum diversity in stream accessibility, variety, and distribution patterns of freshwater fishes have all been linked to diverse sets of environmental gradients that have been widely researched in Western Ghats streams [3,4,5,6]. Streams from west-flowing systems encountered more endemic taxa in the current investigation. These indigenous fishes are generally highly specialised, and their river movements are often restricted. *Puntius denisonii*, for example, is indigenous to the Achankoil River and can only be found in the upstream rapids. The current study reveals remarkable species diversity and endemism in the southern Western Ghats, and the recent descriptions of three new species (*Horlabiosa arunachalami*, *Homaloptera santhamparaiensis*, and *Puntius kannikattiensis*) from the study area suggest that our knowledge of the diversity of fish in this area is far from complete. Furthermore, the study discovered that a number of species in the study region are threatened by various human activities. Habitat change, sand mining, riparian vegetation removal, farm operations, and destructive fishing are the main activities. Habitat modification is frequent in southern Western Ghats streams, where the channels are locally altered for various objectives such as water extraction for drinking, agriculture, and so on. As a result, there is a scarcity of surface flow water in the downstream area, posing a hazard to a variety of localised species.

CONCLUSION

In this study, only five genera of diatoms were collected from five streams in the Palani hills, with the maximum diversity values found in the Moolayar and Pampar streams, and the Kurusedi stream being glaringly missing. This finding suggests that diatom distribution is linked to anthropogenic effect or organic contamination of water. The anthropogenic effect on the Moolayar stream was considerable, but the Kurusedi stream was unaffected. As a result, the streams that had been impacted by humans had more diatoms. Furthermore, this research shows that diatoms aid in the filtering of organic materials in contaminated streams but play a lesser function in unpolluted streams. The distribution of diatoms was highly connected to the pH of water, according to Knudson [1].

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