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Species Richness and distribution of pteridophytes in Kundar rivers of Southern Western Ghats, Shengottai, Tirunelveli District

MUTHIAH Maridass, and GANAPATHY Raju

*Department of Zoology, Pioneer Kumaraswamy College, (Affiliated to Manonmaniam Sundaranar University), Nagercoil, Tamil Nadu

Corresponding Author email: maridassugcpdf@yahoo.co.in

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Abstract
In the study area of Kundar rivers regions of different locality of Southern Western Ghats, Shengottai, Tirunelveli District were observed by 30 species of pteridophytes. They were collected and identified, which belongs to 16 genera and 11 families. The most represented families were Pteridiaceae (12 spp) Polypodiaceae (2 spp), Adiantaceae (2 spp), Aspleniaceae (2 spp.) and Thelypteridaceae (2 spp.), while the most represented genera were Pteris (4spp), Adiantum (4 spp.) and Lycodium (2 spp.) in the kundar regions. The species diversity of four site observed that alpha and beta diversity were recorded significant species diversity. Three species are rare and two were endangered from the study area of Kundar regions. The conclusion of the present study will help us to recognize the patterns of pteridophytes species composition and diversity in the Kundar River in Southern Western Ghats.
Keywords: Pteridophytes, Species diversity, Southern Western Ghats, Shenkottai

1 INTRODUCTION

The richness of pteridophyte represented in the world is estimated that about approximately 12,000 species [1]. Global warming and changes in land use, derived from human activities, are shifting abiotic factors across multiple ecosystems around the world. Both models and empirical observations predict that such shifts could cause, among other effects, increased species extinctions, unexpected alterations of geographic range distributions, and disruption of ecosystem function [2-5].

India is a mega biodiversity country with a high level of endemism of its flora and fauna. There are about 320 species of ferns and fern allies in the Western Ghats, South India. There are about 137 species of ferns endemic to South India and 26 species of ferns confined to Sri Lanka and South India [6]. The highest percentage of endemism is found south of Paighat gap i.e., in region with shortest dry season. Hence, In the present study was observed that species richness and distribution of pteridophytes in rainy seasons of Kundar rivers, Southern Western Ghats, Shengottai, Tirunelveli District, Tamil nadu, South India.

2 MATERIAL AND METHODS

An extensive floristic survey was carried out between July, 2017- June, 2018 to different parts of the Southern Western Ghats Shenkottai, Tirunelveli District, Tamil nadu, in the rainy seasons. Specimens of pteridophytes were collected and identified with the help of reginal floras. Data on various pteridophytic characters in different transect were collected and analyzed through statistical methods [7-9].

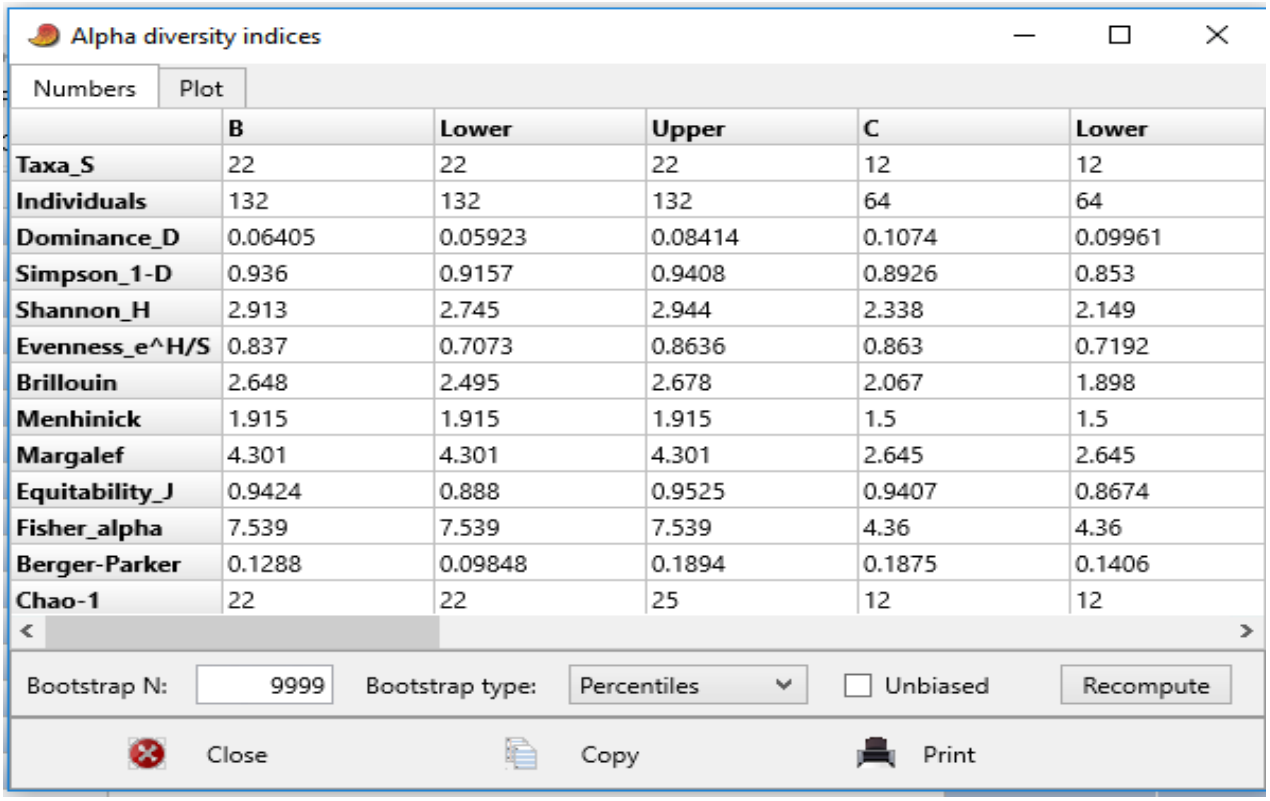
2.1 Statistical Analysis

The data collected during the whole study period were analyzed in PAST statistical software [10] to calculate species diversity, density, richness, and species composition by using the following formulae.(A)Shannon Wiener diversity index , where = index of species diversity, = proportion of total sample belonging to the th species, ln = natural log1.(B)Density = no. of individuals/total area surveyed (in hectare).(C)Menhinick richness index = the ratio of the number of taxa to the square root of sample size.(D)Buzas and Gibson's evenness: .The rarefaction analysis was carried by using Biodiversity Pro software,

1997, to cope up the problem in comparing diversity among various land cover or habitat categories evaluated during the present study.

3 RESULTS AND DISCUSSION

In the present study observed that different sites in kundar rivers in Southern Western Ghats regions in semi-evergreen and evergreen forest and it is one of the important regions of the study area for pteridophytes. 30 species of pteridophytes were collected and identified from the surrounding regions of kundar rivers in Southern Western Ghats (Table-1). The study area observed that most of the pteridophytes were grown on exposed areas, shady areas, stream banks, hill slopes, tree trunks, and mossy rocks. Exploration of pteridophytes diversity observed that Pteridaceae was the dominant family with 12 species and it was followed by polypodiaceae 2 (spp), Thelypteridaceae (2 spp.) and Lygodiaceae (2spp). The results of the species diversity index analysis of pteridophytes were observed in past 3 software represented in the fig.1. The greatest number of importance index values in such families viz., Pteridaceae, polypodiaceae 2(spp), Thelypteridaceae (2 spp.) and Lygodiaceae (2spp). It was noticed that the most species were contributed by Pteridaceae and the species density site1, site2, site3 and site 4 represented in the figure.2. Shannon–Weiner index (H') and Simpson index value and species richness index represented in the fig.2 and 3. According to Smith *et al.* (2006) reported that Pteridaceae consists of a typically tropical group [11], whereas Polypodiaceae is defined by Tryon & Tryon (1982) as comprising plants that commonly occur in the neotropics[12]. Both families are phylogenetically recent in the evolution of the fern group [13], and have been adaptively distributed in tropical biomes, which display recent geological alterations[14]. Three aquatic species of *Marsilea minuta* Linn, *Salvinia molesta* D.S. Mitchell and *Azolla pinnata* R. Br were identified by different regions of Kundar river. Previously studies the southeastern Brazil (from Minas Gerais to Rio Grande do Sul) contains about 600 species [12]. Cook et al. (1974) identified six families of aquatic pteridophytes (Azollaceae, Marsileacae, and Salviniaceae) [13]. Giudice *et al.* (2011), studying rare ferns in Argentina[14], and Yang *et al.* (2011), studying the ferns of Hainan Island (China), pointed out that the greatest threats to diversity in those areas are related to human activity [15]. Fires, timber extraction, agriculture, cattle-raising and the establishment of industries are examples of such activities. Ecological factors and climate are known to constrain the distribution of plant species [16]. While some families have higher species diversity in tropical latitudes, others present higher diversity in temperate latitudes [17]. Now a days many ferns are decline due to for the reasons of over exploitation of medicinal and ornamental purposes collection of uprooted plants, scientific research and pollution. A detailed survey of ferns is therefore essential before they become extinct and necessary to maintain and conserve the regions of their respective habitats.



	B	Lower	Upper	C	Lower
Taxa_S	22	22	22	12	12
Individuals	132	132	132	64	64
Dominance_D	0.06405	0.05923	0.08414	0.1074	0.09961
Simpson_1-D	0.936	0.9157	0.9408	0.8926	0.853
Shannon_H	2.913	2.745	2.944	2.338	2.149
Evenness_e^H/S	0.837	0.7073	0.8636	0.863	0.7192
Brillouin	2.648	2.495	2.678	2.067	1.898
Menhinick	1.915	1.915	1.915	1.5	1.5
Margalef	4.301	4.301	4.301	2.645	2.645
Equitability_J	0.9424	0.888	0.9525	0.9407	0.8674
Fisher_alpha	7.539	7.539	7.539	4.36	4.36
Berger-Parker	0.1288	0.09848	0.1894	0.1875	0.1406
Chao-1	22	22	25	12	12

Fig.1: Alpha diversity indices of Kundar rivers in Southern Western Ghats

Table 1: Pteridophyte diversity of Kundar regions of Southern Western Ghats, Tirunelveli District.

Sl. No.	Pteridophytes (species)	Family name	Site1	Site2	Site3	Site4
1.	*Stenochaleana palustris* (Burm. f.) Bedd	Blechnaceae	* (4)	* (3)	-	* (9)
2.	*Lygodium microphyllum* (Cay.) R.Br.	Lygodiaceae	-	-	-	* (4)
3.	*Lygodium flexosum* (L.).,	Lygodiaceae	* (5)	-	-	* (1)
4.	*Sphaerostephanos unitus* (L) Holt	Thelypteridaceae	* (4)	* (8)	* (9)	-
5.	*Cyclosorus interruptus* (Willd.) H.Ito.,	Thelypteridaceae	-	-	-	* (5)
6.	*Psilotum nudum* (L.) P. Beauv.	Psilotaceae	-	-	* (1)	-
7.	*Marsilea minuta* Linn	Marsileaceae	* (3)	-	-	-
8.	*Salvinia molesta* D.S. Mitchell	Salviniaceae	* (6)	-	-	-
9.	*Azolla pinnata* R. Br	Azollaceae	* (4)	-	-	-
10.	*Drynaria quercifolia* (L.) J. Sm.	Polypodiaceae	-	-	* (8)	* (12)
11.	*Adiantum caudatum* L.	Pteridaceae	* (3)	* (5)	-	-
12.	*Pteris argyraea*	Pteridaceae	-	* (7)	-	-
13.	*Pteris pellucida* C.Presl	Pteridaceae	-	-	-	* (9)
14.	*Pityrogramma calomelanos* var. *calomelanos*	Pteridaceae	* (13)	-	-	-
15.	*Actiniopteris radiata*. (J. Koenig ex Sw.) Link.	Pteridaceae	* (4)	-	-	-
16.	*Hemionitis arifolia* (Burm. f.) T. Moore	Pteridaceae	* (17)	-	(4)	-
17.	*Pteris biaurita* L.	Pteridaceae	* (13)	-	-	* (2)
18.	*Pteris multifida* Poir.	Pteridaceae	-	* (6)	* (1)	* (1)
19.	*Acrostichum aureum* L	Pteridaceae	* (3)	* (5)	* (6)	* (2)
20.	*Adiantum philippense* L.	Pteridaceae	4	3	0	1
21.	*Adiantum hispidulum* Sw.	Pteridaceae	* (8)	* (7)	-	-
22.	*Adiantum incisum* Forssk	Pteridaceae	* (9)	-	-	-
23.	*Actiniopteris radiata* (Sw.) Link	Pteridaceae	* (4)	* (12)	-	-
24.	*Athyrium hohenkarianum* (Kunze) Moore.	Athyriaceae	* (3)	-	-	-
25.	*Diplazium dilatatum* Blume	Athyriaceae	* (1)	* (1)	* (1)	* (4)
26.	*Nephrolepis exaltata* (L.) Schott	Davalliaceae	-	* (2)	* (1)	-
27.	*Nephrolepis cordifolia* (L.) C. Presl	Davalliaceae	* (5)	-	-	-
28.	*Microlepia speluncae* (L.) T. Moore	Dennstaedtiaceae	* (6)	-	-	-
29.	*Selaginella tenera* (Hook. & Grev.) Spring	Selaginellaceae	* (5)	-	-	* (2)
30.	*Selaginella delicatala* (Desv.exPoir) Alston	Selaginellaceae	* (8)	* (5)	-	-
Total number species identified in the different sites			21 (132)	12 (64)	7 (23)	11(52)

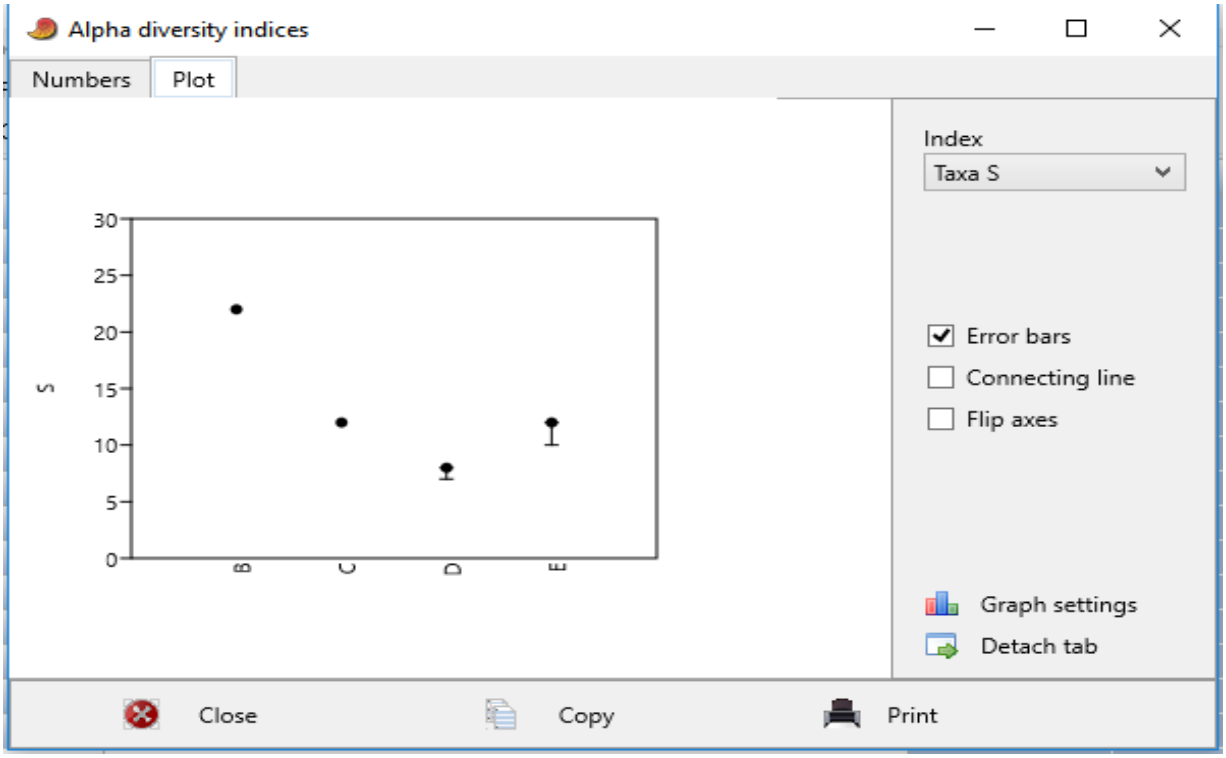


Fig.2: Graphical represented in the Alpha diversity indices of Kundar rivers in Southern Western Ghats

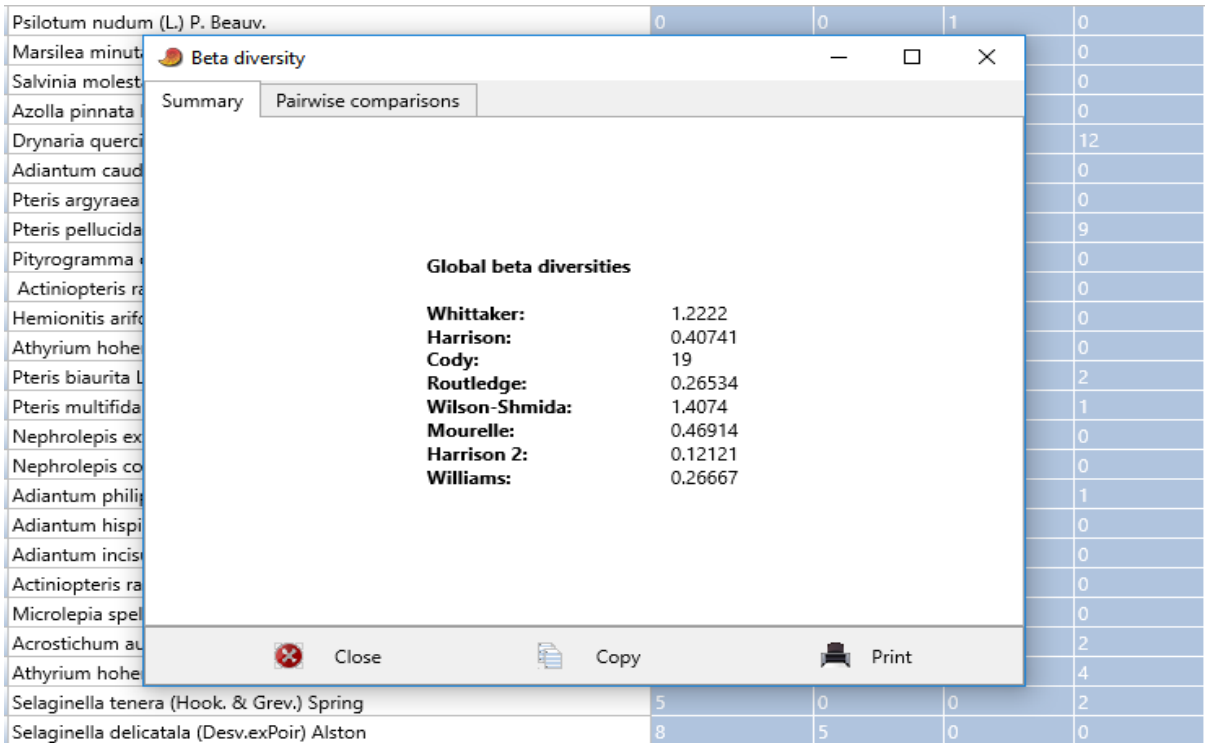


Fig.3: Beta diversity indices of Kundar rivers in Southern Western Ghats

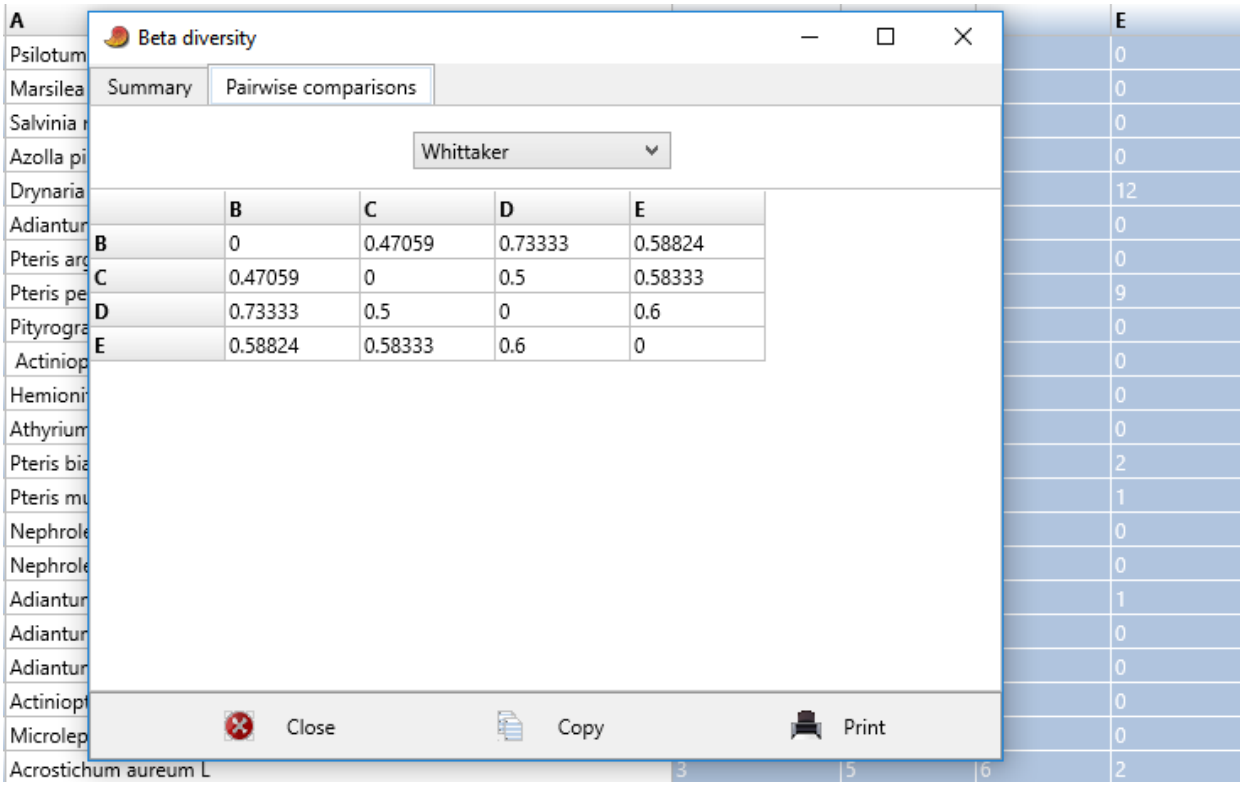


Fig.4: Beta diversity indices of pair wise comparison of Kundar rivers in Southern Western Ghats

4 ACKNOWLEDGEMENTS

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