

RESEARCH ARTICLE

Assessing riparian floristic diversity in the Gayathripuzha river basin of Palakkad district

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Abstract

The riparian flora of the Gayathripuzha river of Palakkad district was studied by a series of survey from July 2022 to February 2023. The study revealed that about 87 species of species belonging to 31 families were identified. The habit wise analysis of the species suggests that 65% of the plants were herbs, 16% shrubs and 8% climbers and 11% creepers. The present study revealed that Asteraceae, Fabaceae and Malvaceae were the dominant families. 74 dicot species and 12 monocot species make up the variety of angiosperm plants. The habit wise analysis of the species suggests that 65% of the plants were herbs, 16% shrubs and 8% climbers and 11% creepers. Asteraceae family dominated the vegetation analysed.

Key Words: Riparian Vegetation.**Introduction**

The word 'Riparian' is defined as vegetation ecosystem and habits that are associated with water bodies. The Latin term "Ripa," means "belonging to the banks of a river". This area is frequently referred to as riparian flora since it is a transition zone between water upland environments. It is called as gallery forest or stream side forest because the riparian zone, which extends from the beginning to the end of a river, is greatly influenced by the quantity and flow of water in the river channel [1] (Brinson 1990). The riparian zones supply shelter and food for many aquatic animals and the shade that limit stream temperature change. The roots of riparian trees and shrubs helps to hold stream banks in place and prevents erosion. Riparian vegetation also traps sediment and pollutants helping to keep the water clean by their root system. Different latitudes and altitudes can support very difficult riparian communities. The average width of the riparian area may vary from between 5 - 20cm, depending on the species used and the site.

Riparian landscapes are highly threatened ecosystem as they are inherently rare habits occupying a mere one thousand of earth surface [2] (Hynes 1970). Studies on riparian vegetation have been carried out all over the world,

identifying floristic diversity and the role of riparian forests as nutrient filters in agricultural watersheds. Climate, altitudinal gradients, upland impacts, flood regimes, and geomorphic channel processes all have a significant impact on the ecological richness of riparian corridors [3] (Naiman, et al., 1993). Factors such as light levels, habitat productivity, water flow, soil moisture, disturbance patterns, and rates of erosion and sediment deposition vary along rivers, influencing the distribution of riparian species ([4] Naiman and Décamps, 1997; [5] Larsen et al., 2019; [6] Pielech and Czortek, 2021)

Degradation of riparian zones not only affects the riparian area but also the surface and ground water resources along with terrestrial ecosystem. Climate change has strongly reduced the number of native species in these ecosystem putting many of them at risk of extinction

Materials and Methods**Study Area**

The research approach involves a taxonomic / vegetational survey of lower stretch of Gayathripuzha River (Fig.1). It is the one of the main tributaries of the second largest river in Kerala, the Bharathapuzha river. It passes through Kollengode, Nemmara, Alathur, Padur and

Pazhayannur before joining the Bharathapuzha at Mayannur. The average rainfall of the area where Gayathripuzha flows is 7348mm.

The main tributaries of Gayathripuzha are Mangalam river, Ayalur river, Vandazhy river, Meenkara river and Chulliyar. We have selected five sites along the Gayathri river to study about its herbeaceous riparian vegetation. These study sites were Pappanchalla and Ootara Vallanghy, Tripallur

and Athipotta (Table 1). A series of survey were conducted from July-February. The specimens were collected and the identification of the specimens was made initially with the help of standard floras [7] Bentham & Hooker (1862–1883), [8] Gamble & Fischer (1915–1936). The collected specimens were deposited in the herbarium of NSS College, Nemmara.

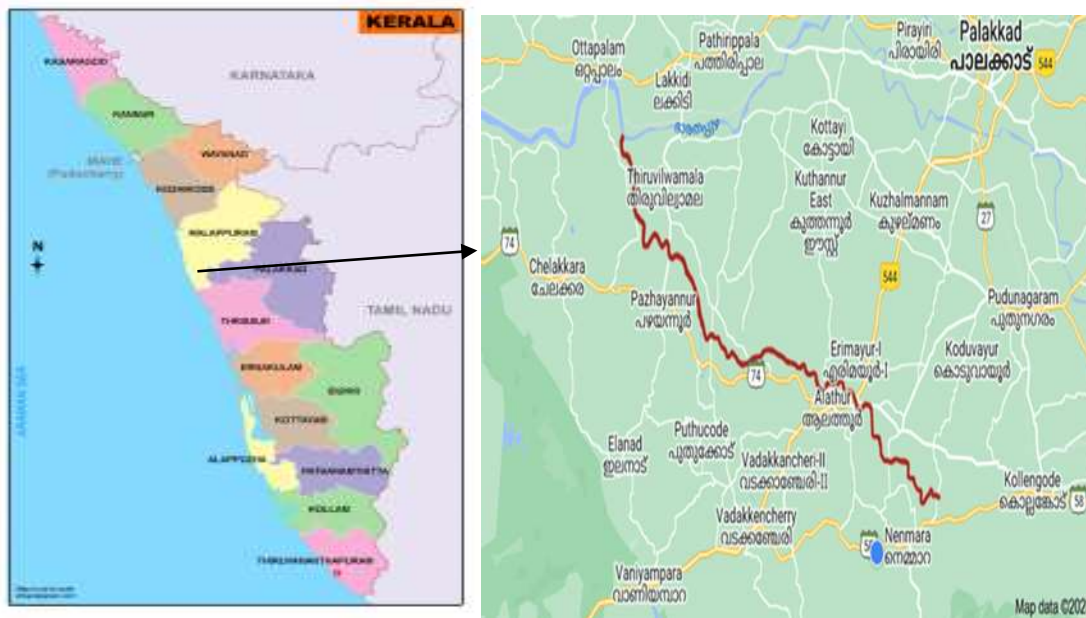


Fig.1 Map showing study area

Table 1. Brief description of study area

S.No.	Name of Sampling Site	GPS Coordinates
1	Pappanchalla	10.619° N and 76.7746° E.
2	Ootara	10.6094° N and 76.7754° E.
3	Vallanghi	10.5967° N and 76.6052° E.
4	Tripalur	10.6441° N and 76.5668° E.
5	Athipotta	10.37435° N and 76.77619° E.

Results and Discussion

During this study of riparian vegetation along the Gayathripuzha river basin, a total of 87 species belonging to 31 families were identified. The Gayathri River's riparian region in the Palakkad district's Chittur thaluk was primarily covered with grasses, shrubs, and herbaceous species. A total of 86 species of angiosperms and 1 species of pteridophytes from 77 genera and 31 families were identified (Table 2.). 74 dicot species and 12 monocot species make up the variety of angiosperm plants. The habit wise analysis of the species suggests that 65% of the plants were herbs,

16% shrubs and 8% climbers and 11% creepers (Fig.3). The ratio of Monocots to Dicots was 1:6.1, Families to Genera is 1: 2.5 Genera to species is 1:1.1 Asteraceae family dominated the vegetation analysed (Table3). Among the Dicots the sub class Gamopetalae was represented by 38 species, while Polypetalae had 27 species and Monochlamydeae was represented with 9 species. A total of 25% of the monocot plant species pertain to the Coronarieae series, 66.66% to the Glumaceae series, and 8.33% to the Nodiflorae Series. Coronarieae, Nodiflorae and Glumaceae have a 3:1:8 ratio.

Table 2. Details of enumerated plants, their botanical names, habit, families

SI No	Species	Family	Common Name	Habit
1	<i>Abutilon indicum</i>	Malvaceae	Velluram	Shrub
2	<i>Acmella uliginosa</i>	Asteraceae	Palluvedhana chedi	Herb
3	<i>Aerva lanata</i>	Amaranthaceae	Cherula	Herb
4	<i>Ageratum conyzoides</i>	Asteraceae	Murianpacha	Herb
5	<i>Allamanda cathartica</i>	Apocynaceae	Kolambi	Creeping shrub
6	<i>Alternanthera sessilis</i>	Amaranthaceae	Ponamgani	Herb
7	<i>Alysicarpus vaginalis</i>	Fabaceae	Nila orila	Herb
8	<i>Amaranthus spinosus</i>	Amaranthaceae	Mullencheera	Herb
9	<i>Amaranthus viridis</i>	Amaranthaceae	Kuppacheera	Herb
10	<i>Ammannia baccifera</i>	Lythraceae	Kallur Vanchi	Herb
11	<i>Asteracantha longifolia</i>	Acanthaceae	Vayalchulli	Herb
12	<i>Asystasia gangetica</i>	Acanthaceae	Valliupudali	Herb
13	<i>Bacopa monnieri</i>	Plantaginaceae	Brami	Creeping herb
14	<i>Biophytum sensitivum</i>	Oxalidaceae	Mukkootti	Herb
15	<i>Blepharis maderaspatensis</i>	Acanthaceae	Hemakandi	Herb
16	<i>Blumea axillaris</i>	Asteraceae		Herb
17	<i>Calopogonium mucunoides</i>	Fabaceae		Climber
18	<i>Calotropis gigantea</i>	Apocynaceae	Erukku	Shrub
19	<i>Cardiospermum halicacabum</i>	Sapindaceae	Uzhinja	Climber
20	<i>Cassia tora</i>	Fabaceae	Vattathakara	Herb
21	<i>Centella asiatica</i>	Apiaceae	Kudangal	Herbaceous creeper
22	<i>Centrosema plumieri</i>	Fabaceae		Climber
23	<i>Chromolaena odorata</i>	Asteraceae	Communist Pacha	Herb
24	<i>Cleome viscosa</i>	Cleomaceae	Ariavila	Herb
25	<i>Clerodendrum phlomidis</i>	Lamiaceae	Kozhiyappa	Shrub
26	<i>Clinopodium brownei</i>	Lamiaceae		Creeping herb
27	<i>Commelina benghalensis</i>	Commelinaceae	Vazhaplaachi	Herb
28	<i>Conyza japonica</i>	Asteraceae		Herb
29	<i>Corchorus olitorius</i>	Sterculaceae	Chanam	Herb
30	<i>Croton hirtus</i>	Euphorbiaceae		Herb
31	<i>Cyperus iria</i>	Cyperaceae		Herb
32	<i>Cyperus marginatus</i>	Cyperaceae		Herb
33	<i>Cyperus rotundus</i>	Cyperaceae	Perumkora	Herb
34	<i>Desmodium gangeticum</i>	Fabaceae	Orila	Shrub
35	<i>Desmodium paniculatum</i>	Fabaceae		Herb
36	<i>Desmodium triflorum</i>	Fabaceae	Cherupulladi	Herb
37	<i>Desmostachya bipinnata</i>	Poaceae	Dharbapull	Herb
38	<i>Eichhornia crassipes</i>	Pontederiaceae	Kulavazha	Herb

39	<i>Eleusine indica</i>	Poaceae		Herb
40	<i>Emilia sonchifolia</i>	Asteraceae	Muyalcheviyan	Herb
41	<i>Eragrotis annulata</i>	Poaceae		Herb
42	<i>Euphorbia hirta</i>	Euphorbiaceae	Attuvattappala	Herb
43	<i>Gomphrena serrata</i>	Amaranthaceae	Velutha Vaadamalli	Herb
44	<i>Heimia salicifolia</i>	Lythraceae		Shrub
45	<i>Hemidesmus indicus</i>	Apocynaceae	Naruneendi	Shrub
46	<i>Hyptis suaveolens</i>	Lamiaceae	Nattapoochedi	Herb
47	<i>Indigofera linnaei</i>	Fabaceae	Chempulladi	Herb
48	<i>Ipomoea aquatica</i>	Convolvulaceae	Ballel Kozhuppa	Climber
49	<i>Ipomoea cairica</i>	Convolvulaceae	Udhayamalari	Climber
50	<i>Justicia tranquebariensis</i>	Acanthaceae		Sub shrub
51	<i>Kyllinga brevifolia</i>	Cyperaceae		Herb
52	<i>Leucas aspera</i>	Lamiaceae	Thumba	Herb
53	<i>Lindernia antipoda</i>	Linderniaceae		Creeping herb
54	<i>Lindernia ciliata</i>	Linderniaceae	Chiravanakk	Herb
55	<i>Lindernia crustacea</i>	Linderniaceae	Cherukakkapoo	Herb
56	<i>Ludwigia polycarpa</i>	onagraceae		Herb
57	<i>Ludwigia hyssopifolia</i>	onagraceae	Neergra	Herb
58	<i>Marsilea quadrifolia</i>	Marsileaceae	Nalilakeera	Herb
59	<i>Mikania micrantha</i>	Asteraceae	Vayara	Climber
60	<i>Mimosa pudica</i>	Fabaceae	Thottalvadi	Creeping shrub
61	<i>Mitracarpus hirtus</i>	Rubiaceae	Thaval	Herb
62	<i>Murdannia semiteres</i>	Commelinaceae	Nilampull	Herb
63	<i>Oldenlandia corymbosa</i>	Rubiaceae	Parppadakam	Herb
64	<i>Ocimum sanctum</i>	Lamiaceae	Tulasi	Herb
65	<i>Pennisetum setaceum</i>	Poaceae	Pothapullu	Herb
66	<i>Persicaria attenuata</i>	Polygonaceae		Herb
67	<i>Phyla nodiflora</i>	Verbenaceae	Neerthippali	Creeping Herb
68	<i>Phyllanthus niruri</i>	Phyllanthaceae	Keezharnelli	Shrub
69	<i>Physalis minima</i>	Solanaceae	Notinotta	Herb
70	<i>Portulaca oleracea</i>	Portulacaceae	Koluppa	Creeping herb
71	<i>Ruellia tuberosa</i>	Acanthaceae	Shivakaratha	Herb
72	<i>Scoparia dulcis</i>	Plantaginaceae	Kallurukki	Herb
73	<i>Senna occidentalis</i>	Fabaceae	Mattan Thakara	Shrub
74	<i>Sesamum indicum</i>	Pedaliaceae	Ellu	Herb
75	<i>Sida acuta</i>	Malvaceae	Malakurumthotti	Shrub
76	<i>Sida cordifolia</i>	Malvaceae	Velluram	Shrub
77	<i>Sida longifolia</i>	Malvaceae		Shrub
78	<i>Spermacoce articularis</i>	Rubiaceae	Kudalchurukki	Herb
79	<i>Sphagneticola trilobata</i>	Asteraceae	Amminipoo	Creeping herb

80	<i>Spilanthus acmella</i>	Asteraceae		Herb
81	<i>Synedrella nodiflora</i>	Asteraceae	Mudiyanpacha	Herb
82	<i>Tephrosia purpurea</i>	Fabaceae	Kozhinjil	Shrub
83	<i>Typha angustifolia</i>	Typhaceae	Aanapullu	Herb
84	<i>Urena lobata</i>	Malvaceae	Oorppanam	Shrub
85	<i>Vernonia cinerea</i>	Asteraceae	Poovamkurunnila	Herb
86	<i>Vitis berlandieri</i>	Vitaceae		Climber
87	<i>Xanthium strumarium</i>	Asteraceae	Arishta	Herb

Table 3. Dominant families of the study area

Sl.No	Family	No. of Genera	No. of species
1	Asteraceae	12	12
2	Fabaceae	9	11
3	Malvaceae	3	5
4	Amaranthaceae	4	5
5	Acanthaceae	5	5
6	Lamiaceae	5	5
7	Cyperaceae	2	4
8	Poaceae	4	4
9	Lindernaceae	1	3
10	Apocynaceae	3	3
11	Rubiaceae	3	3

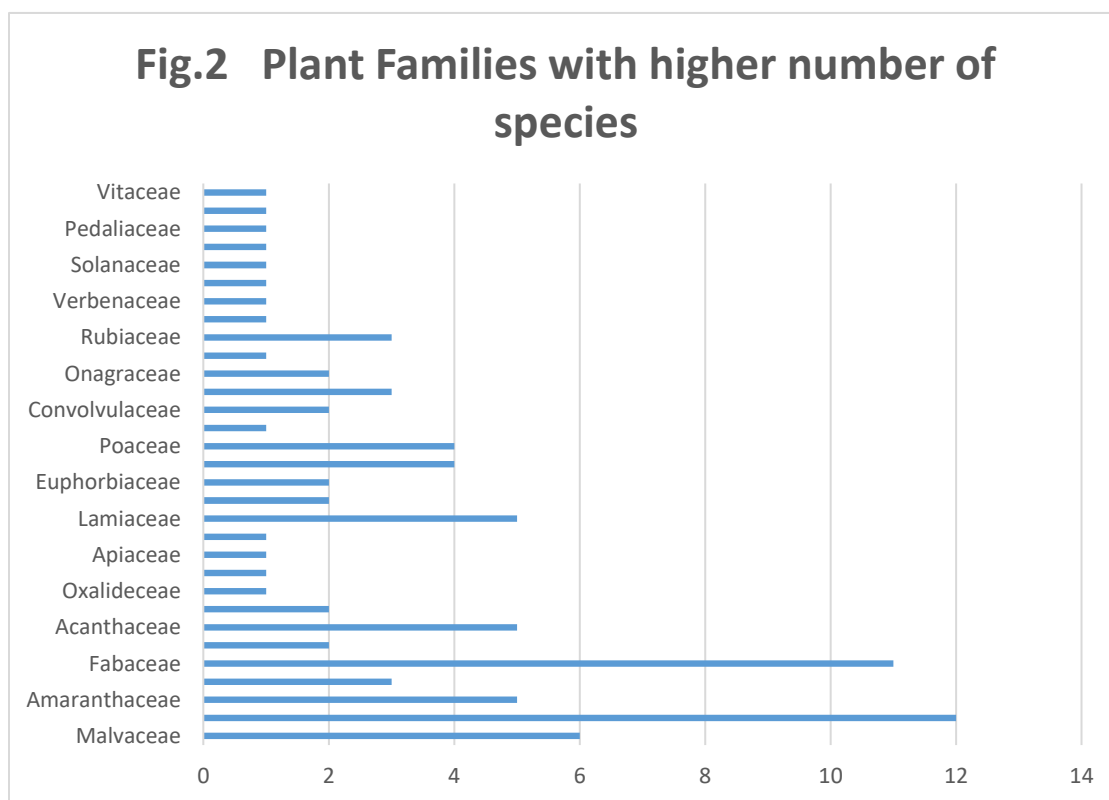
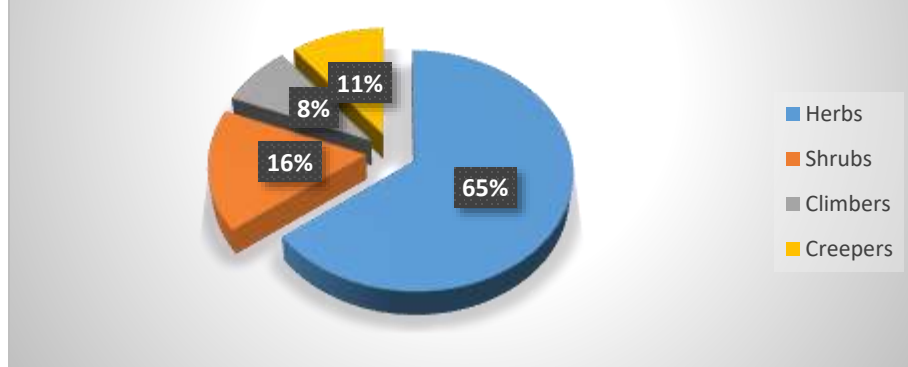


Fig.3. Analysis of habit wise distribution of species



The results of the study showed that Poaceae and Cyperaceae families are the largest monocotyledon families, with 4 species each. While the Asteraceae family is the largest dicotyledon family, with 12 species and 12 genera (Fig 2). The Asteraceae was the largest contribution (12 genera and 12 species) followed by Fabaceae family (9 genera and 11 species), and Malvaceae (3 genera), Acanthaceae (5 genera), Lamiaceae (5 genera) and Poaceae (4 genera) and cyperaceae (2 genera and 4 species). Majority of the plants identified in the current study were either moisture-loving or wetland species. The research area's wetland and terrestrial plant diversity indicates to a close relationship between the two ecosystems as well as the river basin's declining size and sedge and grass predominance. Sedges and grasses make up 10% of the flora's diversity along the Gayathripuzha River's banks. According to [9], the Cyperaceae and Poaceae make up the majority of the wetland flora of the district of Kanyakumari. Riparian vegetation studies conducted earlier along the Chalakudy River [10], the Pamba River [11] and the Benin River [12], revealed Euphorbiaceae (including Phyllanthaceae), Fabaceae and Rubiaceae as the dominant families, in the present study Asteraceae, Fabaceae and Malvaceae were the dominant families. The prevalence of these families along riverbanks can be attributed to the thriving of species in flooded, highly humid environments, as well as the enhanced ability of leguminous trees to adapt to waterlogged areas. This adaptation is facilitated by the presence of symbiotic nitrogen-fixing organisms ([13]; [14]; [15]).

The aquatic ecosystem is seriously threatened by the invasive species like *Eichhornia crassipes* and several *Ipomoea* species, which would obliterate native species. These weeds are a sign that the local vegetation has been disturbed. The primary cause of the proliferation of these weeds outside of their natural habitat is human involvement. The invasion of weeds is the beginning of ecosystem degradation [16].

Threats and its consequences in riparian basin of Gayathripuzha

Grazing is a major threat to the riparian corridor and was recorded throughout the riparian areas of Gayathripuzha. Grazing of cattle and goats has altered the geomorphic riparian ecosystems of the study area. Grazing disrupted the natural riparian vegetation by the removal of herbaceous plants, causing physical damage to plants and changes in fluvial processes that may eliminate germination sites for woody vegetation.

Construction of check dams is another major threat to riparian ecosystem. These dams disconnect rivers from their riparian zones and wetlands. By slowing down the movement of water it prevent the natural downstream movement of sediments to riparian zones, affecting riparian biodiversity and productivity.

Encroachment for agriculture was observed throughout the riparian system of Gayathripuzha this leads to the degradation of natural riparian vegetation. Sand mining had hampered the riparian ecology by causing the river bank to erode, lowering the river bed, and reducing its ability to hold water.

Another important threat to riparian ecosystem is the alien invasive species. Among these, species *Mikania micrantha* is frequently occurring along the riparian system of the study area and it was more widespread and abundant. Invasive exotic species like *Chromolaena odorata*, *Hyptis suaveolens* and *Alternanthera tenella* cause considerable threat to native species

Conclusion

The Gayatriputzha river basin is a home to 87 plant species belonging to 31 families revealing its rich biodiversity and ecological dynamics. It is home to 12 Asteraceae species, 11 Fabaceae family members, 5 species from each of the families like Malvaceae, Acanthaceae, Lamiaceae and 4 Poaceae members and 2 Cyperaceae species. The vegetation profile of the Gaysathripuzha river basin shows a dynamic mix of life forms and ecological niches. By addressing the threats, conservation and management strategies for Gayathripuzha river basin can be customized to ensure the region's biodiversity is preserved for the future.

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