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Studies on riverine flora of Pamba river basin, Kerala

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RIPARIAN ECOSYSTEMS



- Most diverse, dynamic and complex biophysical habitats
- Ecotonal assemblage of aquatic and terrestrial habitats
- Critical transition zones having rich biodiversity with high endemism of diverse flora, fauna and microbes

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Importance of riparian ecosystem

- Regulating water cycle of the forest floor
- Regulating nutrient cycle
- Act as breeding sites for organisms
- Reduce ground and waste water pollution
- Minimize agricultural nutrient and pesticide run-off
- Prevent eutrophication
- Prevent Soil erosion
- Stabilize river banks

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Need and significance of the study

- The vegetation along the rivers of Western Ghats has high degree of diversity, paleo-endemism and RET species
- Pamba river and its associated flood plain support a wide range of flora and fauna
- Anthropogenic intervention has fragmented riparian vegetation of Pamba river and many species are under the threat of extinction

The present paper tries to assess the riparian forest status of Pamba river basin with respect to its species composition and endemism

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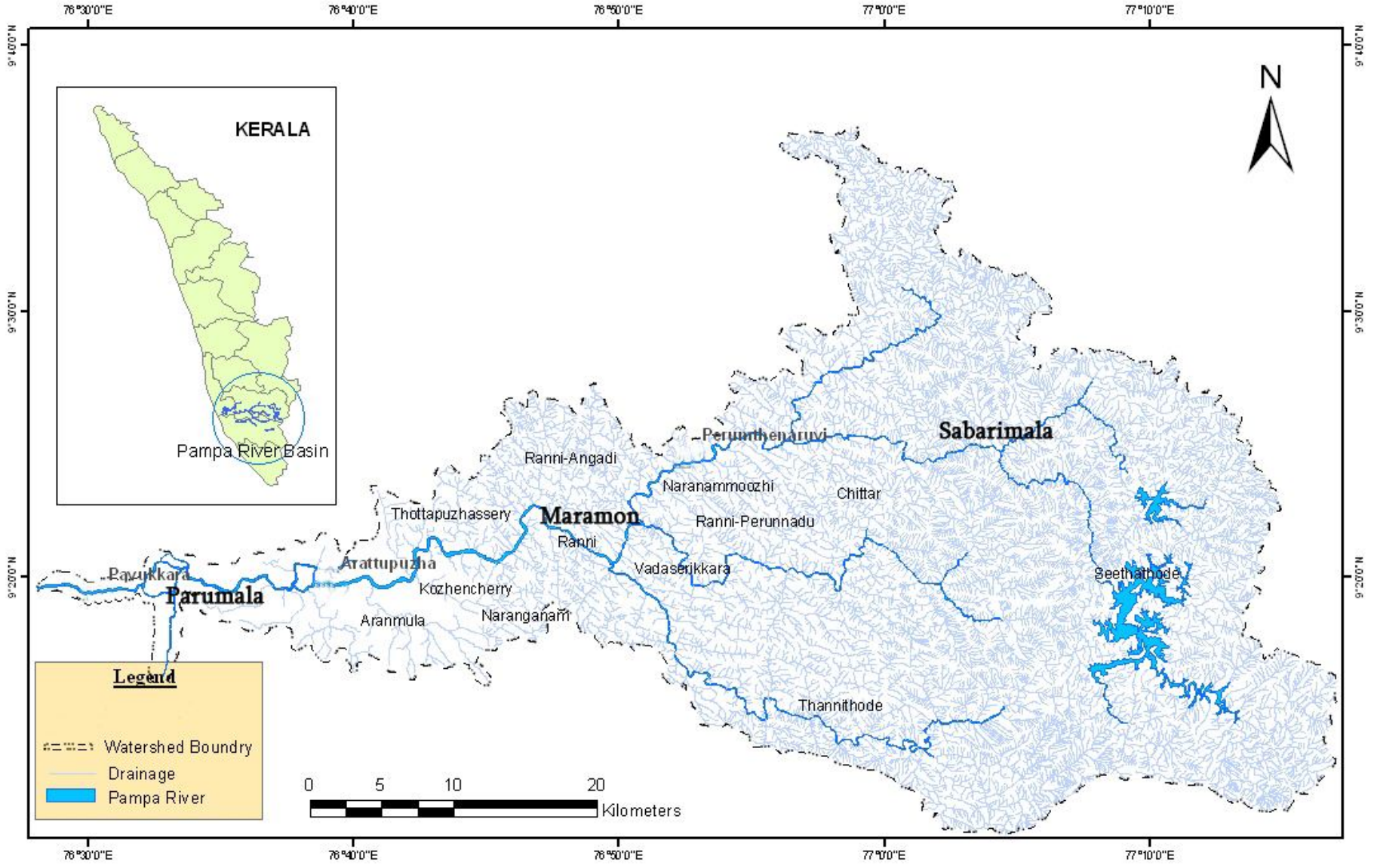
Materials and methods

Study Area: The Pamba watershed

- Lies between 9^0 10' - 9^0 40' N. latitudes and 76^0 15' - 77^0 20' E. longitudes with 2082.80 sq. km. area.
- Located in Pathanamthitta, Alappuzha, Idukki & Kottayam districts of Kerala
- 176 km long river is formed by the confluence of Pamba Ar, Kakki Ar, Azhutha Ar, Kakkad Ar and Kall Ar

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Map of the study area



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Methodology

- **Floristic investigation along the riparian forests of Pamba river basin was conducted during 2006 - '07.**
- The riparian plants were collected, taxonomically identified and enumerated based on standard taxonomic literature (Hooker, 1872 – 1894; Gamble & Fisher, 1915 - 1936).

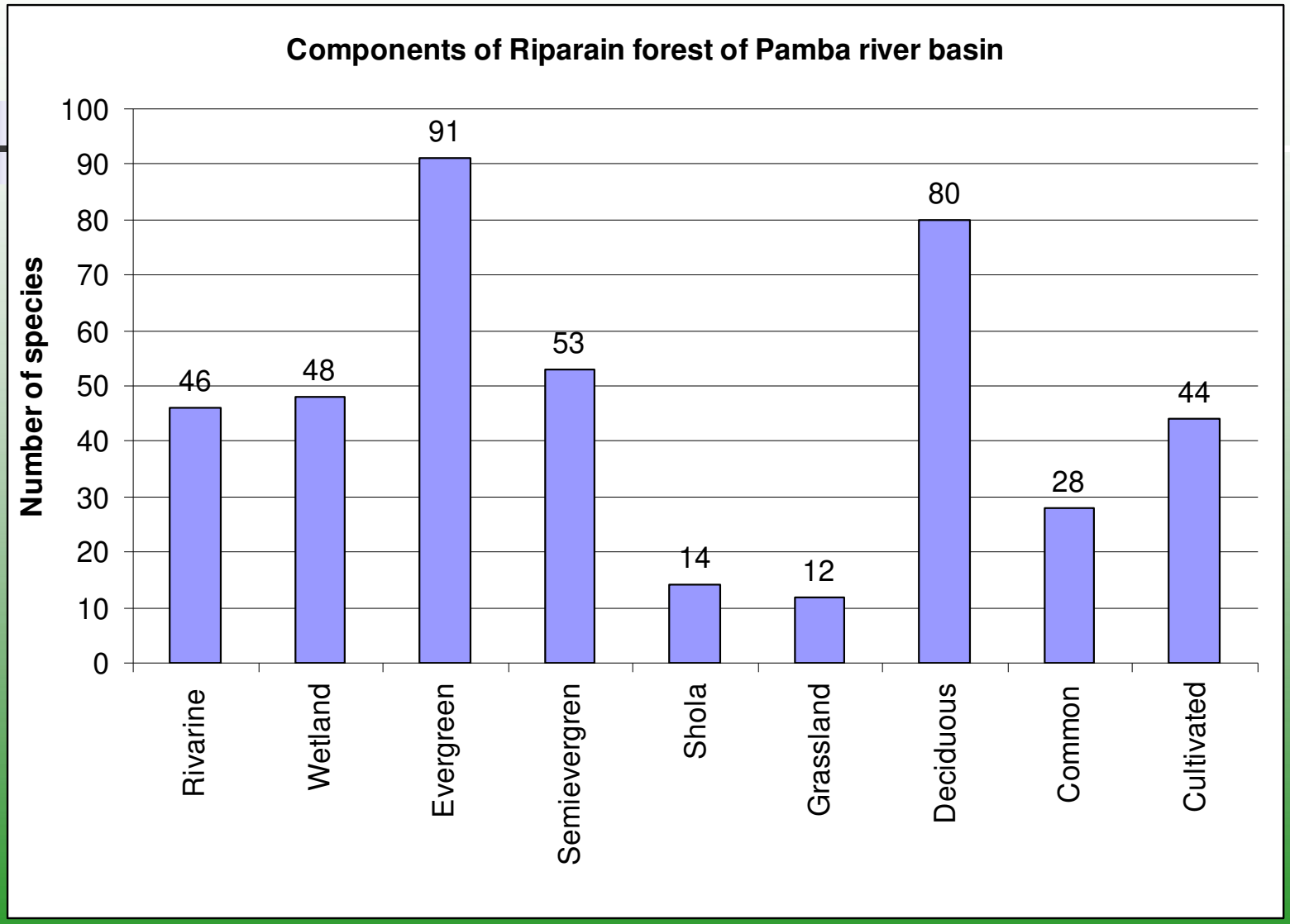
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Results

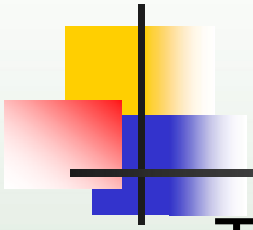
The flora consists of a diverse blend of:

- Evergreen (91 spp)
- Deciduous (80 spp)
- Semi evergreen (53 spp)
- Wetland (48 spp)
- Riverine (46 spp)
- Cultivated (44 spp)
- Common (28 spp)
- Shola (14 spp)
- Grassland (12 spp) components

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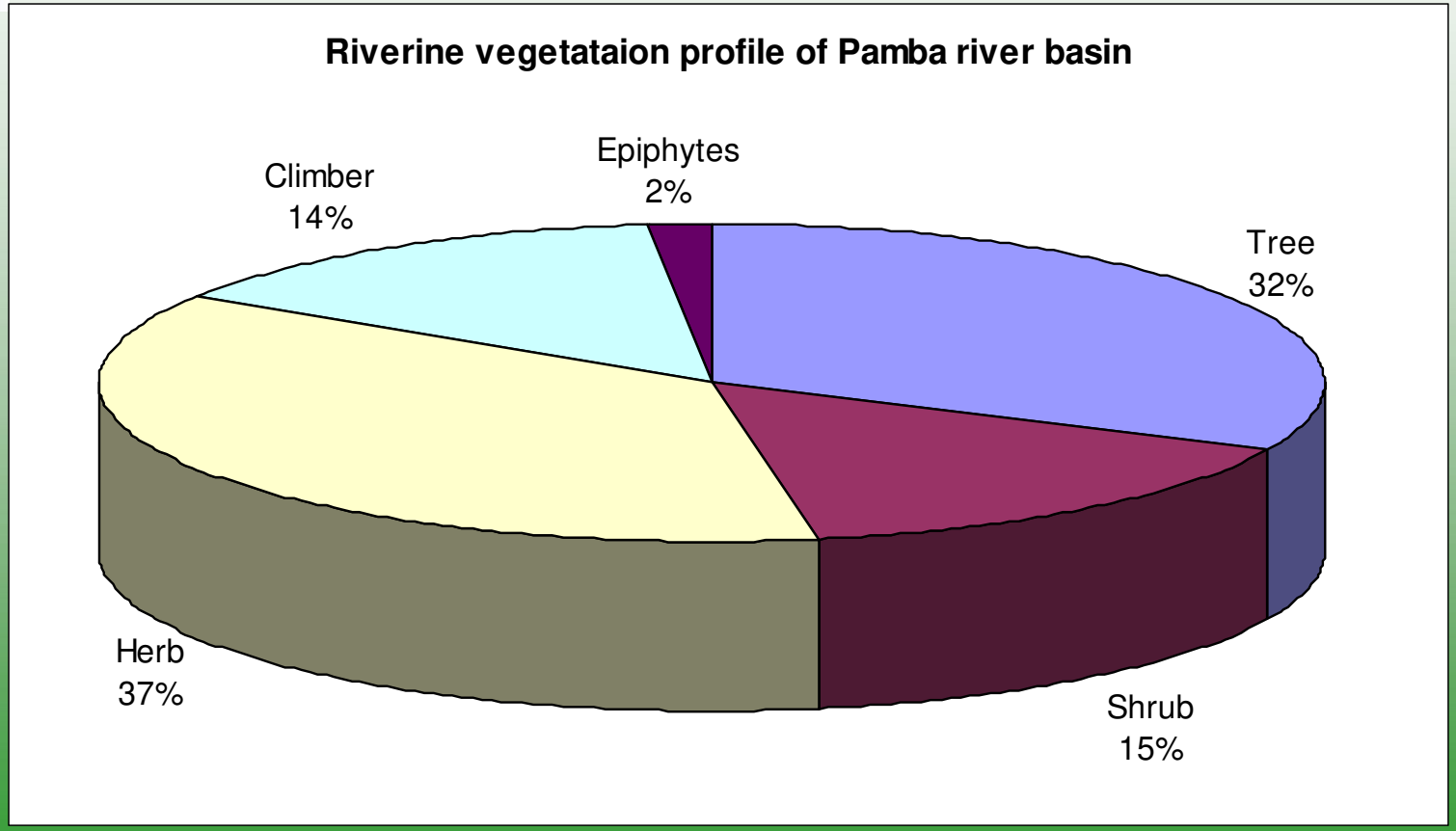
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- Taxonomically identified 433 species which include 410 angiosperms, 3 gymnosperms and 20 pteridophytes
- The dominant families based on the diversity of species are Poaceae, Euphorbiaceae, Rubiaceae, Cyperaceae and Fabaceae
- The river basin holds 17.5 % endemism (76 species) and 17 RET species
- 14 potential riparian tree species were identified from the study area for natural buffer system management

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The vegetation profile includes trees, shrubs, climbers, epiphytes and herbs



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Endemism of the study area

Endemism	Number of species
Endemic to Peninsular India	10
Endemic to South India and Sri Lanka	1
Endemic to Southern Western Ghats	39
Endemic to Western Ghats	26
Total	**76**

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RET Plants from the study area

Botanical Name	Family	Endemism	Status
Anaphyllum wighti Schott.	Araceae	S. Western Ghats	Threatened (Nayar, 1997)
Arenga wightii Griff.	Araceae	Western Ghats	Vulnerable (IUCN, 2000)
Belosynopsis vivipara (Dalz.) Fischer	Commelinaceae	Western Ghats	Vulnerable (Nayar, 1997)
Bentinckia condapanna Berry & Roxb.	Arecaceae	S. Western Ghats	Vulnerable (IUCN, 2000)
Derris benthamii (Thw.) Thw.	Fabaceae		Endangered (Nayar ,1997)
Dipterocarpus bourdillonii Brandis	Dipterocarpaceae	Western Ghats	Critically Endangered (IUCN, 2000)
Elaeocarpus munronii (Wt.) Mast.	Elaeocarpaceae	S. Western Ghats	Lower risk: Near threatened (IUCN, 2000)

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Holigarna grahamii (Wt.)Kurz.	Anacardiaceae	Western Ghats	Rare (Nayar, 1997)
Ixora johnsonii Hook.f	Rubiaceae	S Western Ghats	Critically Endangered (IUCN 2000)
Lasianthus jackianus Wt.	Rubiaceae	S. Western Ghats	Rare (Nayar, 1997)
Ochreinauclea missionis (Wall. ex G. Don) Ridsd.	Rubiaceae	S. Western Ghats	Vulnerable (IUCN, 2000)
Schefflera bourdillonii Gamble	Araliaceae	S. Western Ghats	Endangered (IUCN, 2000)
Semicarpus travancorica Bedd.	Anacardiaceae	S. Western Ghats	Rare (Nayar, 1997)
Symplocos macrocarpa Wt. ex Clarke	Symplocaceae	S. Western Ghats	Vulnerable (Nayar, 1997)
Syzygium bourdillonii (Gamble) Rathkr. & Nair	Myrtaceae	S. Western Ghats	Endangered (IUCN, 2000)
Tabernaemontana gamblei Subram. & Henry	Apocyanaceae	S. Western Ghats	Lower risk: Conservation dependant (IUCN, 2000)
Tabernaemontana heyneana Wall.	Apocyanaceae	S. Western Ghats	Lower risk: Near threatened (IUCN, 2000)

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Anaphyllum wighti Schott.



Arenga wightii Griff.



Anaphyllum wighti Schott.



Arisaema leschenaultii Bl.



Tabernaemontana gamblei Subram. & Henry



Connarus sclerocarpus (Wt. & Arn) Schellenb



Lasianthus jackianus Wt.

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Otonephelium stipulaceum (Bedd.) Radlk.



Symplocos macrocarpa Wt. ex Clarke



Calamus travancoricus Bedd. ex. Becc. & Hook.



Syzygium cumini (L.) Skeels var. *axillare* (Gamble) Sastry & Kashyapa



Piper trichostachyon (Miq.) C. DC



Cinnamomum keralaense Kosterm.



Acrotrema arnottianum Wt.



Acrotrema arnottianum Wt.

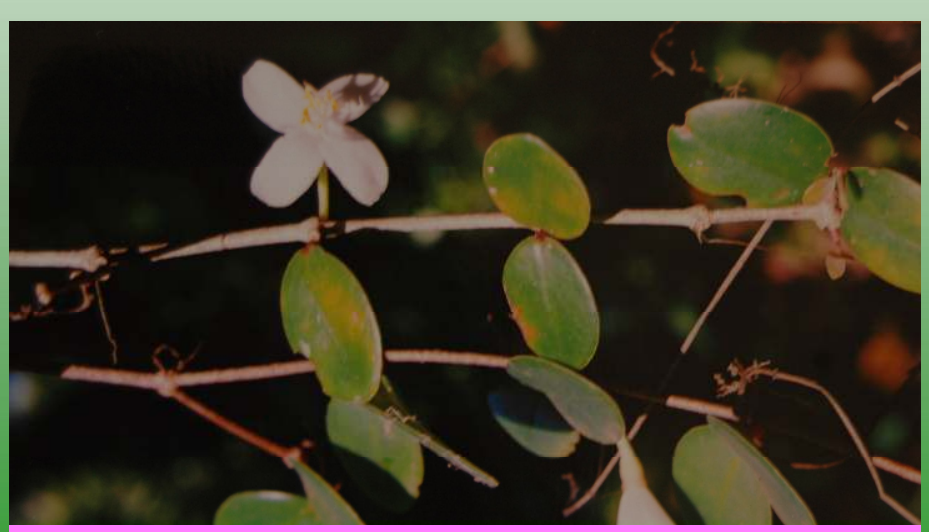
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Litsea insignis **Gamble**



Ixora johnsonii **Hook.f**



Medinella beddomei **Clarke**



Ophiorrhiza eriantha **Wight**

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Potential riparian trees in the Pamba river basin

Botanicl Name	Family
Barringtonia racemosa (L.) Spreng.	Lecythidaceae
Calophyllum inophyllum L.	Cluciaceae
Crataeva magna (Lour.) DC.	Capparaceae
Dillenia pentagyna L.	Dilleniaceae
Elaeocarpus tuberculatus Roxb.	Elaeocarpaceae
Garcinia gummi-gutta (L.) Robs.	Cluciaceae
Humboldtia vahliana Wight	Caesalpiniaceae
Lagerstroemia speciosa (L.) Pers.	Lythraceae
Madhuca neerifolia (Moon) H. J. Lam.	Sapotaceae
Neolamarkia cadamba (Roxb.) Bosser	Rubiaceae
Ochreinauclea missionis (Wall. ex G. Don) Ridsd.	Rubiaceae
Syzygium salicifolium (Wight) Graham	Myrtaceae
Talipaitri tiliaceum (L.) Fryxell.	Malvaceae
Trewia nudiflora L.	Euphorbiaceae

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Calophyllum inophyllum L.



Crataeva magna (Lour.) DC.



Crataeva magna (Lour.) DC.

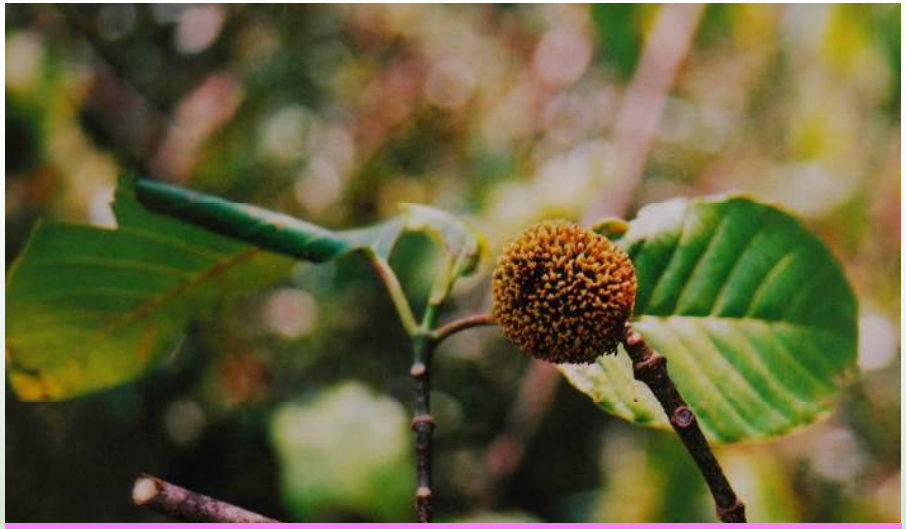


Dillenia pentagyna Roxb.

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Humboldtia vahliana Wight



Neolamarkia cadamba (Roxb.) Bosser



Lagerstroemia speciosa (L.) Pers.



Ochreinauclea missionis (Wall. ex G. Don) Ridsd.

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Homonoia riparia Lour.



Trewia nudiflora L.



Ficus heterophylla L.f.



Syzygium occidenatalis (Bourd.) Gandhi



Ficus heterophylla L.f.



Saccharum spontaneum L.

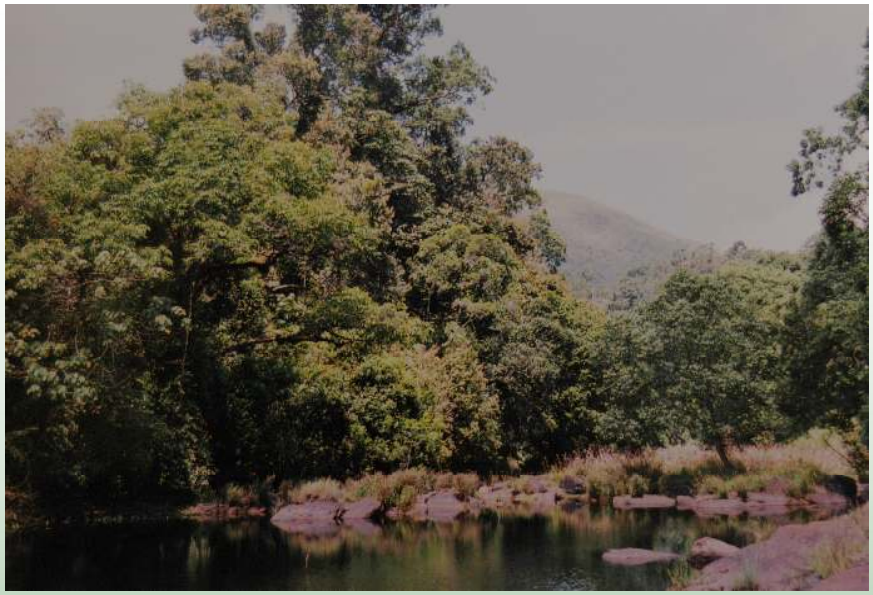


Hydnocarpus macrocarpa (Bedd.) Warb



Saccharum spontaneum L.

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Riparian vegetation near Kochupamba



Riparian vegetation near Athikkayam



Riparian vegetation near Aranmula



Riparian vegetation near Pavukara

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Erosion of riparian vegetation bathing ghats at Pamba triveni



Riparian vegetation near Periyar tiger reserve



Riparian vegetation near Edakadathi



Riparian vegetation near Perunthenaruvi

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Landuse pattern of a riparian belt at Attathode



Riparian zone of Cherukolpuzha



Sand mining near Pavukara



River bank erosion near Cherukolpuzha

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Conclusion

- The riparian species composition revealed the predominance of herbs followed by trees, shrubs, climbers and epiphytes
- The forest type shows structural similarity with west coast tropical evergreen as observed in the Chalakkudy river basin (Bachan 2003)
- The identified taxa constitute 9.25 % of the flowering plants of Kerala
- The river basin holds 17.5% of endemism. This estimate shows a reduction in the percentage of endemism when compared with the endemism of Western Ghats-Sri Lanka biodiversity hotspot (45.6%) as reported by Myers *et al.,* (2000)

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- Natural riparian vegetation in the upper stretches of Pamba river has crucial role for restoring stream functions and aquatic habitats
- Since the lower stretches of the river, from Vembanad lake to Perinad region, has fragmented riparian vegetation, the study recommends urgent restoration efforts based on natural buffer system concept
- This natural buffer system management strategy can be developed incorporating the potential riparian trees identified from the river basin

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