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
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
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.
Materials and methods

Study Area: The Pamba watershed

- Lies between 9° 10’ - 9° 40’ N. latitudes and 76° 15’ - 77° 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
Map of the study area
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).
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
Components of Riparian forest of Pamba river basin

- Rivarine: 46
- Wetland: 48
- Evergreen: 91
- Semievergreen: 53
- Shola: 14
- Grassland: 12
- Deciduous: 80
- Common: 28
- Cultivated: 44
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.
The vegetation profile includes trees, shrubs, climbers, epiphytes and herbs.
### Endemism of the study area

<table>
<thead>
<tr>
<th>Endemism</th>
<th>Number of species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endemic to Peninsular India</td>
<td>10</td>
</tr>
<tr>
<td>Endemic to South India and Sri Lanka</td>
<td>1</td>
</tr>
<tr>
<td>Endemic to Southern Western Ghats</td>
<td>39</td>
</tr>
<tr>
<td>Endemic to Western Ghats</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76</strong></td>
</tr>
<tr>
<td>Botanical Name</td>
<td>Family</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Anaphyllum wighti Schott.</td>
<td>Araceae</td>
</tr>
<tr>
<td>Arenga wightii Griff.</td>
<td>Araceae</td>
</tr>
<tr>
<td>Belosynopsis vivipara (Dalz.) Fischer</td>
<td>Commelinaceae</td>
</tr>
<tr>
<td>Bentinckia condapanna Berry &amp; Roxb.</td>
<td>Arecaece</td>
</tr>
<tr>
<td>Derris benthamii (Thw.) Thw.</td>
<td>Fabaceae</td>
</tr>
<tr>
<td>Dipterocarpus bourdillonii Brandis</td>
<td>Dipterocarpaceae</td>
</tr>
<tr>
<td>Elaeocarpus munronii (Wt.) Mast.</td>
<td>Elaeocarpaceae</td>
</tr>
<tr>
<td>Species Name</td>
<td>Family</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Holigama grahamii (Wt.) Kurz</td>
<td>Anacardiaceae</td>
</tr>
<tr>
<td>Ixora johnsonii Hook.f</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>Lasianthus jackianus Wt.</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>Ochreinauclea missionis</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>(Wall. ex G. Don) Ridsd.</td>
<td></td>
</tr>
<tr>
<td>Schefflera bourdillonii Gamble</td>
<td>Araliaceae</td>
</tr>
<tr>
<td>Semicarpus travancorica Bedd.</td>
<td>Anacardiaceae</td>
</tr>
<tr>
<td>Symplocos macrocarpa Wt. ex Clarke</td>
<td>Symplocaceae</td>
</tr>
<tr>
<td>Syzygium bourdillonii (Gamble) Rathkr. &amp; Nair</td>
<td>Myrtaceae</td>
</tr>
<tr>
<td>Tabernaemontana gamblei Subram. &amp; Henry</td>
<td>Apocyanaceae</td>
</tr>
<tr>
<td>Tabernaemontana heynana Wall.</td>
<td>Apocyanaceae</td>
</tr>
</tbody>
</table>
## Potential riparian trees in the Pamba river basin

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barringtonia racemosa (L) Spreng.</td>
<td>Lecythidaceae</td>
</tr>
<tr>
<td>Calophyllum inophyllum L.</td>
<td>Cluciaeae</td>
</tr>
<tr>
<td>Crataeva magna (Lour.) DC.</td>
<td>Capparaceae</td>
</tr>
<tr>
<td>Dillenia pentagyna L.</td>
<td>Dilletiaceae</td>
</tr>
<tr>
<td>Elaeocarpus tuberculatus Roxb.</td>
<td>Elaeocarpaceae</td>
</tr>
<tr>
<td>Garcinia gummi-gutta (L.) Robs.</td>
<td>Cluciaeae</td>
</tr>
<tr>
<td>Humboldtia vailliana Wight</td>
<td>Caesalpiniaeae</td>
</tr>
<tr>
<td>Lagerstroemia speciosa (L) Pers.</td>
<td>Lythraceae</td>
</tr>
<tr>
<td>Madhuca neerifolia (Moon) H. J. Lam.</td>
<td>Sapotaceae</td>
</tr>
<tr>
<td>Neolamarkia cadamba (Roxb.) Bosser</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>Ochreinauclea missionis (Wall. ex G. Don) Ridsd.</td>
<td>Rubiaceae</td>
</tr>
<tr>
<td>Syzygium salicifolium (Wight) Graham</td>
<td>Myrtaceae</td>
</tr>
<tr>
<td>Talipaitri tiliaceum (L) Fryxell.</td>
<td>Malvaceae</td>
</tr>
<tr>
<td>Trewia nudiflora L.</td>
<td>Euphorbiaceae</td>
</tr>
</tbody>
</table>
Calophyllum inophyllum L.

Crataeva magna (Lour.) DC.

Crataeva magna (Lour.) DC.

Dillenia pentagyna Roxb.
*Humboldtia vahliana* Wight

*Neolamarkia cadamba* (Roxb.) Bosser

*Lagerstroemia speciosa* (L.) Pers.

*Ochroinauclea missionis* (Wall. ex G. Don) Ridl.
Hydnocarpus macrocarpa (Bedd.) Warb

Homonoia riparia Lour.

Trewia nudiflora L.

Syzygium occidentalis (Booth.) Gandhi

Ficus heterophylla L.f.

Ficus heterophylla L.f.

Saccharum spontaneum L.

Hydnocarpus macrocarpa (Bedd.) Warb

Saccharum spontaneum L.
Riparian vegetation near Kochupamba

Riparian vegetation near Athikkayam

Riparian vegetation near Aranmula

Riparian vegetation near Pavukara
Erosion of riparian vegetation bathing ghats at Pamba triveni

Riparian vegetation near Periyar tiger reserve

Riparian vegetation near Edakadathi

Riparian vegetation near Perunthenaruvi
Landuse pattern of a riparian belt at Attathode

Sand mining near Pavukara

Riparian zone of Cherukolpuzha

River bank erosion near Cherukolpuzha
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).
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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