

Validation and documentation of rare endemic and threatened (RET) plants from Nilgiri, Kanuvai and Madukkarai forests of southern Western Ghats, India

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According to Nayar (1996) there are 60 endemic genera and 2,015 species of flowering plants endemic to peninsular India. The Western Ghats possess a high percentage of endemic species, about 48% of 4000 species occur in this region (Gopalan & Henry 2000). The Western Ghats are on the brink of endemic plant

collapse, about 1500 species have a highly fragmented population and at least 50 endemic species have not be relocated after repeated surveys (Nayar 1998).



The current paper is an attempt to study the conservation assessment of rare, endemic and threatened species (RET) of the southern Western Ghats. As part of the Nilgiri Landscape Restoration Programme conducted by the British Council International Climate Champions in association with the Tamil Nadu Forest Department, (Nilgiris North & South Divisions), British Council India, Earth Trust Nilgiris, Edhkwelynawd Botanical Refuge, Nilgiris; the first author visited and validated the RET plants of Kolikorai, Melcoupe, Ammagal, Mukurthy National Park (MNP) and Doddabetta forests of the Nilgiri Biosphere Reserve. After that a detailed field survey was carried out by the authors in Kolikorai, Melcoupe, Kil Kothagiri, Longwood Shola and Kothagiri forests of Nilgiris with the help of Earth Trust Nilgiris, and many plants were identified and documented. As a part of this we also studied the status of RET plants in the Madukkarai Hills and Kanuvai Hills of Coimbatore District and recorded the details systematically.

The Nilgiri Biosphere Reserve (NBR) is a part of SWG and a place of incredible diversity in landscape and life. It lies between 10°45'–12°N & 76°–77°15'E with a total area of 5520km² spread across the three states of Karnataka, Kerala and Tamil Nadu. Altitude within the NBR varies from 250–2670 m, and the reserve encompasses a diversity of vegetation types, ranging from tropical evergreen to thorny scrub (Chandrasekhara 2005). NBR is one of the hot spots of the world with many rare, endemic and threatened plants (Fyson 1932; Nayar 1996).

Madukkarai is located at 10.9°N & 76.97°E along the hill sides of the southern Western Ghats of Coimbatore, Tamil Nadu and also a part of Nilgiri Biosphere Reserve. The name “Madukkarai” originated from the colloquial use of the words “Mathil” (means great wall in Tamil) + “Karai” (means shore in Tamil).

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It has one of the oldest cement plants in India. The temperature ranges from 47.5°C and 16°C respectively (Jayanthi et al. 2011). Kanuvai Hills are located near Maruthamalai forests and the vegetation types are tropical dry deciduous forests and thorn shrub forests.

Result and Discussion: The present study is an enumeration of 51 selected endemic species belonging to 39 genera, 28 families and two subfamilies documented from different forests in Tamil Nadu. Among them *Berberis nilghiriensis* Ahrendt is one of the Critically Endangered (B1+2c) species and collected by the authors from Ammagal forests of NBR. Many rare species were also collected from the study area including *Crotalaria scabra* Gamble, *Murdannia lanuginosa* (Wall. ex Clarke) Brueck. (Nayar & Sastry 1990), *Smilax wightii* A. DC., *Elaeocarpus recurvatus* Corner (Nayar & Sastry 1990), *Litsea wightiana* (Nees) Hook. f. var. *tomentosa* (Meissner) Gamble and *Dalbergia congesta* Graham ex Wight (Sasidharan 2006).

Lauraceae and Fabaceae are the dominant families having eight species each, Acanthaceae and Apocynaceae with three species, Berberidaceae, Gentianaceae, Myrtaceae and Scrophulariaceae with two species and all the other remaining families having one species each. The correct botanical identity, common names (if available), family, habit, habitat, locality and endemism of documented species are given in the table with colour photos (Table 1, Images 1–3).

Conclusion: The Nilgiri Biosphere Reserve is one of the most diverse floristic areas of India with a mixture of both exotic and native species. From the present study the authors properly validated and documented many RET plants from NBR, Madukkarai and Kanuvai Hills of Coimbatore District, Tamil Nadu. Some of the threatened factors such as over-exploitation of natural resources and other anthropogenic activities adversely affect the existing ecosystem and it may lead to the rarity of many species in future. There is an urgent need for developing pragmatic conservation strategies for endemic plants in the southern Western Ghats, which may lead to their effective protection.

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Table 1. List of species documented in the study area

Sno	Botanical Name/Local Name	Family	Habit	Habitat	Locality	Status and Distribution
1	<i>Anaphalis neelgerryana</i> (Sch.-Bip. ex DC.) DC.	Asteraceae	Herb	Dry exposed slopes	MNP	Endemic to SWG
2	<i>Arisaema leschenaultii</i> Blume (Pambucholam, Pambumchena)	Araceae	Herb	Margins of ever- green forests, sholas and grasslands	Kothagiri, Kil Kothagiri	Endemic to SWG
3	<i>Asparagus fysonii</i> J.F. Macbr.	Liliaceae	Shrub	Grass lands	Madukkarai	Rare, Endemic to SWG
4	<i>Barleria acuminata</i> Wight	Acanthaceae	Shrub	Deciduous forests	Kanuvai Hills	Endemic to Peninsular India
5	<i>Barleria buxifolia</i> L.	Acanthaceae	Shrub	Wasteplaces	Kanuvai Hills	Endemic to Peninsular India
6	<i>Berberis nilghiriensis</i> Ahrendt	Berberidaceae	Shrub	Evergreen and shola forests	Ammagal	Critically Endangered, endemic to Tamil Nadu
7	<i>Canscora pauciflora</i> Dalz.	Gentianaceae	Herb	Evergreen forests	Kolikorai	Endemic to SWG
8	<i>Canscora perfoliata</i> Lam.	Gentianaceae	Herb	Wet areas in moist deciduous forests among grasses	Ammagal	Endemic to SWG
9	<i>Caralluma diffusa</i> (Wight.) N.E. Br.	Apocynaceae - Asclepiadoideae	Herb	Scrub jungles	Madukkarai, Kanuvai Hills	Near Threatened, endemic to SWG
10	<i>Caralluma indica</i> (Wight & Arn.) N.E.Br.	Apocynaceae - Asclepiadoideae	Herb	Scrub jungles	Madukkarai	Rare, endemic to SWG
11	<i>Caralluma bicolor</i> VS. Ramach. et al.	Apocynaceae	Herb	Dry deciduous forests and Scrub jungles	Kanuvai Hills	Endangered, endemic to Tamil Nadu
12	<i>Cinnamomum wightii</i> Meisn. (Kattukaruvai)	Lauraceae	Tree	Shola forests	Doddabetta	Rare, endemic to SWG
13	<i>Commelina wightii</i> Raiz.	Commelinaceae	Herb	In the plains	Kothagiri	Threatened, endemic SWG
14	<i>Cordia wallichii</i> G. Don	Boraginaceae	Tree	Moist deciduous forests	Madukkarai	Endemic to peninsular India
15	<i>Crotalaria heyneana</i> Graham ex Wight & Arn.	Fabaceae	Shrub	Semi-evergreen forests	Kothagiri	Endemic to SWG
16	<i>Crotalaria pusilla</i> Heyne ex Roth	Fabaceae	Herb	Semi-evergreen forests	Kil Kothagiri	Endemic to peninsular India
17	<i>Crotalaria ramosissima</i> Roxb.	Fabaceae	Herb	Dry deciduous forests	Kanuvai Hills	Rare, Endemic to SWG
18	<i>Crotalaria scabra</i> Gamble	Fabaceae	Shrub	Grasslands	Kil Kothagiri	Rare, Endemic to SWG
19	<i>Cryptocarya stocksii</i> Meisn.	Lauraceae	Tree	Evergreen and shola forests	Longwood Shola	Rare, Endemic to SWG
20	<i>Curcuma neilgherrensis</i> Wight	Zingiberaceae	Herb	Grasslands	MNP	Endemic to SWG
21	<i>Dalbergia congesta</i> Graham ex Wight.	Fabaceae	Climbing shrub	Semi-evergreen forests	Avalanche	Rare, Endemic to SWG
22	<i>Elaeocarpus recurvatus</i> Corner. (Bhadraksham)	Elaeocarpaceae	Tree	Semi-evergreen forests	MNP	Vulnerable, endemic to SWG
23	<i>Eriocaulon pykarensense</i> Nampy & Manudev	Eriocaulaceae	Herb	Marshy places in grasslands.	Kil Kothagiri	Endangered, endemic to Tamil Nadu
24	<i>Ficus laevis</i> Blume var. <i>macrocarpa</i> (Miq.) Corner	Moraceae	Tree	Evergreen and shola forests	Long Wood Shola	Rare, endemic to SWG
25	<i>Helixanthera wallichiana</i> (Schult.) Danser	Loranthaceae	Shrub	Evergreen forests, also in the plains	MNP	Rare, endemic to WG
26	<i>Hydnocarpus macrocarpa</i> (Bedd.) Warb. (Malamarotti)	Flacourtiaceae	Tree	Evergreen forests	Avalanche	Vulnerable, endemic to SWG
27	<i>Indigofera trita</i> L.f. var. <i>scabra</i>	Fabaceae	Herb	Dry deciduous forests	Madukkarai	Rare, endemic to SWG
28	<i>Indigofera uniflora</i> Buch.-Ham. ex Roxb.	Fabaceae	Herb	Deciduous forests and denuded hillocks	Madukkarai	Endemic to peninsular India
29	<i>Justicia nilgherrensis</i> (Nees) Wall.	Acanthaceae	Shrub	Grasslands	Kothagiri	Endemic to SWG
30	<i>Leucas lanceifolia</i> Desf.	Lamiaceae	Shrub	Margins of shola forests	MNP	Endemic to peninsular India
31	<i>Litsea quinqueflora</i> (Dennst.) Suresh	Lauraceae	Tree	Evergreen forests	Kil Kothagiri	Rare, endemic to SWG

Sno	Botanical Name/Local Name	Family	Habit	Habitat	Locality	Status and Distribution
32	<i>Litsea floribunda</i> (Blume) Gamble (Pattuthali)	Lauraceae	Tree	Evergreen and semi-evergreen forests	Ammagal	Rare, endemic to SWG
33	<i>Litsea wightiana</i> (Nees) Hook. f. var. <i>tomentosa</i> (Meisn.) Gamble	Lauraceae	Tree	evergreen forests	Ammagal, Kil Kothagiri	Rare, endemic to SWG
34	<i>Litsea wightiana</i> (Nees) Hook. f. var. <i>wightiana</i> (Pattuthali, Manjakudala)	Lauraceae	Tree	Shola forests	Kil Kothagiri	Endemic to SWG
35	<i>Mahonia leschenaultii</i> (Wall. ex Wight & Arn.) Takeda ex Dunn (Charayapazham, Mullu Kadambu)	Berberidaceae	Tree	Evergreen forests	MNP	Endemic to SWG
36	<i>Memecylon randerianum</i> SM & MR Almeida (Kaikkathetti, Koovachekki, Kashara, Kazhavu)	Melastomataceae	Shrub	Evergreen and semi-evergreen forests, and also in sacred groves	Kil Kothagiri	Endemic to SWG
37	<i>Moringa concanensis</i> Nimmo ex Gibs. (Kattu Moringa)	Moringaceae	Tree	Scrub jungles and dry deciduous forests	Madukkarai	Rare, endemic to SWG
38	<i>Murdannia lanuginosa</i> (Wall. ex Clarke) Brueck.	Commelinaceae	Herb	Grass lands	Kothagiri	Rare, endemic to peninsular India
39	<i>Neolitsea scrobiculata</i> (Meisn.) Gamble (Mulakunari, Shanthamaram)	Lauraceae	Tree	Evergreen and shola forests	Ammagal	Endemic to SWG
40	<i>Passiflora leschenaultii</i> DC. (Seemavellarai)	Passifloraceae	Climber	Shola forests	Doddabetta	Endemic to peninsular India
41	<i>Phoebe wightii</i> Meisn. (Chudala, Mulakunari)	Lauraceae	Tree	Evergreen forests	Longwood Shola	Endemic to peninsular India
42	<i>Premna glaberrima</i> Wight	Verbenaceae	Shrub	Semi-evergreen and evergreen forests	Kothagiri	Rare, endemic to SWG
43	<i>Pterolobium hexapetalum</i> (Roth.) Sant & Wagh. (Endam)	Fabaceae - Caesalpinoideae	Climber	Dry deciduous forests	Madukkarai	Endemic to peninsular India
44	<i>Rhododendron arboretum</i> J. E. Smith ssp. <i>nilagiricum</i> (Zenk.) Tagg. (Alanchi)	Ericaceae	Tree	Shola forests	Avalanche	Endemic to SWG
45	<i>Rubus glomeratus</i> Blume. (Kattu munthiri)	Rosaceae	Scandent shrub	Evergreen forests and grasslands	MNP	Endemic to peninsular India
46	<i>Smilax wightii</i> A. DC. (Karivilanthi, Chooramullu)	Smilacaceae	Climbing shrub	Moist deciduous and shola forests	MNP	Rare, endemic to SWG
47	<i>Striga densiflora</i> Benth.	Scrophulariaceae	Herb	Dry deciduous forests	Kanuvai	Endemic to peninsular India
48	<i>Syzygium laetum</i> (Buch.-Ham.) Gandhi (Kollinjaval)	Myrtaceae	Tree	Evergreen forests	Avalanche	Endemic to SWG
49	<i>Syzygium mundagam</i> (Bourd.) Chithra (kattuchambai, Mundagam)	Myrtaceae	Tree	Evergreen forests	Doddabetta	Rare, endemic to SWG
50	<i>Torenia hirsuta</i> Willd.	Scrophulariaceae	Herb	Marshy areas	MNP	Endemic to SWG
51	<i>Vaccinium neilgherrense</i> Wight. (Manalamaram)	Vacciniaceae	Tree	River banks of Evergreen forests	MNP	Rare, endemic to SWG

MNP - Mukkurthi National Park; WG - Western Ghats; SWG - southern Western Ghats



Image 1. A & B - *Arisaema leschenaultii* Blume; C - *Barleria acuminata* Nees; D - *Barleria buxifolia* L.; E - *Berberis nilghiriensis* Aherendt; F - *Canscora perfoliata* Lam.; G - *Caralluma diffusa* (Wight) N.E. Br.; H - *Caralluma diffusa* (fruit); I - *Caralluma indica* (Wight & Arn.) N.E.Br.; J - *Commelina wightii* Raiz.



Image 2. A - *Cordia wallichii* G. Don.; B - *Crotalaria heyneana* Graham ex Wight & Arn.; C - *Crotalaria heyneana* (fruit); D - *Crotalaria pusilla* Heyne ex Roth; E - *Crotalaria pusilla* (fruit); F - *Curcuma neilgherrensis* Wight; G - *Helixanthera wallichiana* (Schult.) Danser; H - *Indigofera trita* L.f. var. *scabra*.; I - *Justicia nilgherrensis* (Nees) Wall.; J - *Leucas lanceifolia* Desf.



Image 3. A - *Litsea wightiana* (Nees) Hook. f. var. *tomentosa* (Meisn.) Gamble; B - *Mahonia leschenaultii* (Wall. ex Wight & Arn.) Takeda ex Dunn; C - *Rhododendron arboretum* J.E. Smith spp. *nilagiricum* (Zenk.) Tagg.; D & E - *Rubus glomeratus* Blume; F - *Striga densiflora* Benth.; G - *Syzygium laetum* (Buch.-Ham.) Gandhi; H - *Torenia hirsuta* Willd.

