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An overview of tree ecology and forest studies in the Northern Western Ghats of India
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Supplementary Material

Tab. S1 - Forest types occurring in Northern Western Ghats (NWG) and their details according to Champion and Seth (1968) with addition of latest literature and own observations.

Sr	Forest type	Characteristics	Floristic/Vegetation	Distribution in NWG
	MOIST TROPICAL FORESTS			
	Group I. Tropical Wet Evergreen Forests			
	Sub-group 1A. Southern tropical wet evergreen forest	Dense evergreen, lofty tree-up to height 45m, Numerous epiphytes, buttresses frequent, long cylindrical stem, thin bark, thick-glossy leaves, Cauliflory common, Climbers sometime conspicuous, Canes		
	Sub-division, succession			
1.	**C_4. West coast tropical evergreen forest**	High humidity, Rainfall-1500-5000mm, Elevation-250-1200m.	*Dipterocarpus indicus, Lophopetalum Callophyllum* sp. *Holigarna* spp*., Olea dioica, Aporosa lindleyana, Litsea* spp*., Strobilanthes spp.*	Maharashtra-Southward of Ratnagiri district, Karnataka-Anshi-Dandeli, Goa-Mollem
	Group II. Tropical Semi-evergreen Forests			
	Sub-group 2A. Southern tropical semi-evergreen forest	Includes both evergreen and deciduous species, less dense, buttressed stems, Bark thicker and rougher, Cauliflory not frequent, Climber heavy		
	Sub-division, succession			
2.	**C_2. West coast semi-evergreen forest**	Intermediate between tropical evergreen and moist deciduous forest, Rainfall-2000-2500mm, hill slopes with elevation: 450-1050m	*Terminalia paniculata, Diospyros* spp*., Cinnamomum* spp. *Artocarpus hirsuta, Ixora* spp. *Strobilanthes* spp.	Karnataka- Anshi, Dandeli, Goa-Mollem, Maharashtra-Ratnagiri, Sindhudurg
	General Edaphic and Seral Types of Semi- evergreen forests			

Sr	Forest type	Characteristics	Floristic/Vegetation	Distribution in NWG
3.	**E_4. Lateritic semi-evergreen forest**	Especially on laterite areas from NWG	*Xylia xylocarpa, Pterocarpus marsupium, Annnogissus latifolium, Carya arborea, Bridelia retusa, Leea indica, Holarrhena pubescence*	Coastal areas of Goa, Maharashtra
	Group III. Tropical Moist Deciduous Forests			
	Sub-group 3B. South Indian moist deciduous forest	Closed high forest-30-36m, Dominant species mostly deciduous and few evergreen dominants, Climbers large & abundant, Epiphytes in post climax in Shady places. Absence of small tree & saplings, Leafless period in dry season. Rainfall-1500-2000m		
	Sub-division, succession			
4.	**C_1. Moist teak bearing forest**			
	C_1a-very moist teak forest	Rainfall over 2500, 10% of teak, very dense evergreen growth, no fires and no grazing	*Tectona grandis, Terminalis* spp. *Pterocarpus* spp. *Lagerstroemia* spp. *Adina* sp. *Xylia, Careya* sp., *Dillenia pentagyna, Kydia calicina, Grewia tiliaefolia, Bambusa arundinacea, Glycosmis pentaphylla, Clerodendrum viscosum*	Eastern side of Western Ghats of Maharashtra, Anshi-Dandeli
	C_1b-moist teak forest	Rainfall 1600-2500mm, 10-25% teak, dense under growth, fires rare, light grazing		
	C_1c-Slightly moist teak forest	Rainfall 1200-1600m, 20-60% teak, moderate undergrowth, occasional fires and moderate grazing.		
5.	**C_2 Southern moist mixed deciduous forest**	Evergreen components more, occasional teak presence, all along Western Ghats wherever climate and soil suitable, valleys, and shallow porous higher grounds	*Tetrameles nudiflora, Stereospermum personatum, Dysoxylum binecteriferum, Ficus nervosa* (all occasional); *Syzygium cumini, Olea dioica*, *Bridelia retusa, Mangifera indica, Memecylon, Callicarpa, Leea* spp., Grasses absent	NWG of Maharashtra, Goa

Sr	Forest type	Characteristics	Floristic/Vegetation	Distribution in NWG
	C2/2S1 Southern Secondary moist mixed deciduous forest	Abrupt changes in moist deciduous forest, Secondary Origin-Climatic climax due to direct human actions (Shifting cultivation) indirect action grazing& burning; Without big trees, Scattered primary components, deciduous shrubs, thin grass cover along annual burning	*Terminalia paniculate, Bombax ceiba, Mangifera indica, Dalbergia latifolia, Schleichera oleosa, Alstonia, Olea dioica, Holarrhrna, Mallotus philippensis. Helicteris isora, Leea* sp.	Mentioned in WG-Mangalore and Kerala, however, now also can be seen on hilly grounds of NWG of Maharashtra where climate for semi-evergreen is present (Personal Obervation)
	Group IV. Littoral and Swamp Forests			
	Sub-group 4C. Tropical fresh water swamp forest			
6.	**FS_1 Myristica swamp forest**	Fairly dense evergreen close forest, 15-30m high, clean slender stems in mud, abundant knee roots, little under growth of Aroids and Scitaminae	*Myristica magnifica, Gymnacranthera canarica, Calophyllum apetalum, Hydnocarpus pentandrus, Nothopegia castaneifolia, Calamus pseudotenuis, Pandanus furcatus, Lagenandra toxicaria*	Recent reports from NWG: Sawantwadi Sindhudurga (Sreedaran & Indulkar 2018, Dalavi et al., 2021) and Goa-(Santhakumaran et al. 1995, 1996)
	Sub-group 4E. Tropical riparian fringing forests			
7.	**RS_1. Riparian fringing forest**	Few species with large trees forming narrow strips along water courses, evergreen to deciduous, Scatter distribution of tress with shrubs between them	*Terminalia arjuna, Lagerstroemia speciosa, Salix tetrasperma, Syzygium* spp., *Mangifera indica*	Throughout NWG along most of the rivers
	DRY TROPICAL FORESTS			
	Group V. Tropical Dry Deciduous Forests			
	Sub-group 5A. Southern Tropical dry deciduous forests	Upper canopy uneven, not dense; mixture of deciduous species, some elements of moist deciduous forest with 13-20m high, less number of species; Lower canopy deciduous, rare evergreens in shady places Grasses present, No Canes & Palms Climber few but woody, Epiphyte & ferns very less. Rainfall 1000-1300m, occasionally down 880mm, long dry period		Throughout WG except rainfall exceeding 1900mm.

Sr	Forest type	Characteristics	Floristic/Vegetation	Distribution in NWG
	Sub-division, succession			
8.	**C_3- Southern dry mixed deciduous forests**	Dominant with Boswellia, Thorny plants more as per heavy grazing, Grasses are conspicuous, Climber few, Rainfall:875-1500mm, forest burnt annually	*Anogeissus latifolia, Boswellia, Mitragyna parvifolia, Terminalia* spp., *Diospyros melanoxylon, Lannea, Acacia, Cochlospermum, Rhus* and Grasses	NWG of Maharashtra
	Edaphic climax type in dry deciduous forest			
9.	**E_7. Laterite scrub**	Irregular open scrub of stunted and deciduous trees with thorny species dominating	*Terminalia elliptica, T. paniculate, Embellia officinalis, Strychnos nux-vomica, Lannea, Bridelia retusa, Butea monosperma, Calycopteris floribunda, Carissa* spp. *Pavetta, Ixora, Combretum* spp.	At lower elevation in coastal area between laterite hills in Maharashtra and goa. previously mentioned from Southwards from coastal Karnatak in Western Ghats, however also distributed in lower elevation across coastal area between laterite hills in Maharashtra and goa (Personal observation)
	Group VI. Tropical Thorn Forests			
	Sub-group 6A- Southern tropical thorn forest			
	Sub-division, succession			
10.	**C_1. Southern Thorn Forest**	Open low forest with hardwood species predominant, trees low branching with 6-9m height, lower storey-small tress/shrubs with spiny and xerophytic	*Acacia* spp. *Capparis decidua, C. divericata, Balanites aegyptica, Azadiracta indica, Mimmosa hamata, Cassia auriculata*	Eastern edge of the Western Ghats, in Pune, Satara, Ahmadnagar district, Intermixed with dry deciduous forest on low hills (Personal observation)
	MONTANE SUB-TROPICAL FORESTS			
	Group VIII. Sub-tropical Broadleaved Hill Forest			
	Sub-group 8A Southern Sub-tropical broadleaved hill forests			
	Sub-division, succession			

Sr	Forest type	Characteristics	Floristic/Vegetation	Distribution in NWG
11.	**C_2. Western subtropical hill forest**	1000-1700m higher hill, Exceptional heavy rainfall (5000-6600mm), long period of dry season, dense evergreen with mixes species of low height-15-20m	*Syzygium cumini, Actinodaphne* spp., *Memecylon umbellatum, Terminalia chebula, Olea dioica, Glochidion spp., Canthium* spp. *Allophylus cobbe, Elaegnus conferta, Pavetta indica*	Maharashtra-Mahabaleshwar, Bhimashankar

References

Champion SH, Seth SK (1968). A revised survey of the forest types of India. The manager of publication Delhi, Government of India. 404 pp.

Dalavi J, Mane R, Gaikwad N, Ghane S, Phonde Y, Yadav S. (2021). Studies on Northernmost Myristica Swamp Ecosystem in Western Ghats at Bambarde-Hewale, Maharashtra, India. Phytomorphology 71: 41-50.

Sreedharan G, Indulkar M (2018). New distributional record of the northernmost Myristica swamp from the Western Ghats of Maharashtra. Current Science 115: 1434-1436.

Santhakumaran LN, Singh A, Thomas VT (1995). Description of a sacred grove in Goa (India), with notes on the unusual aerial roots produced by its vegetation. Wood. 24-28.

Santhakumaran LN, Singh A, Thomas VT (1996). Further notes on the sacred grove at Bamber in Goa (India). Wood : 6-7.

Tab. S2 - Vegetation type applicable to forests of NWG according following studies.

Champion & Seth 1968	**Pascal 1988**	**Ghate et al. 1998**	**Bahuguna et al. 2016**
1A. C_4. West coast tropical evergreen forests	Lowland wet climax evergreen forests	Evergreen forests	I.B. West coast tropical evergreen forest
	Disturbed lowland wet evergreen forests	Semi-Closed evergreen forests	-
2A. C_2. West coast tropical semi-evergreen forests	Secondary semi-evergreen forest	Semi-evergreen forests	II.B. West coast semi-evergreen forest
E_4. Lateritic semi-evergreen forest	-	-	
3B. C_1. Moist teak bearing forests	Secondary/climax moist deciduous forest	Moist deciduous forests	III.A. Moist teak forest
C_2. Southern moist mixed deciduous forests			III.B Mixed deciduous forest
4C. FS_1. *Myristica* swamp forests	-	-	IV.D. Tropical fresh water *Myristica* swamps
RS_1. Riparian fringing forests	-	-	-
5A. C_3. Southern dry mixed deciduous forests	Secondary/climax dry deciduous forest	Dry deciduous forests	V.C. Dry mix deciduous forest
E_7. Laterite scrub		-	
6A. C_1. Southern Thorn Forests	-	-	VI.A. Dry thorn forest
8A. C_2. Western subtropical hill forests	Stunted submontane evergreen forests	Stunted evergreen forests	VII.A. Southern montane broadleaved forest

Tab. S3 - Overview of quantitative studies from NWG.

Authors	Study area	Method and Sampling area	No. locations	No. Stems	No. Plots/ Quadrat/ Transect	No. of taxa	Shannon/ Simpson	Basal Area (m^2/ha)	IVI	FIV	Forest/Vegetation /Community type and Remark on dominant species
Puri & Mahajan 1960	Mahabaleshwar	Quadrats (3 m^2); percentage of presence	4	NA	60	63 (14 Trees)	NA	NA	NA	NA	*Syzygium-Memecylon-Actinodaphne, Syzygium-Terminalia-Memecylon, Syzygium-Memecylon-Randia and Syzygium-Artocarpus*
Puri & Jain 1960	Pune (Poona)	Quadrat (5 m radius) ;percent age of presence	5	NA	79	84 (35 Trees)	NA	NA	NA	NA	Dominant Species (*Acacia chundra, Boswelia serrata and Grewia tiliaefolia*)
Gadgil & Vartak 1977	Mahabaleshwar	Plots (One and two acres)	5	1117	5	10 tree species considerd for growth comparison	NA	NA	NA	NA	Overall dominants: *Syzygium cumini, Actinodaphne angustifolia and Memecylon umbellatum*
Watve et al. 2003b	Mulshi (forest fragments)	Transect and quadrat (10 × 10 m), ≥10cm	8		8	52	2.1 to 3.83	14.5 to 72.9			*Dimpcarpus-Aglaia-Ficus nervosa*
Kanade et al. 2008	Chandoli National Park	Belt transect (1000 × 5m), ≥15 cm; 5 ha	10	4200	26 sub-transects	107	2.0 to 3.2	10.22 to 57.16	*Memecylon umbellatum* (49.22), *Syzygium cumini* (25.42), *Olea dioica* (14.25)	Melastomata-ceae (50.32), Myrtaceae (32.39) and Euphorbiaceae (23.16)	*Memecylon-Syzygium-Olea*

Authors	Study area	Method and Sampling area	No. locations	No. Stems	No. Plots/ Quadrat/ Transect	No. of taxa	Shannon/ Simpson	Basal Area (m^2/ha)	IVI	FIV	Forest/Vegetation /Community type and Remark on dominant species
Joglekar et al. 2015	Koyna Wildlife Sanctuary	Belt transect (1000 × 5m), ≥ 15 cm; 6 ha	12	4296	12	108	1.5-3.03	6.76-58.23	*Memecylon umbellatum* (59.77), *Syzygium cumini* (24.75), *Olea dioica* (11.75)	Melastomataceae, Myrtaceae and Moraceae	*Memecylon-Syzygium-Olea*
Kasodekar et al. 2019	Mulshi (forest fragment)	Belt transect (167 × 6 m) >10 cm; 0.3 ha	1	444	3	49	2.97-3.36; 0.057	NA	NA	NA	No different vegetation type designated however passing remark on distinct forest type than the designated one for Semi-evergreen forest.
Tadwalkar et al. 2020	Amboli (Reserve forest and Sacred groves)	Quadrat (20 × 20 m and Transect (500, 250, 200 m × 5 m), ≥15 cm; 2.6 ha	8	2224	46	87	0-2.86	27.02	*Memecylon umbellatum* (61.6), *Syzygium cumini* (27.06), *Diospyros nigrescens* (14.25)	Melastomataceae (56.38),Myrtaceae (~28) and Anacardiaceae (~25)	*Memecylon-Syzygium-Diospyros*