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No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti, Coimbatore, Tamil Nadu 641035, India

Ph: +91 9385339863 | www.threatenedtaxa.org

Email: sanjay@threatenedtaxa.org

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Caption: Cyrtodactylus myintkyawthurai, endemic to Myanmar. Medium: Water colours on watercolor sheet. © Aakanksha Komanduri

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Plant diversity of Point Calimere Wildlife Sanctuary and fodder species grazed by the Blackbuck Antilope cervicapra L.

Ashutosh Kumar Upadhyay¹, A. Andrew Emmanuel², Ansa Sarah Varghese³, D. Narasimhan⁴

¹ Central National Herbarium, Botanical Survey of India, Acharya Jagdish Chandra Bose Indian Botanic Garden, Howrah, West Bengal 711103, India.

² Door No. 1, Block-I, Met Quarters, College Road, Chennai, Tamil Nadu 600006, India.

³ Inchackal (H), Cherukole, P.O, Mavelikara, Alappuzha, Kerala 690104, India.

⁴ Department of Botany, Madras Christian College (Autonomous) Tambaram, Tamil Nadu 600059, India.

¹ashutoshpdh196@gmail.com (corresponding author), ²emmanuel.andrew29@gmail.com, ³ansa.svarghese@gmail.com,

⁴ narasimhand@gmail.com

Abstract: A rapid but intense survey was conducted using visual landmarks in the Point Calimere Wildlife Sanctuary to enumerate the flora and foraging habits of the Blackbuck *Antelope cervicapra*. The area was divided into various segments such as the sanctuary entrance, Maattu muni kovil, Savukku plot or Casuarina plantation, S-Bend road and the old light house for precise enumeration. A total of 111 plant species that include 50 herbs, 16 climbers/lianas, 30 shrubs and sub-shrubs, and 15 trees belonging to 39 plant families were recorded in this study. Visual observations showed that Blackbucks grazed on grasses such as the Mangrove Grass *Aeluropus lagopoides* (L.) Thwaites, Dog's Tooth Grass *Cynodon barberi* Rang. & Tadul., Indian Durva Grass *Cynodon dactylon* (L.) Pers., Feather Finger Grass *Chloris virgata* Sw., and a sedge, the pointed fimbristylis *Fimbristylis acuminata* Vahl during the day time. They were also observed browsing on the leaves and pods of Algaroba *Prosopis juliflora* (Sw.) DC. in the evenings. Our observation on the presence of feral horses and stray cattle in the Point Calimere Wildlife Sanctuary shows that they compete for food and water with the Blackbuck. The spread of invasive alien plant species competes with and reduces the space for native species.

Keywords: Feral, foraging habits, Nagapattinam District, tropical dry evergreen forests, Fodder species, alien species, habitat, survey, Bishnoi community.

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Author details: MR. ASHUTOSH KUMAR UPADHYAY has worked in University of Agricultural Sciences (GKVK) as a Junior Research Fellow and in Botanical Survey of India as Senior Research Fellow. He was recently working on the Taxonomy and Ethnobotany of Elatostema J.R.Forster & G.Forster in India. MR. A. ANDREW EMMANUEL has a master's degree from Madras Christian College in Botany and a degree in Education. He is interested in plant ecology and plant-animal interaction. Currently he is a teacher handling Biology and Biotechnology. MS. ANSA SARAH VARGHESE has worked on the Flora of Rishi Valley School, Andhra Pradesh and has good knowledge of Angiosperm taxonomy. She has also been part of several research programs on Plant breeding at ICAR-IIHR. DR. D. NARASIMHAN is a retired Head of Department of Botany, Madras Christian College. During his tenure he worked extensively towards botanising various parts of India. He currently is a member of Tamil Nadu State Biodiversity Board.

Author contributions: AKU, AAE and ASV were involved in the field survey, identification of plants and preparation of the manuscript. DN supervised the work and gave important inputs for the study. All authors contributed towards writing the manuscript.

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INTRODUCTION

Point Calimere Wildlife Sanctuary harbours a rich diversity of animals, among them is the Blackbuck which is the most exquisite animal in the sanctuary. The name Blackbuck is in reference to the dark-coloured coat of the adult male which varies from dark brown to black. The belly and hind side of the legs are white. The horns of the males are ridged and twisted. Blackbuck Antilope cervicapra L. is listed under Schedule I, Part I of the Indian Wildlife Protection Act, 1972. Habitats of the Blackbuck have been declared as protected areas in several parts of India, with the support of the local people. Punjab and Haryana have honoured the animal as their state animal (Hundal 2004) and the Bishnoi community of Rajasthan considers the blackbuck as a sacred animal. There are six protected areas in Tamil Nadu where Blackbucks occur in considerable numbers. They include: (a) the Guindy National Park and its contiguous campuses such as Raj Bhavan and the Indian Institute of Technology, Madras (IIT-M), though these campuses do not fall under the protected category; (b) Vallanadu Sanctuary, Tuticorin; (c) Point Calimere Wildlife Sanctuary, Kodiakkarai; (d) Sathyamangalam Wildlife Sanctuary and Tiger Reserve, Erode; (e) Kanyakumari Wildlife Sanctuary, Kanyakumari; and (f) Mudumalai Wildlife Sanctuary and National Park, Nilgiris.

Blackbucks are sensitive and get disturbed by human presence. They prefer open grasslands and like to graze during early mornings and late afternoons. There are no direct predators for the Blackbucks in the Point Calimere Wildlife Sanctuary (PCWS). A census conducted in 2015 by the forest department, Tamil Nadu in coalition with the A.V.C Engineering College, Mayiladuthurai and Government Arts and Science College, Poompuhar recorded 948 Blackbucks, 172 feral horses, 82 Wild Boars, 12 Black-naped Hares, and 20 Jackals in the sanctuary (Suresh 2015). The objectives of this study were (a) to survey the plant diversity and highlight the species of herbs, shrubs, and trees seen in PCWS and (b) to document the grasses and other plant species grazed by the Blackbucks.

MATERIALS AND METHODS

Study area

PCWS is one of the largest tropical dry evergreen forests (TDEF) in India located between 10.2878°N & 79.8651°E with an expanse of 1,729 ha located in the Nagapattinam district of Tamil Nadu (Figure 1) (Ali 2005; Parthasarthy et al. 2015). TDEF are the areas of vegetation without a distinct differentiation between the small and canopy forming trees, having coriaceous leaves with an average height of less than 12 m, having a luxuriant growth of lianas and climbers along with an inconspicuous presence of grasses (Champion & Seth 1968; Parthasarthy et al. 2015). This vegetation receives both summer and winter monsoons due to depressions and cyclones in the Bay of Bengal (Meher-Homji 1974). It forms an interface between the coastal and the deciduous vegetation, having varied ecosystems with a visible change in the soil type from sandy, saline to alluvial.

Point Calimere was declared a wildlife sanctuary in 1967 for conserving the Blackbuck population that was dwindling due to intensive poaching and hunting (Baruah 2005). PCWS is bordered by Vedaraniyam salt pans in the north, Palk Strait in the south, Bay of Bengal in the east, and Kodiakadu in the west. It gets its name from the point at which both the Bay of Bengal and the Palk Strait meet. The human habitations around the forest are found mainly in two villages namely, Kodiakkarai and Kodiakadu. The sanctuary is an island which is connected to the mainland by the Vedaraniyam-Kodiakkarai road.

Data collection and analyses

The methods of assessment used were very simple and based on visual observations in the field, i.e., observing Blackbucks while they grazed, followed by visiting the grazing sites to identify the plant species (Altman 1974). Since, this was a rapid survey, methods such as quadrates and other indices were not planned for in the study. However, the sanctuary was divided into the following segments using visual landmarks for effective and efficient data collection: (a) sanctuary entrance, (b) Maattu muni kovil - a temple visited by local cowherds, (c) Savukku plot or Casuarina plantation, (d) S-Bend road, and (e) the old light house. Rapid survey was conducted within the sanctuary for almost a month and a total of about 120 hours were spent exclusively for observing foraging and resting habits of Blackbucks in the PCWS. During the study period, field binoculars were used to observe the grazing activities. The segments were explored to interpret the foraging pattern of Blackbucks and to make a list of plants available in the sanctuary, which was further used to understand the components of the vegetation. Most of the plant species were identified on the site and undesignated plant specimens especially the grasses were taken to the laboratory for identification. All the identified plant species were classified based on their

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Figure 1. Study area

habitats. The botanical names of the plant species were updated using online databases such as POWO (2020), The Plant list (2013) and The International Plant Name Index (IPNI 2018). Specimens were also photographed and kept for reference.

RESULTS

A total of 111 plant species that included 50 herbs (12 grasses, five sedges and four creepers), 16 climbers/ lianas, 30 shrubs & subshrubs, and 15 trees belonging to 39 plant families were recorded in this study (Figure 2). Of the plant families recorded Fabaceae, Poaceae, Amaranthaceae, Lamiaceae, Cyperaceae, Rubiaceae, Convolvulaceae, and Asteraceae were the most speciesrich families having four or more species each (Figure 3). The habitats of different plant species observed were divided into five major types, namely, (a) Inundated plains—areas getting seasonally flooded, dominated by *Chloris virgata* Sw., *Cynodon barberi* Rang. & Tadul., *C. dactylon* (L.) Pers., *Perotis indica* (L.) Kuntze, *Fimbristylis acuminata* Vahl, *F. argentea* (Rottb.) Vahl, Epaltes pygmaea DC., and Platostoma menthoides (L.) A.J.Paton; (b) Low mounds—an elevated land c. a meter high, dominated by Eragrostis viscosa (Retz.) Trin.; (c) High mounds—an elevated land c. 1.5–2 m high, having Cyanthillium cinereum (L.) H.Rob., (d) Sand dunessmall hills of loose sand, with species such as Calotropis gigantea (L.) W.T.Aiton. and Ipomoea pes-caprae (L.) R.Br.; and (e) Mangrove-tropical coastal vegetation comprising of salt tolerant species such as Avicennia marina (Forssk.) Vierh. and Excoecaria agallocha L. The term 'mound' used here is to distinguish elevated patches of land from the rest of the study area. Many plant species (except mangroves) were not rigidly habitat specific and were observed occurring in different habitats. A checklist of plants with their local Tamil names and habitats within the sanctuary was also prepared (cf. Appendix I).

Visual observations from a distance followed by instantaneous site visits in the field showed that the Blackbucks preferred to graze on selected grasses such as *Aeluropus lagopoides* (L.) Thwaites, *Cynodon barberi* Rang. & Tadul., *C. dactylon* (L.) Pers., *Chloris virgata* Sw.,



Figure 2. Habit types observed at Point Calimere Wildlife Sanctuary.





able 1	L. Sugges	ted foddei	r species f	for introd	luction in	Point	Calimere	Wildlife	Sanctuary.
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1.	Grass species for Blackbucks	Cynodon radiatus Roth, Blue panic grass Panicum coloratum L., Panicum curviflorum Hornem., Torpedo grass Panicum repens L., Setaria flavida (Retz.) Veldkamp			
2.	Grasses to be introduced in saline areas	Sprangle top Leptochloa obtusiflora Hochst., Sporobolus maderaspatanus Bor, Coastal rat tail grass Sporobolus virginicus (L.) Kunth			
3.	Grasses to be introduced in sandy areas	Daabh Desmostachya bipinnata (L.) Stapf, Dimeria avenacea (Retz.) C.E.C.Fisch., Manisuris myurus L., Indian comet grass Perotis indica (L.) Kuntze, Trachys muricata (L.) Pers. ex Trin			
4.	Tree species to be introduced within the sanctuary	Babul Vachellia nilotica (L.) P.J.H.Hurter&Mabb., Reonja Vachellia leucophloea (Roxb.) Maslin, Seigler & Ebinger, Bidi leaf treeBauhinia racemosa Lam., Flame of the forest Butea monosperma (Lam.) Kuntze, Siris tree Albizia lebbeck (L.) Benth., Krishna Siris Albizia amara (Roxb.) B.Boivin, Black Siris Albizia odoratissima (L.f.) Benth., Indian Coral tree Erythrina variegata L.			

a sedge *Fimbristylis acuminata* Vahl during the day time and they were seen browsing on the leaves and pods of *Prosopis juliflora* (Sw.) DC. in the evenings usually before sunset. They preferred grazing in open areas and around mounds. They were usually observed grazing in herds and rarely in solitude.

DISCUSSION

Conservation of the whole habitat of blackbucks in the sanctuary initially resulted in multiplication of their numbers but that was impeded due to the increase in the number of feral horses and stray cattle over the years. Entry of feral horses and stray cattle into the sanctuary poses two main problems: (a) competition for food and water and (b) spread of invasive alien plant species. Pods of Prosopis juliflora (Sw.) DC., one of the most aggressive invasive alien species is preferred by these cattle and the seeds were dispersed through their faeces into the sanctuary area, leading to the spread and increase in its population. By trampling the vegetation, altering the soil texture and overgrazing, these animals have a penetrating effect on the ecosystem. Feral horses build up to high numbers during good years, and many starve during drought (Wilson et al. 1992). Quality and nutritional value of plants available for grazing influences the diet and habitat relationship in large herbivores (Ahrestani et al. 2012). The distribution pattern of plant species and their dominance in an area plays an important role in their preference by these herbivores (Chamaille-Jammes & Bond 2010). Blackbucks, cattle from nearby villages, and feral horses, all compete for the same forage stock and there are not many differences between their foraging habits.

To control the competition faced by Blackbucks in PCWS by feral horses and stray cattle a few steps may be implemented.

1. Native fodder species can be introduced into the

sanctuary on an experimental basis to provide more fodder to herbivores and to enhance local biodiversity (Dayanandan 1994). A few fodder species including grasses and leguminous trees have been listed for this purpose. (Table 1).

2. Stray cattle from the nearby villages can be stopped by fencing at strategic places where they are most probable to enter inside, and awareness programs can be conducted to educate the nearby villagers about the ecological and cultural significance of Blackbucks and the ill-effects of stray cattle grazing in the sanctuary premises. The population of feral horses can be controlled by methods such as relocation and sterilization (Khan et al. 2019).

CONCLUSION

This study has employed a very simple direct observational methodology for collection of data sets from PCWS. In spite of the seasonal limitations experienced, it provides a base for possible furthering of full-fledged ecological, floristic, and conservation studies in the area. Field surveys in different seasons need to be undertaken for a holistic understanding of the ecology of Blackbuck in Point Calimere with emphasis on the fodder species, especially the grasses. This study is expected to help prepare policies for plantation of fodder species in the sanctuary, and help in conservation of Blackbuck population with their long-term survival. The suggested mitigation measures are expected to help in controlling the spread of invasive alien plant species too, thereby, enriching the local flora.

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Image 1. 1—A view of the tropical dry evergreen forest (TDEF) in Blackbuck habitat of Point Calimere Wildlife Sanctuary | 2—Vegetation on sand dunes | 3—The sanctuary entrance and beginning of study segment at Maattu-muni kovil | 4—Constructed water pool by used spotted deers and feral horses during dry seasons | 5—Blackbucks in the Sanctuary | 6—Local cattle grazing in the sanctuary, a competition for Blackbucks for fodder and water | 7—Feral horses spotted in the sanctuary | 8—Blackbucks grazing in slightly inundated plains. © Ashutosh Kumar Upadhyay

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Image 2. Flora of Point Calimere Wildlife Sanctuary: 9—Salicornia brachiata Roxb. | 10—Pithecellobium dulce (Roxb.) Benth. | 11—Tecticornia indica (Willd.) K.A. Sheph. & Paul | 12—Epaltes divaricata Cass. | 13—Cressa cretica L. | 14—Glycosmis mauritiana (Lam.) Tanaka | 15—Jasminum angustifolium (L.) Willd. | 16—Fimbristylis acuminata Vahl | 17—Gmelina asiatica L. | 18—Pentatropis capensis (L.f.) Bullock | 19—Olax scandens Roxb. | 20—Opuntia dillenii (Ker Gawl.) Haw. © Ashutosh Kumar Upadhyay



Image 3. Flora of Point Calimere Wildlife Sanctuary: 21—*Prosopis juliflora* (Sw.) DC. | 22—*Rivea hypocrateriformis* (Desr.) Choisy | 23—*Ruellia patula* Jacq. | 24—*Scutia myrtina* (Burm.f.) Kurz | 25—*Suaeda maritima* (L.) Dumort. | 26—*Vincetoxicum indicum* (Burm.f.) Mabb. | 27—*Vitex negundo* L. (inset- fruits) | 28—*Lantana camara* L. | 29—*Pandanus odorifer* (Forssk.) Kuntze | 30—*Sesuvium portulacastrum* (L.) L. | 31— *Avicennia marina* (Forssk.) Vierh. | 32—*Suaeda monoica* Forssk. ex J.F. Gmel. © Ashutosh Kumar Upadhyay

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Plants of Point Calimere WS and fodder grazed by Blackbuck

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Appendix I. List of plants observed at Point Calimere Wildlife Sanctuary

Sno	Binomial & Common names	Family	Habitat	
	GRAS	SES		
1	Aeluropus lagopoides (L.) Thwaites	Poaceae	Inundated plains	
2	Stapfochloa elata (Desv.) P.M.Peterson Tamil name: Kodai pullu, Sevarug pullu	Poaceae	Inundated plains	
3	Chloris virgata Sw.	Poaceae	Inundated plains	
4	Cynodon barberi Rang. & Tadul.	Poaceae	Inundated plains	
5	Cynodon dactylon (L.) Pers. Tamil name: Arugam pullu	Poaceae	Inundated plains	
6	Dactyloctenium aegyptium (L.) Willd.	Poaceae	Inundated plains	
7	Eragrostis sp.	Poaceae	Inundated plains with sparse trees	
8	<i>Eragrostis tenella</i> (L.) P.Beauv. ex Roem. & Schult Tamil name: Poom Pullu	Poaceae	Low mounds	
9	Eragrostis viscosa (Retz.) Trin.	Poaceae	Low mounds	
10	Panicum sp.	Poaceae	High mounds and Inundated plains	
11	Perotis indica (L.) Kuntze Tamil name: Narival, Kudiraival pullu, Thopparai pullu	Poaceae	Inundated plains	
12	Spinifex littoreus (Burm.f.) Merr. Tamil name: Elikunjai pullu, Ravanan meesai	Poaceae	Sand dunes	
	SEDG	GES		
1	Cyperus dubius Rottb.	Cyperaceae	Inundated plains	
2	Fimbristylis acuminata Vahl	Cyperaceae	Inundated plains	
3	Fimbristylis argentea (Rottb.) Vahl	Cyperaceae	Inundated plains	
4	Fimbristylis falcata (Vahl) Kunth	Cyperaceae	Inundated plains	
5	Fimbristylis sp.	Cyperaceae	Inundated plains	
	HER	BS		
1	Achyranthes aspera L. Tamil name: Navurivi	Amaranthaceae	Inundated plains with sparse trees	

Sr.c	Pinamial & Common names	Family	Habitat	
Sno		ramily		
2	Tamil name: Peelai, Sirupeelai	Amaranthaceae	Inundated plains with sparse trees	
3	Salicornia brachiata Roxb. Tamil name: Kolliam, Pavalappundu	Amaranthaceae	Halophytic	
4	Asystasia gangetica (L.) T. Anderson	Acanthaceae	Inundated plains with sparse trees and low mounds	
5	<i>Boerhavia diffusa</i> L. Tamil name: Mookarattai	Nyctaginaceae	Inundated plains with sparse trees	
6	Cressa cretica L. Tamil name: Vuppu marikkozhundhu	Convolvulaceae	Inundated plains	
7	<i>Croton bonplandianus</i> Baill. Tamil name: Rail poondu	Euphorbiaceae	Inundated plains with sparse trees and low mounds	
8	Cyanthillium cinereum (L.) H. Rob. Tamil name: Mookutthipoondu, Sahadevi	Asteraceae	Low mounds with sparse trees	
9	Epaltes divaricata (L.) Cass.	Asteraceae	Inundated plains	
10	Epaltes sp.	Asteraceae	Inundated plains	
11	Geniosporum sp.	Lamiaceae	Inundated plains	
12	<i>Tecticornia indica</i> (Willd.) K.A.Sheph. & Paul G.Wilson Tamil name: Pavazhappundu, Sitrumari	Amaranthaceae	Halophytic	
13	Leucas diffusa Benth.	Lamiaceae	Inundated plains with sparse trees	
14	Ocimum americanum L. Tamil name: Ganjaankorai, Nai thulasi	Lamiaceae	Inundated plains with sparse trees	
15	Ocimum tenuiflorum L. Tamil name: Thulasi, Rama thulasi	Lamiaceae	Inundated plains with sparse trees	
16	Oldenlandia herbacea (L.) Roxb.	Rubiaceae	Inundated plains with sparse trees	
17	Oldenlandia umbellata L.	Rubiaceae	Inundated plains with sparse trees	
18	<i>Vicoa indica</i> (L.) DC. Tamil name: Jimikipoo, Mookutthipoondu	Asteraceae	Inundated plains with sparse trees	
19	Platostoma menthoides (L.) A.J.Paton Tamil name: Ganjaankorai	Lamiaceae	Inundated plains	
20	Ruellia patula Jacq.	Acanthaceae	Inundated plains with sparse trees	
21	Synostemon bacciformis (L.) G.L.Webster	Phyllanthaceae	Inundated plains with sparse trees and low mounds	
22	Sesuvium portulacastrum (L.) L.	Aizoaceae	Halophytic	
23	<i>Spermacoce hispida</i> L. Tamil name: Nathaichoori	Rubiaceae	Sand dunes	
24	<i>Suaeda maritima</i> (L.) Dumort. Tamil name: Nari vumari, Uppukkeerai	Amaranthaceae	Halophytic	
25	Suaeda vermiculata Forssk.ex J.F. Gmel.	Amaranthaceae	Halophytic	
26	<i>Tephrosia maxima</i> (L.) Pers. Tamil name: Kollukaai vaelai, Periya kozhinji	Fabaceae	Inundated plains with sparse trees	
27	<i>Tephrosia purpurea</i> (L.) Pers. Tamil name: Kozhinji, Kollukaai vaelai	Leguminosae	Inundated plains with sparse trees	
28	Vahlia dichotoma (Murray) Kuntze	Vahliaceae	Inundated plains	
29	<i>Vigna trilobata</i> (L.) Verdc. Tamil name: Pani payaru	Fabaceae	Inundated plains with sparse trees	
	CLIMBER /	LIANA		
1	Abrus precatorius L. Tamil name: Kundumani	Fabaceae	Inundated plains with sparse trees	
2	Asparagus racemosus Willd. Tamil name: Thaneer vitaan kizhangu, Sadhavaeri	Asparagaceae	Inundated plains with sparse trees	
3	Capparis brevispina DC.	Capparaceae	High mound with sparse trees	
4	<i>Capparis zeylanica</i> L. Tamil name: Athondai	Capparaceae	Inundated plains with sparse trees	
5	Cissus quadrangularis L.	Vitaceae	Inundated plains and low mounds	

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Vitaceae

Cucurbitaceae

Inundated plains with sparse trees

Inundated plains with sparse trees

Cissus vitiginea L. Tamil name: Chembirandai, Mudai naari

Coccinia grandis (L.) Voigt Tamil name: Kovai

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Sno	Binomial & Common names	Family	Habitat	
8	Gmelina asiatica L. Tamil name: Nilakkumizh, Mulkumizh	Lamiaceae	Inundated plains	
9	Jasminum angustifolium (L.) Willd. Tamil name: Kaattu malli, Paambu kala	Oleaceae	Inundated plains with sparse trees	
10	<i>Jasminum cuspidatum</i> Rottler Tamil name: Oosi malli	Oleaceae	Inundated plains with sparse trees	
11	<i>Olax scandens</i> Roxb. Tamil name: Kadal azhinji, Malli vaeppam	Olacaceae	Low mound with sparse trees	
12	Pentatropis capensis (L. f.) Bullock Tamil name: Uppili, Uppilankodi	Apocynaceae	Halophytic	
13	<i>Rivea hypocrateriformis</i> (Desr.)Choisy Tamil name: Boodhikeerai	Convolvulaceae	Low mound with sparse trees	
14	<i>Scutia myrtina</i> (Burm. f.) Kurz Tamil name: Indu, Kokku mullu	Rhamnaceae	Inundated plains	
15	<i>Solanum trilobatum</i> L. Tamil name: Thoodhuvalai	Solanaceae	Inundated plains with sparse trees	
16	Vincetoxicum indicum (Burm.f.) Mabb. Tamil name: Naippalai, Nanjaruppaan	Apocynaceae	Inundated plains with sparse trees	
	SHRUBS & SU	B-SHRUBS		
1	Azima tetracantha Lam. Tamil name: Pee changam, Mulsangam	Salvadoraceae	Inundated plains	
2	Acacia sp.	Fabaceae	Inundated plains	
3	Guilandina bonduc L. Tamil name: Kazharchikaai, Gajjakkaai	Fabaceae	Inundated plains and sand dunes	
4	<i>Calotropis gigantea</i> (L.) W.T.Aiton Tamil name: Erukku, Arkkam	Apocynaceae	Sand dunes	
5	Canthium parviflorum Roxb.	Rubiaceae	Inundated plains with sparse trees	
6	Catunaregam spinosa (Thunb.) Tirveng. Tamil name: Kaalagam, Madukaarai	Rubiaceae	Inundated plains with sparse trees	
7	Chamaerops humilis L.	Arecaeae	Inundated plains with sparse trees	
8	Crotalaria laburnifolia L. Tamil name: Kilukiluppai, Narimiratti	Fabaceae	Inundated plains with sparse trees	
9	Crotalaria pallida Aiton	Fabaceae	Inundated plains with sparse trees	
10	Dichrostachys cinerea (L.) White & Arn. Tamil name: Vidathalam thazhai	Fabaceae	Inundated plains	
11	Diospyros ferrea (Willd.) Bakh. Tamil name: Irumbuli	Ebenaceae	Inundated plains with sparse trees	
12	Ehretia microphylla Lam.	Boraginaceae	Inundated plains	
13	Flueggea leucopyrus Willd. Tamil name: Pulanji	Phyllanthaceae	Inundated plains	
14	Glycosmis mauritiana (Lam.) Tanaka Tamil name: Konji	Rutaceae	Inundated plains with sparse trees	
15	Grewia carpinifolia Juss.	Malvaceae	Inundated plains with sparse trees	
16	<i>Gymnosporia emarginata</i> (Willd.) Thwaites Tamil name: Kattanji	Celastraceae	Inundated plains	
17	Hygrophila auriculata (Schumach.) Heine Tamil name: Neermulli	Acanthaceae	Inundated plains	
18	Lantana camara L. Tamil name: Unnichedi, Jimiki malli	Verbenaceae	Inundated plains	
19	<i>Opuntia dillenii</i> (Ker Gawl.) Haw. Tamil name: Chappathikkalli	Cactaceae	Inundated plains and low mounds	
20	Pandanus odorifer (Forssk.) Kuntze Tamil name: Thazhai, Kaidha	Pandanaceae	Inundated plains	
21	Prosopis juliflora (Sw.) DC. Tamil name: Velikkaathaan, Seemai mullu	Fabaceae	Inundated plains	
22	Psilotrichum elliotii Baker	Amaranthaceae	Inundated plains and low mounds	
23	<i>Senna auriculata</i> (L.) Roxb. Tamil name: Avaram, Avaarai	Fabaceae	Inundated plains and low mounds	
24	Senna occidentalis (L.) Link Tamil name: Peiyavarai. Thagarai	Fabaceae	Inundated plains and low mounds	
25	Senna timoriensis (D.C.) H.S. Irwin & Barneby	Fabaceae	Inundated plains	

Euphorbia thymifolia L.

Tamil name: Sittrapaladai Evolvulus alsinoides (L.) L.

Tamil name: Vishnukarandi

Ipomoea pes-caprae (L.) R. Br. Tamil name: Attukkal, Kudhirai kulambu

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Sno	Binomial & Common names	Family	Habitat	
26	<i>Suaeda monoica</i> Forssk. ex J.F. Gmel. Tamil name: Karuvumari, Umarinandi	Amaranthaceae	Halophytic	
27	<i>Vitex negundo</i> L. Tamil name: Nochi, Vennochi	Lamiaceae	High mound with sparse trees	
28	Volkameria inermis L. Tamil name: Pinchil, Pinarichanganguppu	Lamiaceae	Inundated plains	
29	Ziziphus jujuba Mill. Tamil name: Illandhai	Rhamnaceae	Inundated plains	
30	Ziziphus oenopolia (L.) Mill. Tamil name: Soorai pazham, Soorai mullu	Rhamnaceae	Inundated plains with sparse trees	
	SMALL AND E	BIG TREES		
1	<i>Albizia lebbeck</i> (L.) Benth. Tamil name: Vaagai	Fabaceae	Inundated plains with sparse trees	
2	Avicennia marina (Forssk.) Vierh. Tamil name: Venkandal, Vellaikkandal	Avicenniaceae	Mangrove	
3	Azadirachta indica A. Juss. Tamil name: Vaembu, Vaeppam	Meliaceae	Inundated plains	
4	Cassia fistula L. Tamil name: Kondrai, Sarakkondrai	Fabaceae	Inundated plains	
5	Casuarina equisetifolia L. Tamil name: Savukku	Casuarinaceae	Inundated plains	
6	<i>Excoecaria agallocha</i> L. Tamil name: Thillai	Euphorbiaceae	Mangrove	
7	Ficus benghalensis L. Tamil name: Aal, Ichi	Moraceae	Sand dunes	
8	<i>Lannea coromandelica</i> (Houtt.) Merr. Tamil name: Odhiya maram, Odhi	Anacardiaceae	Inundated plains	
9	<i>Manilkara hexandra</i> (Roxb.) Dubard Tamil name: Kannupalai, Paala maram	Sapotaceae	Inundated plains with sparse trees	
10	<i>Peltophorum pterocarpum</i> (DC.) Backer ex K. Heyne Tamil name: Iyalvaagai, Perugondrai	Fabaceae	Inundated plains with sparse trees	
11	<i>Pithecellobium dulce</i> (Roxb.) Benth. Tamil name: Kodukkaai puli	Fabaceae	Inundated plains and high mounds	
12	Pongamia pinnata (L.) Pierre Tamil name: Punga maram	Fabaceae	Inundated plains	
13	Premna serratifolia L. Tamil name: Munnai	Lamiaceae	Inundated plains with sparse trees	
14	Salvadora persica L. Tamil name: Chitthu vila, Kalarva	Salvadoraceae	Inundated plains	
15	<i>Thespesia populnea</i> (L.) Sol. ex Correa Tamil name: Poovarasu	Malvaceae	Inundated plains	
	CREEPE	ERS		
1	<i>Grona triflora</i> (L.) H.Ohashi & K.Ohashi Tamil name: Sirupulladi	Fabaceae	Inundated plains	

Euphorbiaceae

Convolvulaceae

Convolvulaceae



Low level shady moist area

Sand dunes

Inundated plains with sparse trees

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