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

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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 *Antilope cervicapra*. The area was divided into various segments such as the sanctuary entrance, Maattu muni kovil, Savukku plot or Casuarina plantation, 5-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 *Avicennia alba* L., Indian Daju *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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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
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 species-rich 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,

Epilites 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 dunes—small hills of loose sand, with species such as Calotropis gigantea (L.) W.T.Alton. 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.,
Plants of Point Calimere WS and fodder grazed by Blackbuck

Table 1. Suggested fodder species for introduction in Point Calimere Wildlife Sanctuary.

|   | Grass species for Blackbucks | Grasses to be introduced in saline areas | Grasses to be introduced in sandy areas | Tree species to be introduced within the sanctuary |
|---|-----------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------------|
| 1. | Cynodon radiatus Roth | Sprangle top Leptochloa obtusiflora Hochst., | Dactylis Desmostachya bipinnata (L.) Stapf, | Babul Vachellia nilotica (L.) P.J.H.Hurter & Mabb., |
|   | Blue panic grass Panicum coloratum L., | Coastal rat tail grass Sporobolus virginicus (L.) Kunth | Dimeria avenacea (Retz.) C.E.C.Fisch., | Reonja treeeaauhnia racemosa Lam., |
|   | Panicum repens L., | | | Flame of the forest Butea monosperma (Lam.) Kunth, |
|   | Setaria flavida (Retz.) Veldkamp | | | 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 *Fimbristyris 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.
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
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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Appendix I. List of plants observed at Point Calimere Wildlife Sanctuary

| Sno | Binomial & Common names | Family | Habitat |
|-----|-------------------------|--------|--------|
| **GRASSES** | | | |
| 1 | Aeluropus lagopoides (L.) Thwaites | Poaceae | Inundated plains |
| 2 | Stapfochloa elata (Desv.) P.M.Peterson | Poaceae | Inundated plains |
| 3 | Chloris virgata Sw. | Poaceae | Inundated plains |
| 4 | Cynodon barberi Rang. & Tadul. | Poaceae | Inundated plains |
| 5 | Cynodon doxyliflorus (L.) Pers. Tamil name: Arugam pullu | Poaceae | Inundated plains |
| 6 | Dactyloctenium aegyptium (L.) Wild. | Poaceae | Inundated plains |
| 7 | Eragrostis sp. | Poaceae | Inundated plains with sparse trees |
| 8 | Eragrostis tenella (L.) P.Beauv. ex Roem. & Schult Tamil name: Poorn Pullu | Poaceae | Low mounds |
| 9 | Eragrostis viscosa (Retz.) Trin. | Poaceae | Low mounds |
| 10 | Panicum sp. | Poaceae | High mounds and inundated plains |
| 11 | Pennisetum indica (L.) Kunze Tamil name: Narival, Kudiraival pullu, Thoppai pullu | Poaceae | Inundated plains |
| 12 | Spinifex littoreus (Burm.f.) Men. Tamil name: Poom Pullu | Poaceae | Sand dunes |
| **SEDGES** | | | |
| 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 |
| **HERBS** | | | |
| 1 | Achyranthes aspera L. Tamil name: Nayurivi | Amaranthaceae | Inundated plains with sparse trees |
| Sno | Binomial & Common names | Family | Habitat |
|-----|--------------------------|--------|---------|
| 2   | Ouret lanata (L.) Kuntze  | Amaranthaceae | Inundated plains with sparse trees |
| 3   | Solanum brachistioides Roxb. | Amaranthaceae | Inundated plains with sparse trees and low mounds |
| 4   | Asystasia gongetica (L.) T. Anderson | Acanthaceae | Inundated plains with sparse trees and low mounds |
| 5   | Boerhavia diffusa L. | Nyctaginaceae | Inundated plains with sparse trees |
| 6   | Cressa cretica L. | Convolvulaceae | Inundated plains |
| 7   | Croton bongolondianus Baill. | Euphorbiaceae | Inundated plains with sparse trees and low mounds |
| 8   | Cyanthillium cinereum (L.) H. Rob. | Asteraceae | Low mounds with sparse trees |
| 9   | Epilobium divaricata (L.) Cass. | Asteraceae | Inundated plains |
| 10  | Epilobium sp. | Asteraceae | Inundated plains |
| 11  | Geniosporum sp. | Lamiaceae | Inundated plains |
| 12  | Rooticia indica (Wild.) K.A.Sheph. & Paul G.Wilson | Amaranthaceae | Halophytic |
| 13  | Leucas diffusa Benth. | Lamiaceae | Inundated plains with sparse trees |
| 14  | Ocimum americanum L. | Lamiaceae | Inundated plains with sparse trees |
| 15  | Ocimum tenuiflorum L. | 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  | Vicia indica (L.) DC. | Lamiaceae | Inundated plains with sparse trees |
| 19  | Plastosoma menthoides (L.) A.J.Paton | Lamiaceae | Inundated plains with sparse trees |
| 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  | Spermacoce hispida L. | Rubiaceae | Sand dunes |
| 24  | Suaeda maritima (L.) Dumort. | Amaranthaceae | Halophytic |
| 25  | Suaeda vermiculata Forsk.ex I.F. Gmel. | Amaranthaceae | Halophytic |
| 26  | Tephrosia maxima (L.) Pers. | Fabaceae | Inundated plains with sparse trees and low mounds |
| 27  | Tephrosia purpurea (L.) Pers. | Fabaceae | Inundated plains with sparse trees and low mounds |
| 28  | Vahlia dichotoma (Murray) Kuntze | Vahliaeeae | Inundated plains |
| 29  | Vigna trilobata (L.) Verdc. | Fabaceae | Inundated plains with sparse trees |

**CLIMBER / LIANA**

| Sno | Binomial & Common names | Family | Habitats |
|-----|--------------------------|--------|----------|
| 1   | Abrus precatorius L. | Fabaceae | Inundated plains with sparse trees |
| 2   | Asparagus racemosus Wild. | Asparagaceae | Inundated plains with sparse trees |
| 3   | Cassia brevifolia DC. | Capparaceae | High mound with sparse trees |
| 4   | Capparis zeylanica L. | Capparaceae | Inundated plains with sparse trees |
| 5   | Cissus quadrangularis L. | Vitaceae | Inundated plains and low mounds |
| 6   | Cissus sicyoides L. | Vitaceae | Inundated plains with sparse trees |
| 7   | Coccinia grandis (L.) Voigt | Cocciniaeeae | Inundated plains with sparse trees |
| Sno | Binomial & Common names | Family | Habitat                      |
|-----|-------------------------|--------|------------------------------|
| 8   | Gmelina asiatica L.     | Lamiaceae | Inundated plains             |
| 9   | Jasminum angustifolium (L.) Willd. | Oleaceae | Inundated plains with sparse trees |
| 10  | Jasminum cuspidatum Rottler | Oleaceae | Inundated plains with sparse trees |
| 11  | Olaax scandens Roxb.     | Olacaceae | Low mound with sparse trees   |
| 12  | Pentatropis capsensis (L. f.) Bullock | Apocynaceae | Halophytic                 |
| 13  | Rivea hypozononiformis (Dess.)Choisy | Convolvulaceae | Low mound with sparse trees   |
| 14  | Scuta myrtilin (Burm. f.) Kurz | Rhamnaceae | Inundated plains             |
| 15  | Solanum trilobatum L.   | Solanaceae | Inundated plains with sparse trees |
| 16  | Vincetoxicum indicum (Burm.f.) Mabb. | Apocynaceae | Inundated plains with sparse trees |

**SHRUBS & SUB-SHRUBS**

| Sno | Binomial & Common names | Family | Habitat                      |
|-----|-------------------------|--------|------------------------------|
| 1   | Azima tetracantha Lam.  | Salvadoreaceae | Inundated plains             |
| 2   | Acacia sp.              | Fabaceae | Inundated plains             |
| 3   | Guilandina bonduc L.    | Fabaceae | Inundated plains and sand dunes |
| 4   | Calotropis gigaes (L.) W.T.Aiton | Apocynaceae | Sand dunes                 |
| 5   | Canthium parviflorum Roxb. | Rubiaceae | Inundated plains with sparse trees |
| 6   | Catunaregam spinosa (Thrub.) Tirveng. | Rubiaceae | Inundated plains with sparse trees |
| 7   | Chamaeophorus humilis L. | Arecaceae | Inundated plains with sparse trees |
| 8   | Crotalaria laburnifolia L. | Fabaceae | Inundated plains with sparse trees |
| 9   | Crotalaria pallida Aiton | Fabaceae | Inundated plains with sparse trees |
| 10  | Dichrostachys cinerea (L.) White & Arn. | Fabaceae | Inundated plains             |
| 11  | Diospyros ferrree (Willd.) Bakh. | Ebenaceae | Inundated plains with sparse trees |
| 12  | Ehretia microphylla Lam. | Boraginaceae | Inundated plains             |
| 13  | Flueggea leucopsis Willd. | Phyllanthaceae | Inundated plains             |
| 14  | Glycosmis mauritiana (Lam.) Tanaka | Rutaceae | Inundated plains with sparse trees |
| 15  | Grewia carpinifolia Juss. | Malvaceae | Inundated plains with sparse trees |
| 16  | Gymnosporis emarginata (Willd.) Thwaites | Celastraceae | Inundated plains             |
| 17  | Hygrophila auriculata (Schumach.) Heine | Acanthaceae | Inundated plains             |
| 18  | Lantana camara L.        | Verbenaceae | Inundated plains             |
| 19  | Opuntia dillenii (Ker Gawl.) Haw. | Cactaceae | Inundated plains and low mounds |
| 20  | Pandanus odorifer (Forsk.) Kuntze | Pandanaceae | Inundated plains             |
| 21  | Prosopis juliflora (Sw.) DC. | Fabaceae | Inundated plains             |
| 22  | Psilotrichum eliotii Baker | Amaranthaceae | Inundated plains and low mounds |
| 23  | Senna auriculata (L.) Roxb. | Fabaceae | Inundated plains and low mounds |
| 24  | Senna occidentalis (L.) Link | Fabaceae | Inundated plains and low mounds |
| 25  | Senna timoniensis (O.C.) H.S. Irwin & Barneby | Fabaceae | Inundated plains             |
| Sno | Binomial & Common names                  | Family          | Habitat                                      |
|-----|------------------------------------------|-----------------|----------------------------------------------|
| 26  | Suaeda monoica Forssk. ex J.F. Gmel.     | Amaranthaceae   | Halophytic                                   |
| 27  | Vitex negundo L.                          | Lamiaceae       | High mound with sparse trees                 |
| 28  | Vollomera inermis L.                      | Lamiaceae       | Inundated plains                             |
| 29  | Ziziphus jujuba Mill.                     | Rhamnaceae      | Inundated plains                             |
| 30  | Ziziphus oenopolia (L.) Mill.             | Rhamnaceae      | Inundated plains with sparse trees           |

**SMALL AND BIG TREES**

| Sno | Binomial & Common names                  | Family          | Habitat                                      |
|-----|------------------------------------------|-----------------|----------------------------------------------|
| 1   | Albizia lebbeck (L.) Benth.              | Fabaceae        | Inundated plains with sparse trees           |
| 2   | Avicennia marina (Forsk.) Vieh.          | Avicenniaceae   | Mangrove                                     |
| 3   | Azadirachta indica A. Juss.              | Meliaceae       | Inundated plains                             |
| 4   | Cossa fistula L.                         | Fabaceae        | Inundated plains                             |
| 5   | Casuarina equisetifolia L.               | Casuarinaceae   | Inundated plains                             |
| 6   | Excoecaria gallocho L.                   | Euphorbiaceae   | Mangrove                                     |
| 7   | Ficus benghalensis L.                    | Moraceae        | Sand dunes                                   |
| 8   | Lannea coromandelica (Houtt.) Merr.      | Anacardiaceae   | Inundated plains                             |
| 9   | Manilkara hexandra (Roxb.) Dubard        | Sapotaceae      | Inundated plains with sparse trees           |
| 10  | Peltophorum pterocarpum (DC.) Backer ex K. Heyne | Fabaceae        | Inundated plains with sparse trees           |
| 11  | Pithecellobium dulce (Roxb.) Benth.      | Fabaceae        | Inundated plains and high mounds             |
| 12  | Pongamia pinnata (L.) Pierre             | Fabaceae        | Inundated plains                             |
| 13  | Premna serratifolia L.                   | Lamiaceae       | Inundated plains with sparse trees           |
| 14  | Salvadora persica L.                     | Salvadoreaceae  | Inundated plains                             |
| 15  | Thespesia populnea (L.) Sol. ex Correa   | Malvaceae       | Inundated plains                             |

**CREEPERS**

| Sno | Binomial & Common names                  | Family          | Habitat                                      |
|-----|------------------------------------------|-----------------|----------------------------------------------|
| 1   | Grona triflora (L.) H.Ohashi & K.Ohashi  | Fabaceae        | Inundated plains                             |
| 2   | Euphorbia thymifolia L.                  | Euphorbiaceae   | Low level shady moist area                   |
| 3   | Evolvulus alsinoides (L.) L.             | Convolvulaceae  | Inundated plains with sparse trees           |
| 4   | Ipomoea pes-caprae (L.) R. Br.           | Convolvulaceae  | Sand dunes                                   |
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