

Flora of wetlands in point calimere wildlife and bird sanctuary, Nagapattinam district, Tamil Nadu

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Abstract

Wetlands in India are distributed in different geographical regions ranging from Himalayas to Deccan plateau. The variability in climatic conditions and changing topography is responsible for significant diversity. Coastal wetlands include littoral zones, brackish water and estuarine regions, lagoons and coral reefs, and constitute ~ 70% of total wetlands of the country. The Ramsar Convention is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. In the present study, an attempt has been made to highlight the diverse floral resources and distribution of vegetation types in wetlands of Point Calimere, Nagapattinam District, Tamil Nadu. Exploratory surveys involving field visits and literature review were carried out to find out the present status of wetlands during 2008 – 2009. About 147 plant species of 110 genera belonging to 55 families are described.

Keywords: conservation, flora, point calimere, wetlands

Introduction

Wetlands landscape feature found all parts of the world. They are known as “kidneys of the landscape” and “Ecological supermarkets”. Wetlands are one of the most productive ecosystems on the Earth (Ghermandi *et al.*, 2008) [12]. It provides numerous valuable services to human society (ten Brink *et al.*, 2012) [27]. Wetlands are considered to have unique ecological features which provide several products and services to humanity (Prasad *et al.*, 2002) [23]. Worldwide the areal area of wetland ecosystems ranges from 917 million hectares (m ha) (Lehner and Döll, 2004) [16] to more than 1275 m ha (Finlayson and Spiers, 1999) [10] with an estimated economic worth of about US\$ 15 trillion a year (MEA, 2005) [18]. India, with its unreliable topography and climatic regimes, supports diverse and unique wetland habitats (Prasad *et al.*, 2002) [23]. As per the estimates, India has about 757.06 thousand wetlands with a total wetland area of 15.3 m ha, accounting for nearly 4.7% of the total geographical area of the country. Out of this, area under inland wetlands accounts for 69%, coastal wetlands 27%, and other wetlands (smaller than 2.25 ha) 4% (SAC, 2011) [26].

The Ramsar Convention is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 127 contracting parties to the Convention, with 1085 wetland sites, totalling 82.2 million hectares, designated for inclusion in the Ramsar List of Wetlands of international importance. In the present study, an attempt has been made to highlight the diverse floral resources in the Ramsar listed wetland of Point Calimere Wildlife and Bird Sanctuary, Nagapattinam District, Tamil Nadu.

Area of Study

The area of study Point Calimere falls under the Nagapattinam district and it was under the erstwhile district

of Tanjore of Tamil Nadu before bifurcation. Point Calimere wildlife sanctuary created in 1967 for conservation of black buck. It is an endangered and endemic species of India. In 1988, the sanctuary expanded with the inclusion of Great Vedaranyam Swamp and the Talaignayar Reserve Forest and renamed the Point Calimere Wildlife and Bird Sanctuary, with a total area of 377 km². The vast swampy tract of Point Calimere is one of India's greatest avian habitats. Point Calimere encompasses sandy coast fringed by saline swamps and thorny scrub around the backwaters. Ramar Padam, Modimandapam and old Chola light house are the important historical places located in the sanctuary. The biodiversity consists of tropical evergreen forests, luxuriant mangroves, salt marsh to grasslands. The sanctuary has been recognized as a very important wetland for the migratory waterfowl which has been included in the Ramsar sites (Wetlands of International importance) during 2002 (Ramsar site no. 1210 dated 18.08.2002) (Ecology of Point Calimere Sanctuary, 1991; Atlas of Mangrove Wetlands of India, 2002) [9] [3].

Methodology

The source of materials for this floristic research was the extensive field collections of specimens made from the area of study during the period from Apr. 2010 to June. 2011. During the course of this study 14 field trips were undertaken. Standard methodology was used to elicit the knowledge of wetland plants. All the relevant information of each wetland plants was recorded. The plants specimens collected were processed and preserved in the form of Herbarium at the Survey of Medicinal Plants Unit – Siddha [CCRS], Palayamkottai, Tirunelveli district, Tamil Nadu and identified with the help of available literature. The identification of plants was done referring the Mathew [1983 -1988] [17], Nair and Henry (1983) [20] and Gamble and Fischer [1915 – 1936] [11]. For collect information about the medical uses standard references (Daniel and

Umamaheswari, 2001; Yognarasiman, 2000) [7] [31] were referred. Information on nomenclature and family was taken from an online botanical database The Plant List – version 1.1 (2013) [28]. The plants were arranged based on APG IV classification.

Results and Discussion

The Point Calimere Reserve forest extends to an area of 5663 hectares of flat land, having slight slopes, with consolidated and shifting sand dunes along with salt marshes which are inundated by the tides and monsoonal showers causes variation in the salinity of the margins of the elevated inlets. The vegetation varies with different habitats such as foreshore sandy, inland sandy, salt marsh, mangrove, sand dune and woody scrub jungles. The reserve has two main water storage units such as Munninyapan Lake and Nandupallam. Fresh water of potable quality has been available at quite a few spots in natural ponds and manmade water holes, as claimed by the natives.

Species diversity

Point Calimere is a coastal wetland. Point Calimere wetland is spanning a continuum from salt to fresh water; these include mangroves, salt marshes and freshwater marshes. During the present field work 158 angiosperm species were recorded in the Point Calimere sanctuary. They belong to 110 genera distributed in 61 families. In dicots 110 species are representing 46 families. Among the dicots, family Amaranthaceae is the most dominant family with 10 species and followed by Asteraceae, Fabaceae and Lamiaceae with 8 species each. In Monocot 48 species are representing 15 families. Highest number of species recorded in the family Cyperaceae (16). The second largest family is Poaceae with 13 species. Two species of Pteridophytes and one species of Bryophyte are also recorded in the area of study. On the whole there are 33 Angiospermic monospecific families, of which 22 are dicots and 11 monocots. Based on the quality of the water samples, the type of vegetation also varies in the present study. Eight families namely, Aizoaceae, Cleomaceae, Combretaceae, Droseraceae, Gentianaceae, Hydrocharitaceae, Molluginaceae and Pontederiaceae were represented by two species each.

The quality of the water exhibits different characteristics in Nalla thaneerkulam when compare to other places, so the fresh water vegetation such as *Salacia chinensis*, *Canavalia virosa*, *Ficus* spp., *Marsilea*, are found common around this area. Many annual and perennial seeds germinate during or after rainy season when the concentration of salts is somewhat lower. *Fimbristylis ferruginea*, *Aeluropus lagopoides* and *Eremopogon foveolatus* are common in the salt marshes. The partial stem parasite represented by one species (*Dendrophthoe falcata*) and their host range include *Excoecaria agallocha*, *Lumnitzera racemosa* etc. *Centranthera tranquebarica*, *Fimbristylis argentea*, *Eragrostiella bifaria* and *Trachys muricata* are common in wet sandy soil. Insectivorous plants obtain their nitrogen by assimilating the insects by specialized structures. There are three species recorded in the study area. They are *Drosera burmannii*, *D. indica* and *Utricularia bifida*.

Globally, it is estimated that in-between 16 and 18 million hectares coastal land covered by the mangrove forest (Valiela et al., 2001) [29]. Mangroves are located in the intertidal zones and estuarine margins with trees, shrubs, and other plants that have adapted to living in saline waters,

continually or at high tides (Duke, 1992) [8]. Mangroves are well known for their apparently dense network of woody vegetation and their exclusive adaptations to the double stresses of flooding and salinity (Mitsch and Gosselink, 2000) [19]. The plants distributed near old light house are mostly halophytic (mangrove) in nature and this may be due to the presence of high content of chloride, sulphate, calcium, magnesium, sodium and potassium in water. The dominant halophytes in this area are *Excoecaria agallocha* L., *Aegiceras corniculatum* [L.] Blanco, *Tamarix troupitii* Hole and *Lumnitzera racemosa* Willd. They store water and mucilage. Leaves are usually leathery, fleshy and shining. *Eichhornia crassipes* is a free floating hydrophyte, typically float on water surface with extensive root system. *Nelumbo nucifera* and *Nymphaea pubescens* were the rooted macrophytes with floating leaves present in the study area. *Aeschynomene indica*, *Ammannia baccifera*, *Ammannia octandra*, *Aponogeton natans*, *Cyperus iria*, *Cyperus difformis*, *Hygrophila auriculata*, *Ipomoea aquatica*, *Linnophila heterophylla*, *Linnophila indica*, *Ludwigia perennis*, *Sphaeranthus indicus*, *Typha domingensis*, *Utricularia bifida* are amphibious hydrophytes, in which aerial parts are with mesophytic characters and the submerged parts shows true hydrophytic characters. Many of these thrive well even after the substratum is considerably dried up. In *Ottelia alismoides*, *Vallisneria natans* and *Monochoria vaginalis* the foliage is entirely submerged, conduct with soil or rock but their reproductive parts are raised slightly above the water level. Marshy Vegetation are also known as 'border line' plants, occur on the edges of the water bodies. The common marshy and wetland plant includes, *Alternanthera sessilis*, *Bacopa monnieri*, *Basilicum polystachyon*, *Centella asiatica*, *Commelina benghalensis*, *Cynodon dactylon*, *Echinochloa colona*, *Eriocaulon quinquangulare*, *Cyperus rotundus*, *C. bulbosus*, *C. pygmaeus*, *C. squarrosus*, *Iphigenia indica*, *Queenlandiella hyaline*, *Lindernia antipoda*, *L. crustacean*, *L. hyssopoides*, *L. fugax*, *Nothosaerva brachiata*, *Phyla nodiflora*, *Portulaca oleracea*, *P. pilosa*, *Pouzolzia zeylanica*, *Scoparia dulcis*, *Cyanotis axillaris*, *C. cucullata*, *Drosera burmannii* and *D. indica*.

Endemic plants

Indian flora has about 17,000 species of which 5725 are endemic and belong to 140 genera (Nayar, 1997) [21]. Peninsular India has 2015 species distributed in 600 genera (Ahmeddullah and Nayar, 1987) [1]. The endemic status has been derived based on the literature available in Flora of Gulf of Mannar (Daniel and Umamaheshwari, 2001) [7]. Species such as *Cyanotis cucullata* is the common peninsular endemics recorded in the present study. The study reported *Aegiceras corniculatus* is exclusively insular. The flora of the region has close affinity with that of Sri Lanka. The Indo - Sri Lankan species are *Geniosporum tenuiflorum*, *Leucas biflora*, *Polygala rosmarinifolia*, *Sansvieria roxburghiana*, *Sopubia delphinifolia* and *Terminalia arjuna*.

Diversity of grasses and sedges

In an aquatic ecosystem, the dominant vegetation is monocots with more species diversity in contrast to terrestrial habitats. Sedges and grasses dominate the study area with 16 and 13 species respectively. *Aeluropus lagopoides* inhabits damp, saline soil on the fringes of salt

marshes. It survives at high-salinity habitats. The plant itself has a very low salt content and it is able to expel the salt, it gains from the highly saline soil, through glands on the leaves [31]. Sedges and grasses also occupy a very important ecological role in communities where they are native. They are food plants, shelter plants, and soil stabilizers. They can even serve as a growth surface for other plant species. Many different kinds of birds will nest in and around grasses and sedges as well. Some species are pivotal in the succession of different habitat types.

Life forms

Trees and shrubs are generally sparse with vegetation mainly consisting of herbs. During the study two climbers, seven each trees and twiners, eleven shrubs and 131 herbs were recorded. In *Cardiospermum* lower portion of the inflorescence is modified into tendril. *Coccinia grandis* tendril arises from the axil of the leaf. Geophytes were defined by Raunkiaer (1934) as plants with an underground perennation organ (bulb, corm, tuber, or rhizome) and leaves that die back annually (Serban *et al.*, 2006) [25]. *Typha domingensis*, *Chloris barbata*, *Cyperus procerus*, *Nelumbo nucifera*, *Nymphaea pubescens*, *Canna indica*, *Musa paradisiaca*, *Fimbristylis triflora*, *Sesuvium portulacastrum*, *Aeluropus lagopoides*, are rhizomatous perennial plants of the study area. *Coccinia grandis*, *Ruellia tuberosa*, *Iphigenia indica*, *Cyanotis tuberosa*, *Chlorophytum tuberosum* *Theriophonum minutum*, *Cyperus rotundus* and *Aponogeton natans* is the common tuberous plant distributed in wetlands. *Cynodon dactylon* spreads by scaly rhizomes and flat stolons to form a dense mat. One bulbous geophyte *Cyperus bulbosus* also found along the margin of the water bodies. *Cyperus procerus* is stoloniferous.

Economic importance

Cyperus procerus culms are also used as a source of material for weaving mats [29]. *Typha* leaves are plaited into ropes and mats. *Cyperus iria* culms are woven into mats. *Cyperus rotundus* dried roots are aromatic, used in perfumes and incense sticks. *Eragrostiella bifaria* dried inflorescence is used in making bouquets. Many grasses and sedges are widely used as fodder eg., *Cynodon dactylon*, *Dactyloctenium aegyptium* *Chloris barbata* *Eragrostiella bifaria* etc. The fruits are used as vegetables in *Coccinia grandis* and *Canavalia cathartica*. The leaf of *Alternanthera sessilis*, *Celosia argentea*, *Centella asiatica* and *Sauropus bacciformis* used as vegetable. Leaf of *Eclipta prostrata* is used in preparation of hair oil. Fruits of *Musa paradisiaca* and *Limonia acidissima* are edible. Stilt root of *Pandanus odorifer* used in preparation of country brush. *Nelumbo nucifera* rhizomes are consumed after roasting, while dried slices are utilized in curry, as chips or as pickles.

Discussion

Coastal wetlands provide a critical interface between terrestrial and marine environments. Their importance to

global sediment and nutrient budgets is much greater than their proportional surface area on earth would suggest (Schlesinger, 1997) [24]. Wetlands are 75% more valuable in terms of ecosystem services than lakes and rivers, 15 times more valuable than forests, and 64 times more valuable than grassland or rangelands (Constanza *et al.*, 1997) [6]. Riparian wetlands occur as ecotones or interfaces between aquatic and upland ecosystems, have distinct vegetation and soil characteristics (Johnson *et al.*, 1979; Gregoty *et al.*, 1991) [15] [14], and perform important functions at the watershed scale (Brinson *et al.*, 1981) [5].

Point Calimere is an area of high biodiversity, with many unique species of animals and birds. Point Calimere Wildlife and Bird Sanctuary [PCWBS] is inhabited by 14 mammal species, 18 reptile species and 9 amphibian species. The Flagship species of the sanctuary is Near Threatened Blackbuck antelope, the sole member of the Antelope family in India and the most numerous large animals in the sanctuary. It has the largest population of Blackbuck in South India. This site has recorded the 2nd largest congregation of migratory water birds in India, with a peak population in excess of 100,000, representing 103 species [Baruah, 2005] [4]. Point Calimere wild life sanctuary is listed an Important Bird Area [IBA] for India. This is because it contains about 110 species of water birds, of which 34 are winter migrants. Wetland supports congregation of large number of migratory and resident species of birds as it has high nutritional value as well as productivity [Whittaker and Likens 1973; Gibbs 1993; Paracuellos 2006] [30] [12] [22]. As per Ali and Ripley [1983] [2], 273 species of birds in India can be considered as waterfowls, the birds that depend on wetland ecosystem. Point calimere wetland area provide important habitat for waterbirds. Many species depend on these wetlands for feeding, breeding and as a place to refuel and rest during migrations.



Source: District Forest Office, Nagapattinam

Map 1: Land cover map showing various sites in Point Calimere

Table 1: List of plant species recorded in the Point Calimere wet lands, Tamil Nadu

| S.no. | Botanical Name | Family | Habit | Tamil Name | Uses |
|-------|------------------------------------|---------------|-------|-------------|-----------|
| 1. | <i>Acalypha ciliata</i> Forssk. | Euphorbiaceae | Herb | - | - |
| 2. | <i>Acalypha indica</i> L. | Euphorbiaceae | Herb | Kuppaimeni | Medicinal |
| 3. | <i>Acanthospermum hispidum</i> DC. | Asteraceae | Herb | Kadle mullu | - |
| 4. | <i>Achyranthes aspera</i> L. | Amaranthaceae | Herb | Nayurivi | Medicinal |

| | | | | | |
|-----|--|--------------------------------|---------|-------------------------------|---|
| 5. | <i>Aegiceras corniculatum</i> [L.]Blanco | Primulaceae | Shrub | Narikandal | Medicinal |
| 6. | <i>Aerva lanata</i> [L.] Juss. ex Schult | Amaranthaceae | Herb | Peelai, sirupeelai | Medicinal |
| 7. | <i>Aeschynomene indica</i> L. | Fabaceae | Herb | - | - |
| 8. | <i>Allmania nodiflora</i> [L.] R. Br. ex Wight | Amaranthaceae | Herb | Vallikeerai | Leaf vegetable |
| 9. | <i>Alternanthera pungens</i> Kunth | Amaranthaceae | Herb | - | Medicinal |
| 10. | <i>Alternanthera sessilis</i> [L.] R. Br. ex DC | Amaranthaceae | Herb | Ponnankanni | Leaf vegetable |
| 11. | <i>Aeluropus lagopoides</i> (L.) Trin. ex Thwaites | Poaceae | Herb | Kadal Arugampullu | Soil binder |
| 12. | <i>Alysicarpus bupleurifolius</i> [L.] DC. | Fabaceae | Herb | - | - |
| 13. | <i>Alysicarpus monilifer</i> [L.] DC. | Fabaceae | Herb | Kasukkoti | - |
| 14. | <i>Alysicarpus vaginalis</i> [L.] DC. | Fabaceae | Herb | Kuranthaidakki | - |
| 15. | <i>Amaranthus roxburghianus</i> Nevski | Amaranthaceae | Herb | - | - |
| 16. | <i>Amaranthus spinosus</i> L. | Amaranthaceae | Herb | Mullukkeerai .. | Medicinal |
| 17. | <i>Ammannia baccifera</i> L. | Lythraceae | Herb | Neermel-neruppu | Medicinal |
| 18. | <i>Ammannia octandra</i> L. f. | Lythraceae | Herb | - | - |
| 19. | <i>Aponogeton natans</i> [L.] Engl. & Krause | Aponogetaceae | Herb | Kotti vitlaan kizhangu | Medicinal |
| 20. | <i>Avicennia officinalis</i> L. | Acanthaceae | Tree | Uppattam | Medicinal |
| 21. | <i>Bacopa monnieri</i> [L.] Pennell | Plantaginaceae | Herb | Neerbrahmi | Medicinal |
| 22. | <i>Basilicum polystachyon</i> [L.] | Lamiaceae | Herb | Sannaki poondu | Medicinal |
| 23. | <i>Biophytum sensitivum</i> [L.] DC. | Oxalidaceae | Herb | Jala puspam | Medicinal |
| 24. | <i>Canavalia cathartica</i> Thouars | Fabaceae | Twiner | Kattuttambattan | Fruit vegetable |
| 25. | <i>Canna indica</i> L. | Cannaceae | Shrub | Kalvazhai, | Ornamental |
| 26. | <i>Canscora crustaceans</i> [L.] Gilg. | Gentianaceae | Herb | - | - |
| 27. | <i>Cardiospermum halicacabum</i> L. | Sapindaceae | Climber | Mudakotthan | Medicinal |
| 28. | <i>Celosia argentea</i> L. | Amaranthaceae | Herb | Pannai keerai | Leaf vegetable |
| 29. | <i>Celosia polygonoides</i> Retz. | Amranthaceae | Herb | Orukkadaiththoyyak keerai . | - |
| 30. | <i>Centella asiatica</i> [L.] Urb. | Apiaceae | Herb | Vallarai | Leaf vegetable |
| 31. | <i>Centranthera tranquebarica</i> [Spreng.] Merr. | Orobanchaceae | Herb | - | -- |
| 32. | <i>Chloris barbata</i> Sw. | Poaceae | Herb | Kodaipullu | Fodder |
| 33. | <i>Chlorophytum tuberosum</i> [Roxb.] Baker | Asparagaceae | Herb | Vaipuruthi | Medicinal |
| 34. | <i>Cleome chelidonii</i> L. f. | Cleomaceae | Herb | - | - |
| 35. | <i>Cleome gynandra</i> L. | Cleomaceae | Herb | Nal vaelai | Medicinal |
| 36. | <i>Coccinia grandis</i> (L.) Voigt. | Cucurbitaceae | Climber | Kovai | Medicinal |
| 37. | <i>Commelina benghalensis</i> L. | Commelinaceae | Herb | Kanaangozhai | Medicinal |
| 38. | <i>Corchorus aestuans</i> L. | Malvaceae | Herb | Kattuttuti | - |
| 39. | <i>Corchorus fascicularis</i> Lam. | Malvaceae | Herb | Punaku, peratti .. | - |
| 40. | <i>Corchorus tridens</i> L. | Malvaceae | Herb | - | Fibre |
| 41. | <i>Corchorus urticifolius</i> Wight & Arn. | Malvaceae | Herb | - | - |
| 42. | <i>Cyanotis arcotensis</i> R.S. Rao | Commelinaceae | Herb | - | - |
| 43. | <i>Cyanotis axillaris</i> (L.) D.Don ex Sweet | Commelinaceae | Herb | - | - |
| 44. | <i>Cyanotis cucullata</i> (Roth) Kunth | Commelinaceae | Herb | - | - |
| 45. | <i>Cynodon dactylon</i> [L.] Pers. | Poaceae | Herb | Arugam pullu | Medicinal, soil binder |
| 46. | <i>Cyperus arenarius</i> Retz. | Cyperaceae | Herb | - | - |
| 47. | <i>Cyperus bulbosus</i> Vahl. | Cyperaceae | Herb | Silanthi | - |
| 48. | <i>Cyperus difformis</i> L. | Cyperaceae | Herb | Vattakorai | - |
| 49. | <i>Cyperus exaltatus</i> Retz. | Cyperaceae | Herb | - | - |
| 50. | <i>Cyperus iria</i> L. | Cyperaceae | Herb | Yanaikkitti, oosikorai | Culms woven into mats |
| 51. | <i>Cyperus procerus</i> Rottb. | Cyperaceae | Herb | Mattakorai | - |
| 52. | <i>Cyperus pygmaeus</i> Rottb. | Cyperaceae | Herb | - | - |
| 53. | <i>Cyperus rotundus</i> L. | Cyperaceae | Herb | Koraikilangu | Medicinal, dried root used in perfume, incence sticks |
| 54. | <i>Cyperus squarrosus</i> L. | Cyperaceae | Herb | - | - |
| 55. | <i>Dactyloctenium aegyptium</i> (L.) Willd. | Poaceae | Herb | Kakkakalpul | - |
| 56. | <i>Dendrophthoe falcata</i> (L. f.) Etting. | Loranthaceae | Herb | Pulluruvi | - |
| 57. | <i>Dichanthium foveolatum</i> (Delile) Roberty | Poaceae | Herb | - | - |
| 58. | <i>Drosera burmannii</i> Vahl | Droseraceae | Herb | Azhukanni . | - |
| 59. | <i>Drosera indica</i> L. | Droseraceae | Herb | - | - |
| 60. | <i>Echinochloa colona</i> (L.) Link | Poaceae | Herb | Kudiravalli pullu, Rail pullu | Fodder |

| | | | | | |
|------|--|--------------------------------|--------|----------------------------|---|
| 61. | <i>Eclipta prostrata</i> [L.] L. | Asteraceae | Herb | Vellai karisalakanni | Hair oil preparation |
| 62. | <i>Eichhornia crassipes</i> [Mart.] Solms | Ponteridiaceae | Herb | Venkayattamarai | - |
| 63. | <i>Emilia sonchifolia</i> [L.] DC. | Astereaceae | Herb | Muyalcevi | Medicinal |
| 64. | <i>Enicostema axillare</i> [Lam.] Raynal | Gentianaceae | Herb | Vellarugu | Medicinal |
| 65. | <i>Eremopogon foveolatus</i> (Delile) Stapf. | Poaceae | Herb | - | Soil binder |
| 66. | <i>Epaltes divaricata</i> [L.] Cass. | Asteraceae | Herb | -- | - |
| 67. | <i>Eragrostiella bifaria</i> [Vahl] Bor | Poaceae | Herb | - | Dried inflorescence is used in making bouquets. |
| 68. | <i>Eragrostis japonica</i> [Thunb.] Trin. | Poaceae | Herb | Kanjirapul | - |
| 69. | <i>Eriocaulon quinquangulare</i> L. | Eriocaulaceae | Herb | - | - |
| 70. | <i>Excoecaria agallocha</i> L. | Euphorbiaceae | Tree | Tillai, Amballath | Medicinal |
| 71. | <i>Ficus hispida</i> L. | Moraceae | Tree | Kattu athith, Peyatti | - |
| 72. | <i>Fimbristylis argentea</i> [Rottb.] Vahl | Cyperaceae | Herb | - | - |
| 73. | <i>Fimbristylis ferruginea</i> [L.] Vahl | Cyperaceae | Herb | - | - |
| 74. | <i>Fimbristylis polytrichoides</i> [Retz.] R. Br. | Cyperaceae | Herb | - | - |
| 75. | <i>Fimbristylis triflora</i> [L.] K. Schum. ex Engl. | Cyperaceae | Herb | - | - |
| 76. | <i>Geniosporum tenuiflorum</i> [L.] Merr. | Lamiaceae | Herb | Nalla thulasi | Medicinal |
| 77. | <i>Gisekia pharnaceoides</i> L. | Gisekiaceae | Herb | Kokilikkirai, | Medicinal |
| 78. | <i>Glinus lotoides</i> L. | Molluginaceae | Herb | Ceruppatai | Medicinal |
| 79. | <i>Glinus oppositifolius</i> L. | Molluginaceae | Herb | Thura poondu | - |
| 80. | <i>Hackelochloa granularis</i> [L.] Kuntze | Poaceae | Herb | - | - |
| 81. | <i>Halopyrum mucronatum</i> [L.] Stapf. | Poaceae | Herb | - | - |
| 82. | <i>Heliotropium curassavicum</i> L. | Boraginaceae | Herb | - | - |
| 83. | <i>Hybanthus enneaspermus</i> [L.] F. Muell. | Violaceae | Herb | Orilai thamarai | Medicinal |
| 84. | <i>Hygrophila auriculata</i> (Schumach.) Heine | Acanthaceae | Herb | Neermulli | Medicinal |
| 85. | <i>Hyptis suaveolens</i> [L.] Poir. | Lamiaceae | Herb | - | Medicinal |
| 86. | <i>Indigofera limmaei</i> Ali | Fabaceae | Herb | Sheppunerunji | - |
| 87. | <i>Iphigenia indica</i> [L.] A. Gray ex Kunth | Colchicaceae | Herb | Neerpanai | - |
| 88. | <i>Ipomoea aquatica</i> Forssk. | Convolvulaceae | Twiner | Vallai-k-kirai,. | - |
| 89. | <i>Ipomoea carnea</i> Jacq. | Convolvulaceae | Shrub | Neyveli kattamanakku | - |
| 90. | <i>Ipomoea obscura</i> [L.] Ker. | Convolvulaceae | Twiner | Chirudalli,., Siruthaali,. | - |
| 91. | <i>Ledebouria revoluta</i> (L.f.) Jessop | Asparagaceae | Habit | Narivengayam | - |
| 92. | <i>Leucas aspera</i> [Willd.] Link | Lamiaceae | Herb | Thumbai | Medicinal |
| 93. | <i>Leucas biflora</i> [Vahl] R.Br. | Lamiaceae | Herb | - | - |
| 94. | <i>Limnophila heterophylla</i> [Roxb.] Benth. | Plantaginaceae | Herb | - | - |
| 95. | <i>Limnophila indica</i> [L.] Druce, | Plantaginaceae | Herb | - | - |
| 96. | <i>Limonia acidissima</i> L. | Rutaceae | Tree | Vilam palam | - |
| 97. | <i>Lindernia antipoda</i> [L.] Alston | Linderniaceae | Herb | Thanneer poondu | - |
| 98. | <i>Lindernia crustacea</i> [L.] F. Muell. | Linderniaceae | Herb | - | - |
| 99. | <i>Lindernia hyssopoides</i> [L.] Haines | Linderniaceae | Herb | - | - |
| 100. | <i>Lindernia fugax</i> R.G.N. Young | Linderniaceae | Herb | - | - |
| 101. | <i>Lipocarpha squarrosa</i> (L.) Goetgh. | Cyperaceae | Herb | - | - |
| 102. | <i>Ludwigia perennis</i> L. | Onagraceae | Herb | Musalkathilai | - |
| 103. | <i>Lumnitzera racemosa</i> Willd. | Combretaceae | Tree | Tipparathai. | - |
| 104. | <i>Melochia corchorifolia</i> L. | Malvaceae | Herb | Punnakku poondu | - |
| 105. | <i>Mimosa pudica</i> L. | Mimosaceae | Herb | Thotal surungi | - |
| 106. | <i>Monochoria vaginalis</i> [Burm.f.] Presl, | Ponteridaceae | Herb | Karu-n-kuvalai | - |
| 107. | <i>Musa paradisiaca</i> L. | Musaceae | Tree | Vaalazhi | Fruit edible |
| 108. | <i>Nelumbo nucifera</i> Gaertn. | Nelumbonaceae | Herb | Tamarai, | Medicinal |
| 109. | <i>Nesaea lanceolata</i> [Heyne ex C.B. Clarke] Koehne | Lytharaceae | Herb | -- | - |
| 110. | <i>Nothosaerva brachiata</i> [L.] Wight | Amaranthaceae | Herb | - | - |
| 111. | <i>Nymphaea pubescens</i> Willd. | Nymphaeaceae | Herb | Vellambal | Medicinal |
| 112. | <i>Ocimum filamentosum</i> Forssk. | Lamiaceae | Herb | - | - |
| 113. | <i>Oldenlandia biflora</i> L. | Rubiaceae | Herb | - | - |
| 114. | <i>Osbeckia decandra</i> (Sm.) DC. | Melastomataceae | | - | - |
| 115. | <i>Ottelia alismoides</i> [L.] Pers. | Hydrocharitaceae | Herb | Nirkkuliri | - |
| 116. | <i>Pandanus odorifer</i> (Forssk.) Kuntze | Pandanaceae | Shrub | Thazhambu | Flower |

| | | | | | |
|------|--|------------------|------------|--------------------|----------------------|
| 117. | <i>Peplidium maritimum</i> [L. f.] F. Asch | Phrymaceae | Herb | - | - |
| 118. | <i>Perotis indica</i> [L.] Kuntze | Poaceae | Herb | Narivalpullu | |
| 119. | <i>Phyla nodiflora</i> [L.] Greene | Verbanaceae | Herb | Poduthalai | Medicinal |
| 120. | <i>Phyllanthus amarus</i> Schum. & Thonn. | Phyllanthaceae | Herb | Keezhanelli | Medicinal |
| 121. | <i>Phyllanthus reticulatus</i> Poir. | Phyllanthaceae | Shrub | Civappu-p-pula, | Medicinal |
| 122. | <i>Phyllanthus rotundifolius</i> Klein ex Willd. | Phyllanthaceae | Herb | - | Medicinal |
| 123. | <i>Physalis minima</i> L. | Malvaceae | Herb | Tholtakkali | - |
| 124. | <i>Polygala bulbothrix</i> Dunn | Polygalaceae | Herb | - | - |
| 125. | <i>Polygala javana</i> DC. | Polygalaceae | Herb | Selagachedi | Medicinal |
| 126. | <i>Polygala rosmarinifolia</i> Wight & Arn. | Polygalaceae | Herb | - | - |
| 127. | <i>Portulaca oleracea</i> L. | Portulacaceae | Herb | Paruppu keerai | Leaf vegetable |
| 128. | <i>Portulaca pilosa</i> L. | Portulacaceae | Herb | Mukkuli keerai, | - |
| 129. | <i>Portulaca quadrifida</i> L. | Portulacaceae | Herb | Pasalai keerai | - |
| 130. | <i>Pouzolzia zeylanica</i> [L.] Benn. | Ueticaceae | Herb | Nir-c-cinni . | Medicinal |
| 131. | <i>Premna serratifolia</i> L | Lamiaceae | Shrub | Munnai, | Medicinal |
| 132. | <i>Queenslandiella hyalina</i> (Vahl) Ballard | Cyperaceae | Herb | Velutta nirbasi | - |
| 133. | <i>Rhynchospora colorata</i> (L.) H.Pfeiff. | Cyperaceae | Herb | Oosikorai | - |
| 134. | <i>Ruellia tuberosa</i> L. | Acanthaceae | Herb | Pattaskai | - |
| 135. | <i>Salacia chinensis</i> L. | Celastraceae | Shrub | Pon korandi | Medicinal |
| 136. | <i>Salvadora persica</i> L. | Salvadoraceae | Small tree | Peru-vila | Medicinal |
| 137. | <i>Sauropus bacciformis</i> [L.] Airy Shaw | Phyllanthaceae | Shrub | Thavasi murunggai | Leaf vegetable |
| 138. | <i>Scoparia dulcis</i> L. | Plantaginaceae | Herb | Sarakkotthini | Medicinal |
| 139. | <i>Sesuvium portulacastrum</i> [L.] L. | Aizoaceae | Herb | Vallaikkirai, . | Medicinal |
| 140. | <i>Sphaeranthus indicus</i> L. | Asteraceae | Herb | Kottai Karanthai | Medicinal |
| 141. | <i>Synedrella nodiflora</i> [L.] Gaertn, | Asteraceae | Herb | Mudiyan Achchai | Medicinal |
| 142. | <i>Tamarix indica</i> Willd. | Tamaricaceae | Tree | - | - |
| 143. | <i>Teramnus labialis</i> [L. f.] Spreng. | Fabaceae | Twiner | Kattu-Ulandu | - |
| 144. | <i>Terminalia arjuna</i> [Roxb. ex DC.] Wight & Arn. | Combretaceae | Tree | Marutu | Medicinal |
| 145. | <i>Theriophonum minutum</i> [Willd.] Baillon | Araceae | Herb | - | Medicinal |
| 146. | <i>Trachys muricata</i> [L.] Pers. ex Trin. | Poaceae | Herb | Vennai thirati pul | - |
| 147. | <i>Tragia involucrata</i> L. | Euphorbiaceae | Twiner | Kanchori | Medicinal |
| 148. | <i>Trianthema portulacastrum</i> L. | Aizoaceae | Herb | Sharunnai | Medicinal |
| 149. | <i>Tridax procumbens</i> L. | Asteraceae | Herb | Vettukkaaya-Thalai | Medicinal |
| 150. | <i>Tylophora indica</i> [Burm. F] Merr. | Apocynaceae | Twiner | Nancharuppan | Medicinal |
| 151. | <i>Typha domingensis</i> Pers. | Typhaceae | Herb | Sambu | Rope and mats making |
| 152. | <i>Utricularia bifida</i> L. | Lentibulariaceae | Herb | - | - |
| 153. | <i>Vallisneria natans</i> [Lour.] Hara | Hydrocharitaceae | Herb | - | Fish food |
| 154. | <i>Vernonia cinerea</i> (L.) Less | Asteraceae | Herb | Naichotte Poondu | Medicinal |
| 155. | <i>Viola betonicifolia</i> J.E. Smith | Violaceae | Herb | - | - |
| 156. | <i>Volkameria inermis</i> L. | Lamiaceae | Shrub | Pinarichanganguppu | Medicinal |
| 157. | <i>Waltheria indica</i> L. | Malvaceae | Shrub | - | Medicinal |
| 158. | <i>Zornia diphylla</i> [L.] Pers.` | Fabaceae | Twiner | Chirupalatai. | - |

Conservation

India is one of the favorite destinations of migratory birds. India has come out with a five-year national action plan to conserve the habitats of these migratory birds. The action plan spanning 2018-23, brought out by the Union environment ministry, is meant for coordinated actions among states for securing and enhancing population of migratory birds in India within their range across the Central Asian Flyway. The National Action Plan (NAP) lays down a range of actions at national, state and local levels with overall longer-term goal to arrest population decline and secure habitats of migratory bird species. It includes

measures to manage wetlands and coastal areas which are being used by 310 species of migratory birds s their habitats in several states having wetlands and coast areas.

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