



## Diversity of Coastal Vegetation along Cuddalore District of Tamil Nadu

M.P. Sugumaran\* and S. Avudainayagam

Department of Environmental Sciences  
Tamil Nadu Agricultural University, Coimbatore- 641 003, Tamil Nadu.

**The sand dunes in coastal regions of Cuddalore are important ecosystems because of their small size, the rare species found in this habitat, and the beautiful landscapes they create. This study investigated the current vegetative status of sand dunes on Cuddalore district and the communities living close to the coastal sand dunes. A study of sand dune flora along coastal sand dune areas was done from January, 2016 to March, 2017. About, 38 species belonging to 37 genera and 25 families were identified at different distances from the shoreline. Coastal dune constitutes a variety of habitats wide varieties of diverse habitats and ecosystems are essential for the maintenance of food webs, migration routes and increase productivity. Such unique sensitive systems have to be protected from habitat exploitation in order to protect their native biodiversity and ecological functions.**

**Key words:** Ecological functions, Biodiversity, Ecosystems, Food web, Habitat, Sand dunes

Beach ecosystems in India have been studied for their physical, geological and restoration aspects (Mascarenhas and Jayakumar, 2008). Coastal sand dunes ecosystems are categorized as ecologically sensitive (MoEF, 1991). Indian subcontinent has a coastline of about 7,516 km long with 2.1 million km<sup>2</sup> exclusive economic zone and 0.13 million km<sup>2</sup> continental shelf spread over 9 states. The coastline of Tamil Nadu has a length of about 1,076 kms, constitutes about 15% of the total coastal length of India. Rodgers and Panwar, (1988), indicated that coastal zone is one among the 10 biogeographically important habitats of the Indian subcontinent. Natural disasters such as storms, cyclones, and tsunamis cause severe damage to human lives and material assets in coastal areas (Das and Vincent, 2009). These areas are governed by the revenue and forest departments of the respective states under Coastal Regulation Zone (CRZ) notification (Environment Protection Act, 1986). After the tsunami of 2004, coastal planning activities have focused mainly on building massive coastal shelterbelts to act as bioshields (Selvam *et al.*, 2005). Both native (mangroves) and non-native species (Casuarina) are being promoted as leading candidates for bioshields, but casuarina monoculture is more widespread as mangrove habitats are limited. This is despite the fact that non-native species have impacts on coastal ecosystems and biodiversity.

In a world where biodiversity is in steady decline, it is important not only to study why this decline is taking place and how best to halt it, but also how to reverse it? Habitat fragmentation and degradation have been pointed out as two of the main reasons for the world-wide biodiversity loss (Fischer and Linden

Mayer, 2007). Coastal zone is a dynamic natural environment with many cyclic processes owing to a variety of resources and habitats, considered as the most taxonomically rich and productive ecosystems on the earth. Although occupies only 8% of the total earth surface, these are ecologically important areas accounting for 20-25% of global plant growth. Sand dune vegetations play bioengineering role in sediment accumulation, sand binding and land building processes.

### Material and Methods

#### Study area

Cuddalore coast of Bay of Bengal located as a part of Coramandal coast falling between 11°44'39" N and 79°47'00" E, lies 25 km (16mi) south of Pondicherry. Devanampattinam, Thazhanguda, Singarathoppu, Pudupeetai, Annankovil are some of the coastal villages with sand dune coverage of about 30 km<sup>2</sup> extent. Cuddalore district has a total coastal line of 57.5 km, prone to both anthropogenic and natural disaster. Cyclone Thane hit Cuddalore coast on 29<sup>th</sup> and 30<sup>th</sup> of December, 2011 with wind speeds of up to 135 kmph (83 mph) and tidal surges reaching up to a height of 1.5m, is a worth mentioning disaster apart from the Tsunami hit during December, 2004. Industrialization has occupied nearly 500 ac. of coastal land in Cuddalore district, which causes pollution and destruction of sand dune vegetation. A line transect along the entire coast length of about 57 km up to 50 m width inside the land was made and the plant species along the transect was collected and identified by using published flora (Banerjee *et al.*, 2002) and also with the help of scientists from Botanical Survey of India, Coimbatore. All recorded plant species were divided into annual versus

\*Corresponding author's email: sugumar.ens@gmail.com

perennial groups. The study was carried out during the period from January, 2016 to March, 2017.

### Results and Discussion

About 41 species belonging to 40 genera and 27 families were registered during this survey. Fabaceae was the most common and dominant family with 6 species followed by 3 species in Apocynaceae and 2 species each of Arecaceae, Euphorbiaceae, Myrtaceae and Cyperaceae. Nineteen families were represented by only one single species (Table 1). Similar to this study, about 55 species belonging to 46 genera and 26 families were identified at different distances from the shoreline in Tirunelveli district

**Table 1. List of plants identified along the coastline of Cuddalore district**

Botanical name	Family	Habit
<i>Acacia leucocephala</i>	Fabaceae	Tree
<i>Anacardium occidentale</i>	Anacardiaceae	Tree
<i>Azadirachta indica</i>	Meliaceae	Tree
<i>Boerhaavia diffusa</i>	Nyctaginaceae	Shrub/herb
<i>Borassus flabellifer</i>	Arecaceae	Tree
<i>Calotropis gigantea</i>	Apocynaceae	Shrub
<i>Canthium parvifloram</i>	Rubiaceae	Tree
<i>Crotalaria pallida</i>	Fabaceae	Shrub
<i>Casuarina equisetifolia</i>	Casuarinaceae	Tree
<i>Croton bonplandianus</i>	Euphorbiaceae	Shrub
<i>Cyperus</i> sp	Cyperaceae	Grass
<i>Eucalyptus</i>	Myrtaceae	Tree
<i>Ficus benghalensis</i>	Moraceae	Tree
<i>Ficus hispida</i>	Moraceae	Tree
<i>Fimbristylis</i> sp.	Cyperaceae	Grass
<i>Gisekia pharnaceoides</i>	Gisekiaceae	Herb
<i>Ipomoea pes-caprae</i>	Convolvulaceae	Creepers
<i>Launaea bellidifolia</i>	Asteraceae	Herb
<i>Mollugo verticillata</i>	Molluginaceae	Herb
<i>Morindia pubescens</i>	Rubiaceae	Tree
<i>Passiflora foetida</i>	Passifloraceae	Shrub
<i>Pedaliium murex</i>	Pedaliaceae	Herb
<i>Phoenix sylvestre</i>	Arecaceae	Tree
<i>Pongamia pinnata</i>	Fabaceae	Tree
<i>Prosopis julifera</i>	Fabaceae	Shrub
<i>Securingea leucopyros</i>	Euphorbiaceae	Herb
<i>Senna occidentalis</i>	Fabaceae	Herb
<i>Sida cordifolia</i>	Malvaceae	Shrub
<i>Soparia dulcis</i>	Plantaginaceae	Herb
<i>Spinifex littoreus</i>	Poaceae	Grass
<i>Syzygium cumini</i>	Myrtaceae	Tree
<i>Tebebuia rosea</i>	Bignoniaceae	Tree
<i>Tectona grandis</i>	Verbenaceae	Tree
<i>Tephrosia</i> sp.	Fabaceae	Herb
<i>Thespesia populenea</i>	Malvaceae	Tree
<i>Tribulus terrestris</i>	Zygophyllaceae	Shrub
<i>Tylophora indica</i>	Apocynaceae	Herb
<i>Typha angustifolia</i>	Typhaceae	Grass/reed
<i>Vitex negundo</i>	Lamiaceae	Shrub
<i>Wrightia tinctoria</i>	Apocynaceae	Tree
<i>Zizyphus jujuba</i>	Rhamnaceae	Tree

(Ramarajan and Murugesan, 2014). Temperate coastal sand dunes comprise mainly the members of Poaceae, while tropics adore with Asteraceae, Cyperaceae, Fabaceae and Poaceae (Rao and

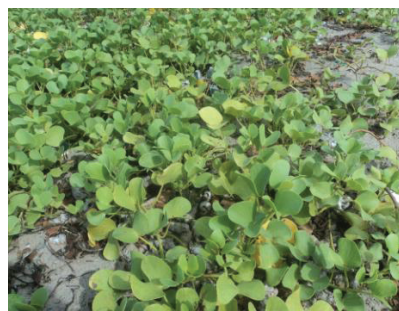
Sherieff, 2002; Muthukumar and Samuel, 2011). Present work also indicates that the study area



*Spinifex littoreus*



*Fimbristylis nutans*



*Ipomoea pes-caprae*



*Pedaliium murex*



*Gisekia pharnaceoides*



*Launaea bellidifolia*

**Fig.1 Plant species identified along the sand dunes in Cuddalore district**

preserves a rich flora with high number of native dune plants. Moreover, the different vegetation formations together with the dune field geomorphologic heterogeneity provide a wide variety of environmental conditions and habitat types that support a diverse native fauna like crabs, dune lizards etc. The conservation of the native vegetation of the coastal sand dune is a priority area of research to conserve the integrity of the natural communities in coastal regions.

### Conclusion

This study assessed coastal sand dunes in Cuddalore district (North Tamil Nadu), using vegetation as an indicator for evaluating the succession stages of sand dunes. Once known as very natural and inaccessible, the majority of the sand dunes in Cuddalore have been destroyed. Today, these dunes remain as fragmented strips lying parallel to the coastline in an east-west direction and are largely occupied by mining, fishing, tourism and agriculture. Indiscriminate grazing and increase in visitors have also damaged the typical vegetation on sand dunes. Wastes and sewage from cities and tourism centres are also frequently dumped in the sea and estuarine water bodies. Clearance of upstream land for agriculture has also resulted in sedimentation and silt accumulation; impacting the mangrove and reef areas in particular. Creepers like *Ipomoea pes-caprae* and *Pedaliium murex* are the two species frequently observed on the sand dunes of Cuddalore coast. The roots of such creepers

could bind the soil and protect sand dunes from wind erosion. Shelterbelts with *Casuarina equisetifolia* and *Casuarina junghuhniana* along the shoreline will also help to protect the unique sensitive coastal systems from natural disasters.

### References

- Banerjee, L.K., Rao, T.A., Sastry, A.R.K., and D. Ghosh. 2002. Diversity of Coastal Plant Communities in India, Botanical Survey of India, Kolkata. pp: 233–320.
- Das and Vincent. 2009. Mangroves protected villages and reduced death toll during Indian super cyclone. *Proc. Natl. Acad. Sci USA* **106**:7357–7360.
- Fischer and Lindenmayer. 2007. 'Landscape modification and habitat fragmentation: a synthesis, *Global Ecology and Biogeography* **16**: 265–280.
- Lee, J.K., Lee, K.S., Ihm, B.S., Kim, H.S., and S.H. Lee. 2000. Studies on the vegetation distribution and standing biomass at the coastal sand dune of Uido. *Basic Science Research* **15**: 53–60.
- Mascarenhas, A., and S. Jayakumar. 2008. An environmental perspective of the post-tsunami scenario along the coast of Tamil Nadu, India: Role of sand dunes and forests. *Journal of Environmental Management* **89**: 24–34.
- MoEF. 1991. Declaration of Coastal Stretches as Coastal Regulation Zone (CRZ), Notification, S.O. no. 114(E), 19<sup>th</sup> February. New Delhi: Ministry of Environment and Forests Bulletin No. 4.
- Musila, W.M., Kimyamario, J.I., and P.D. Jungerius. 2001. Vegetation dynamics of coastal sand dunes near Malindi, Kenya. *African Journal of Ecology* **39**: 170–177.
- Muthukumar., and A.S. Samuel. 2011. Coastal sand dune flora in the Thoothukudi District, Tamil Nadu, southern India. *Journal of Threatened Taxa* **3(11)**: 2211–2216.
- Rodgers, W.A., and H.S. Panwar. 1998. Planning a Wildlife Protected Area Network in India, Wild life Institute of India, Dehra Dun, India.
- Rao, T.A., and A.N. Sherieff. 2002. Coastal Ecosystem of the Karnataka State, India II – Beaches. Bangalore: Karnataka Association for the Advancement of Science. p: 250.
- Selvam, V.R., Karunakaran, T., Ramasubramanian, R., Eganathan, P. and A. K. Parida. 2005. Toolkit for Establishing Coastal Bioshield. M.S. Swaminathan Research Foundation, Chennai. p:120
- Ramarajan, R. and K. Murugesan. 2014. Plant Diversity on Coastal sand dune flora, Tirunelveli district, Tamil Nadu, *Indian Journal of Plant Sciences*, **32**: 42–48