III. STUDY AREA
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Vegetation

Earlier published works, describing the vegetation of the study area, have commented on the degraded state of much of the area. Champion and Seth (1968) recorded Tropical dry evergreen forest (Type 7/C1) and Tropical dry evergreen scrub (Type 7/DS1), as the common vegetation found on the Coromandel coast, extending for 500 km from Ramanathapuram in south to Vishakhapatnam in the north, with a width of 50 km (Blanchflower 2005). Physiognomically it occurs as scrub-woodland or thicket, the latter maybe continuous or dense (Meher-Homji 1973) Floristically based on the characteristic and preferential species (sensu Braun-Blanquet 1932), exclusively or mostly confined to this type as well as some companion species of high presence. Meher-Homji (1973) described the phytosociological assemblage as the Albizia amara community. His list of characteristic, preferential and differential species has more shrubs than trees. Blasco and Legris (1973) ‘found no “dry evergreen forests” (Champion & Seth 1968)’, but two kinds of thickets—the Point Calimere type and the Marakkanam type dominated by shrubs. They found that, radiant herbs accounted for more than 50%, shrubs and under-shrubs 22%, climbers 17%, and trees accounting for just 11% of the species.

Recent studies focusing on the forests preserved as scared groves, record trees and lianas as the predominant woody species. The coastal forests had 46 tree species >10cm, belonging to 43 genera and 25 families (Venkateswaran & Parthasarathy 2003) and in the inland forests 77 tree species >10cm dbh, belonging to 61 genera of 30 families (Mani & Parthasarathy 2006) and 35 liana species >1cm dbh (Reddy & Parthasarathy 2006) A
A qualitative study has recorded 149 woody species belonging to 122 genera and 49 families (Parthasarathy et al. 2008). Tree species are dominant representing 69% (102 species) and lianas 32% (47 species). However, the tree species in a fragment ranges from only 6 to 36, with a significant difference in species composition between the fragments (Parthasarathy et al. 2008). Common tree species are Memecylon umbellatum (32%), Tricalysia spahaerocarpa (10.5%), Pterospermum canescens (9.7%) and common lianas are Combretum albidinum (14.2%), Strychnos minor (14%), Reissentia indica (6.5%), and Cissus quadrangularis (Reddy & Parthasarathy 2006, Parthasarathy et al., 2008). The stature of forests too differed, with tall forests (mean height ~ 12 m) on sandy soils with alluvium deposits and short -statured forests (mean height < 8 m) on hard ferralitic compact soil (Parthasarathy et al. 2008). A comparison of heights showed that disturbed (mean height~ 5m) were lower than undisturbed sites (mean height~ 5m ) (Venkateswaran & Parthasarathy 2003). A litter production of 13.39 tonnes ha\(^{-1}\) yr\(^{-1}\) was recorded from two forests, with the trees contributing 71% and lianas 29% (Pragasan & Parthasarathy 2005).

Since Puthupet, a scared grove is the nearest forest formation to our study area on the coastal areas, it was chosen as the possible 'climax'. It is considered one of the more disturbed sites in the area (Venkateswaran & Parthasarathy 2003), and a re-census of the forest of tree >10cm dbh ,shows that in 2002 the density was 1338 ha\(^{-1}\), the basal area had decreased in ten years by 8% to 34.5m\(^{2}\) ha\(^{-1}\). The forest has 29 trees species >10cm dbh (Venkateswaran & Parthasarathy 2005). A species richness is 28 for lianas >1cm dbh has also been recorded (Reddy & Parthasarathy 2003).
While the tropical dry evergreen forest typifies the “climax vegetation” of the region, the landscape, owing to its proximity to Pondicherry, a rapidly growing city, is patchy in nature. The landscape, with villages surrounded by agricultural land, and degraded revenue (government), national and state highways, produces a very diverse vegetation picture, with the land in many stages of succession and reflecting varying degree of land use patterns. Thus it is common to find formations of grasslands, savannas, wastelands, continuous and discontinuous thickets, with the climax forest patches preserved and confined mostly to scared grooves around temples (Parthasarathy et al. 2008).

Climate

The climate of this region is referred to as tropical dissymmetric regime. The rains are scanty and erratic during the early part of the S.W. monsoon (July –September), but heavy in October-December, so the peak of the rainy season is not centred in the middle of the year (July), but is pushed towards the months October-December resulting in a dissymmetric regime (Meher Homji 1974). The average dry period is 6 to 8 months. An important source of moisture is dew from September to April in the coastal areas (Meher Homji 1974).

Climate data available for Puducherry, for the past decade (1992-2002), reveal a mean annual temperature of 29.5°C ± 2.45°C (Mani & Parthasarathy 2006). Mean annual temperature for 2007 was 28.6 °C and rainfall was 1300 mm. For 2008 (till July), the mean annual temperature was 29.3°C and rainfall was 421 mm.
I. Comparison of seres

The study is based on two chronosequences, the open areas subjected to grazing and resource removal undergoing spontaneous succession represented by agricultural and silviculture fallows, aged two, four, 10 and 50 years to define different stages of succession; and the protected sites experiencing directed succession, studied by areas banded for water harvesting and soil conservation, planted by primary TDEF species and protected from grazing and human disturbance, by sites aged two, six, 12 and 30 years. These were compared with one site of Tropical Dry Evergreen Forest (TDEF), a climax forest represented by site Puthupet. Three plots were studied in each site.

Open /spontaneous succession: Five study sites were chosen in and around Puducherry on the Coromandel coast of India. Puthupet (N 11°, E079°), a sacred grove, is located 15 km north of Puducherry. The 2-year old, (2 acres), and 4-year old, (2 acres) (N 11° 57.700', E 079° 45.396') sites are located 12 km west of Puducherry, the 10-year old site (2-3 acres), (N 11° 59.552', E 079° 46.943') is 5 km north of Puducherry and the oldest site is located within the Pondicherry University campus (>100 acres), (N 12° 01.487', E 079° 50.950'), 10 km north of Puducherry town.

The directed seres are located in different parts of Auroville, the 2-year site (15 acres) (N 11° 58.850', E 079° 46.579'), is 5 km north of Puducherry, the 6-year site (50 acres) (N 11° 59.267', E 079° 48.289') and 30-year site (70 acres) (N 11° 58.846', E 079° 48.814') are 4 km north of Puducherry and the 12-year site (20 acres) (N 11° 57.911', E 079°
46.000') is 12 km west of Puducherry. The age of the sites was fixed based on the time the sites have been afforested. Plates 1-4 show the four seral stages of both pathways.

II. Facilitation experiment

The study was conducted in two sites of privately owned semi-natural scrub, which were cashew plantations left without inter-cultivation, allowing natural regeneration, 1 km apart, one inside Pondicherry University campus (N 12° 01.487', E 079° 50.950') and the other in Pillaiachavadi (N 12° 01.953', E 079° 50.751'). The experiment was conducted in the scrub in the Pondicherry University campus and a scrub in Lakeside (N 11° 57.700', E 079° 45.396'), 12 km west of Puducherry. Facilitation study depicted in Plates 5 and 6.

III. Phoenix pusilla population study

The four study sites are - Puthupet, a forest fragment (N 11°, E079°) 15 km north of Puducherry, the tree savanna and Acacia auriculiformis plantation within the Pondicherry University campus (N 12° 01 487', E 079° 50.950') and a wasteland/open area, located in Lakeside 12 km west of Puducherry (N 11° 57.700', E 079° 45.396'), which was a Casuarina equisetifolia silviculture - plantation left fallow for five years prior to the study. Plate 7 shows flowering and fructing of Phoenix pusilla.

IV. Economic study of wasteland species

The survey was carried out in a region covering 300 villages, spanned by Puducherry in the south, Marakkanam (40 km north of Puducherry) and Tindivanam (40 km west of Puducherry).
Plate 1

Comparison of spontaneous and directed succession
Open - 2 Year sere

Protected – 2 Year sere
Plate 2

Open - 4 Year sere

Protected - 6 year sere
Plate 3

Open - 10 year sere with inset showing top soil erosion

Protected - 12 year sere inset shows the clumps of *Selima nervosum*
Plate 4

Open - 50 year sere

Protected - 30 year sere
Plate 5

Facilitation by *Phoenix pusilla*

*Phoenix pusilla* establishes (1) and facilitates *Azadirachta indica* (2). The smaller bushes grow to coalesce and form patches (3) that progressively grow larger and accumulate more species (4).
Experiment to prove that *Phoenix pusilla* ameliorates soil and microclimate

Germination of *Walsura trifolia* under *Phoenix pusilla*

Only one seedling emerged in the bare interspace in the University campus.
*Phoenix pusilla* is an acaulescent palm, reaching to a height of 1.5m.

Flowering male

Flowering female

Ripe and unripe drupes