

# Population Dynamix and the Distribution Pattern of Vegetation in Pachamalai Hills, Tiruchirappalli Districts, Tamil Nadu, India

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**Abstract:** Reserve forests are major reporting for the survival of many valuable herb and shrub population. Through, the present study found that low rainfall and anthropogenic pressure loaded presences on the distribution pattern and dynamix of many herbs of pachamalai vegetation. A minimum number of herb diversity was observed in kanapadi mainly due man –made activities.

**Keywords:** Population, Diversity Index, Herb, Shrub, Pachamalai, Rainfall.

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## 1. INTRODUCTION

Last three decades the anthropogenic pressure on environment has drastically changed the distribution, dynamics and diversity of the plant population. The extinction of plant species across the world has been stimulated a number of experimental studies in the field of ecosystem. Plant populations are characterized by their size structure often influenced by their local environment. Indeed a population belonging to the same species, change in numbers over time, living in the same area. Recent development in the biodiversity analysis, the models provide document and understand patterns of population dynamics (Paulette Bierzychudek, 2013). Niche models have endeavoured to estimate key fitness components such as survival, growth, development and reproduction as a function of species attributes like physiology, phenology, behavior etc. that vary with climatic conditions (Kearney *et al.*, 2010).

Changes in the abundance of plant species are remarkably found in every rainy season especially the herbs and Shrub. The static populations are long-lived trees that may cover the entire vegetational areas of forest ecosystem. Different components of biodiversity vary independently of each other along ecological gradients that regulate species coexistence. In particular, the functional diversity of natural assemblage does not necessarily increase with species diversity (De Bello *et al.*, 2006). Changes in vegetation dynamics can be distinguished by seasonal changes, gradual trend changes and abrupt changes. The gradual changes refer to the trend component beyond the seasonal variation, slowly acting environmental processes (De Jong *et al.*, 2012). In the light the present paper mainly deals with the Population Dynamix and the Distribution pattern of Herb and Shrub in Pachamalai Hills.

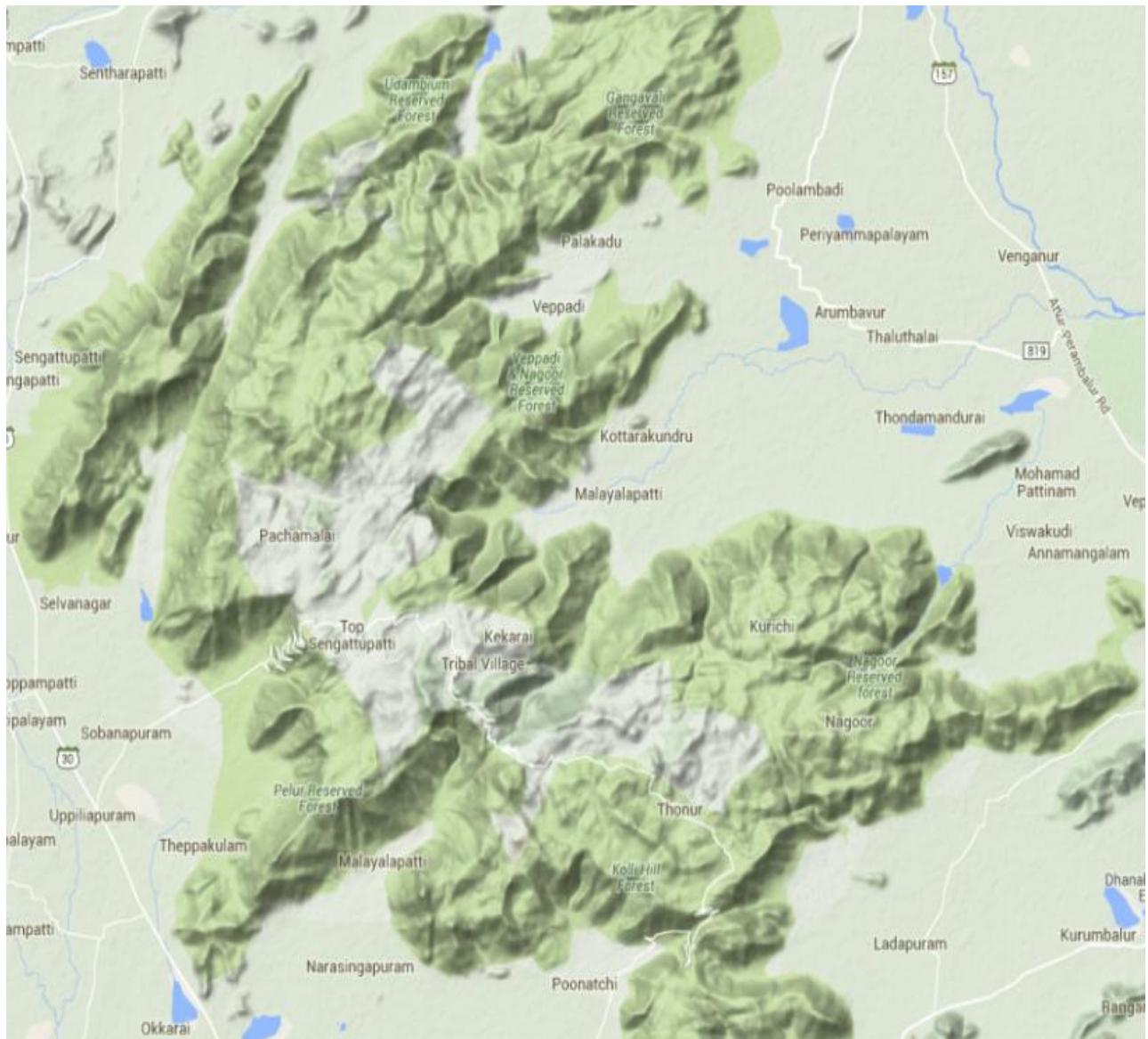
## 2. MATERIALS AND METHODS

### Research area:

The reserved forest of Pachamalai is located between 78°31' East and 11°28' North and 11°10' South and 78°20' West latitude under a portion of Eastern Ghats in Tiruchirappalli districts, Tamil Nadu, India. The elevation range from 400 - 1500 MSL. The mean temperature is 29.1°C and annual rainfalls are 860 mm and mean humidity is 60 percent. Different types of forest types are present including the evergreen forest, semi evergreen forest, dry evergreen forest and dry mixed deciduous forest (Fig 1).

**Vegetation analysis:**

To study community composition and other phytosociological attributes characteristics of the herb and shrub vegetation at seven selected sites, thorough field surveys. Plant species were studied by randomly enumeration and altitude range laying 20 quadrats of shrub layers and Herb layer were sampled in 5m × 5 m size at each sites (Rajvanshi *et al.*, 1987). Specimens of plant species were collected and herbarium was prepared for the department of Botany, National College (Autonomous), Tiruchirappalli, Tamil Nadu. Its taxonomical identification is following by Bentham and Hookers system of classification as reported by Gamble (1935), Mathew (1983, 1996 and 1998) and Pallithanam (2001).



**Fig 1 : Study area of Pachamalai**

**Data analysis:**

The present study area in plant species vegetation data analyzed using the Shannon Wiener’s Diversity Index was calculated by using the following formula (Shannon Wiener, 1963; Whittaker, 1975).

$$H' = -1 \sum p_i \times \ln p_i$$

Where  $P_i$  = Relative abundance of the species

$\sum p_i$  = Sum of all the relative abundance of all the species encountered in the sample.

3. RESULT

Enumeration studies:

The present study systematically included enumeration, diversity index and population dynamics in the clear view an vegetation of Pachamalai vegetation (A portion of Eastern Ghats) in Tiruchirappalli, Tamilnadu. In order to understand sub-divisions into 7 forest areas i.e., Manmalai, Sengattupatti, Kalamankovil, Arsadi Arivetti, Solaimatti, Kanapadi and Manalodai. The present study 690 angiospermic plants belonging to 122 families which broadly included in 441 genera. In addition to that same Pteridophytic (9) and Gymnospermic (1) taxa was reported and found into between the vegetation. Among the following plants are based on the growth form i.e., (182) Herbs, (228) Trees, (91) Shrub, (61) Sub-Shrubs, (19) Culms, (25) Straggler, (39) Vine, (07) Twiner, (14) Liane, (33) Climber and (1) Woody Climber has been found in all seven study areas.

Table I: Distribution of Herb and Shrub

Study area	Herb	Shrub
Manmalai	81	74
Sengattupatti	110	89
Kalamankovil	18	24
Arsadi Arivetti	47	42
Solaimatti	33	23
Kanapadi	46	35
Manalodai	75	54

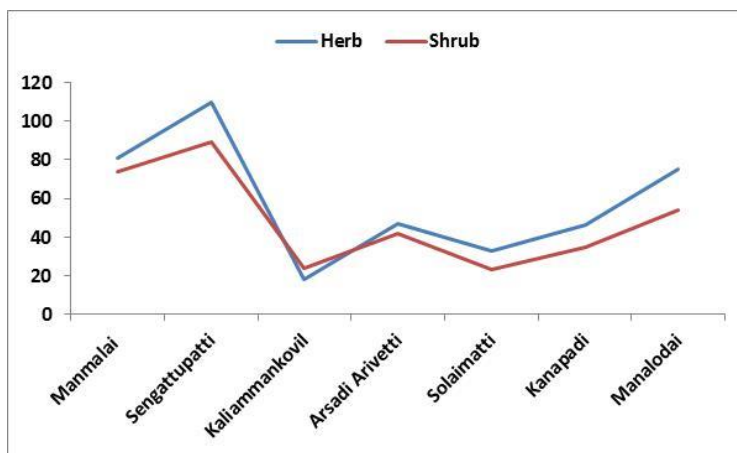


Fig 2: Distribution of Herb and Shrub layers in seven sites

A total number of herbs and shrub species reported in the seven reserve forest from divided (Table: I). The present studies on highest herbs recorded Sengattupatti (110), Manmalai (81), Manalodai (75), Arsadi Arivetti (47), Kanapadi (46), Solaimatti (33) and Kalamankovil (18), and highest shrub Sengattupatti (89), Manmalai (74), Manalodai (54), Arsadi Arivetti (42), Kanapadi (35), Kalamankovil (24) and Solaimatti (23). Figure - 2 shows a comparative view on herb and shrub, it is seen that the curve with seven study areas in the present lower herb of Kalamankovil forest. But in general has species turnover showed the highest values between herbs of Sengattupatti forest. Shrub has present in lower Solaimatti forest and species turnover showed the highest values between shrubs of 89 Sengattupatti forest.

Diversity index analysis:

The estimation of plants population, destitution in growing places were calculated by Shannon - Winer's index. The relationship between the indices of diversity on herbaceous and shrub vegetation, were significantly varied in 20 quadrats. The population diversity index in herb Manmalai (2.871353), Sengattupatti (2.877316), Kalamankovil (3.126575), Arsadi Arivetti (3.187165), Solaimatti (2.593224), Kanapadi (2.099221 ) and Manalodai (2.593224). The herbaceous

population diversity index showed maximum numbers in Arsadi Arivetti (3.187165) and minimum numbers in Kanapadi (2.099221). The population diversity index in Shrub Manmalai (3.04215), Sengattupatti (2.800251), Kaliammankovil (3.187165), Arsadi Arivetti (3.034837), Solaimatti (2.353047), Kanapadi (2.363641) and Manalodai (2.526575) The shrub population diversity index showed maximum numbers in Kaliammankovil (3.187165) and minimum numbers in Solaimatti (2.353047) (Fig 3).

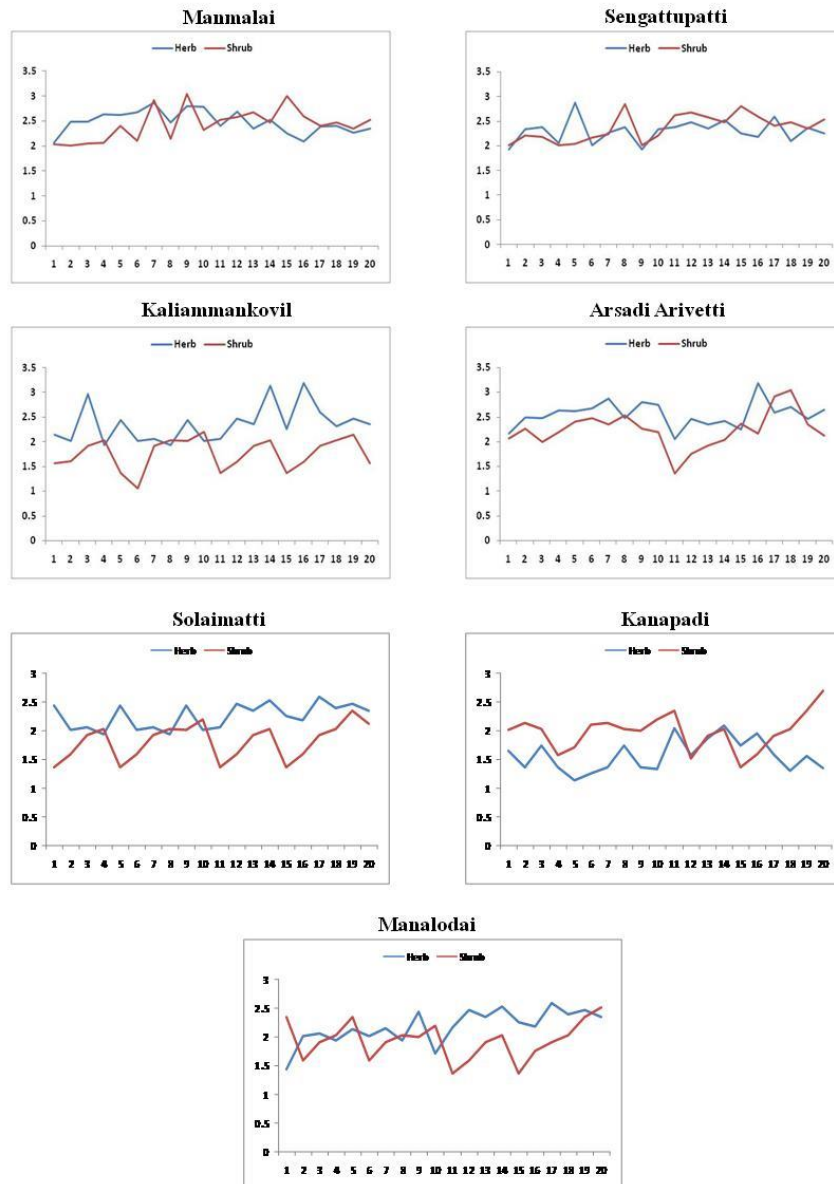


Fig 3: Comparative of Herb and Shrub layers in seven sites

#### 4. DISCUSSION

In the combined data set (i.e. the 60 plots), the indices of species diversity (richness, Simpson and evenness) were robustly correlated among them, with the exception of evenness, which was weakly correlated to richness. Different indices of FD (calculated by taking into account a different number of traits) were significantly correlated among them. Only the FD index that takes into account 7 traits presented a significant, but weak, correlation with richness ( $r/0.40$ ;  $p/0.05$ ) and the Simpson index ( $r/0.29$ ;  $pB/0.05$ ). Consequently most analyses and discussion were particularly focused on this index. The diversity index correlates significantly with Simpson diversity can shows quite different environmental response (de Bello *et al.*, 2006).

Dominant herb response was correlated with five of the six predictors, but the overall regression relation was also weak, supporting the general observation that these species are able to thrive and dominate the herb layer in a variety of forest conditions (Halpern and Spies 1995). Thus, neither overstory structure nor “successional” time appears to be a major influence on the variability in dominant herb abundance among plots (McKenzie *et al.*, 2000). Shrubs dominate probably as a result of the relatively open tree canopies frequent soil disturbance and moist soil conditions (Robert *et al.*, 1998).

In addition, there are different indicators of biodiversity change, such as the number of species committed to extinction (Pereira *et al.*, 2010), extinction risk and also change in abundances (Leadley *et al.*, 2010). The number of species committed to extinction is probably not the most appropriate metric to forecast the future of biodiversity because the extinction debt could vary from decades to centuries. A complementary metric of biodiversity can be changes in MSA, which is an index defined as the mean abundance of original species relative to their abundance in undisturbed ecosystems. According to the influence of climate change and ecological restoration programs on vegetation activity dynamic, the thresh- old segmentation method was used to separate influence of climate change and ecological restoration programs (Haijing Tian *et al.*, 2015).

## 5. CONCLUSION

Population dynamix and the distribution of vegetation especially herbs & shrubs in pachamalai. Predominantly controlled by both man – made activities and lesser rainfall rate during the rainy season. Most of the herbaceous taxa controlled their growth by using the available water content but it can help for their species survival. Moreover the new population patterns not observed in almost all seven study area. Man – made and aroundactivities in the range and is adversely affected the reproductive cycle and species regeneration.

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