Chapter - VI

Conclusions
The present study pertaining to estimation of carbon sequestration potential of forests of Nallamalais in Andhra Pradesh in sampled 120 plots recorded a total of 306 plant taxa (124 trees, 6 lianas, 18 shrubs, 141 herbs and 17 vines) belonging to 215 genera and 61 families. Legumes with 54 species and grasses with 32 species are the dominating plant groups. Tree component is represented by 124 species comprising 14,199 tree individuals with a range of 26-357 individuals per 0.1 ha plot. The top ten dominant tree species shares 58.33% of population and 48.26% of basal area. Lianas are represented by 6 species and comprise 162 individuals. Shrubs represent by 18 species comprising 616 individuals. Herbaceous component (herbs and vines) represent 158 species and accounts for 2,630 individuals.

Pertaining to trees, the mean basal area is 17.47±10.99 m² ha⁻¹ ranging between 1.66-85.62 m² ha⁻¹ in the sampled plots. The top ten dominant tree species shared 48.26% of the total basal area. Trees having ≥10cm diameter, shared 86.31% of the total basal area and with <10cm diameter shared 13.68%. The mean basal area of the present study is in between the estimates from tropical dry evergreen forests of Peninsular India-14.9 m² ha⁻¹ and 27.0 m² ha⁻¹ (Mani and Parthasarathy, 2009), and near to estimated mean basal area in five inland sites (18.14 m² ha⁻¹) and less than that of five coastal sites (25.52 m² ha⁻¹) in tropical dry evergreen forests of peninsular India (Mani and Parthasarathy, 2007). The total wood volume of the study area is 81.098 M m³. Indian forests mean volume density for the year 2005 was 59.79 m³ ha⁻¹ and is lower than reported from the present study.
The mean biomass of trees with ≥10cm diameter is 55.38±41.30 Mg ha\(^{-1}\) and ranges between 0.74-205.95 Mg ha\(^{-1}\) in the sampled plots sharing 86.28% of the total tree above-ground biomass. It is 8.80±9.6 Mg ha\(^{-1}\) for <10cm diameter trees. Trees/Lianas are the major contributors of above-ground live biomass in Nallamalais with 96.72% share. The mean density is 64.19±42.63 Mg ha\(^{-1}\) ranging between 5.20-299.30 Mg ha\(^{-1}\) in the sampled plots. The total biomass contributed by these life forms is 49.041 Mt. The density was greater in <10cm diameter class (55.13%) followed by ≥10-20 class (32.55%) and is found decreasing with the increasing diameter class.

Shrubs contribute 0.47% of above-ground live biomass, with a mean value of 0.76±0.64 Mg ha\(^{-1}\) ranges between 0.01-2.82 Mg ha\(^{-1}\) in the plots sampled. A total of 0.58 Mt of biomass is stored by shrubs in the study area. Herbs and Vines contribute 2.79% of AGLB with a mean value of 1.85±1.11 Mg ha\(^{-1}\) which varied between 0.20-6.00 Mg ha\(^{-1}\) in the sampled plots. The total biomass accounts for 1.41 Mt.

The biomass of trees, shrubs and herbs and vines in each 0.1 ha plot were added together to get above-ground live biomass of the plot which worked out as 94.77% of the total study area.

Litter constitutes 12.97% of AGDB and accounts for 0.33 Mt in the study area. Mean dead wood density represented by 3.20±2.13 Mg ha\(^{-1}\) (equaling 1.51 Mg C ha\(^{-1}\)) with a range of 0.26-14.97 Mg ha\(^{-1}\) in the plots sampled. It is 87.81% of the above-ground dead biomass and accounts for 2.44 Mt in the study area. In the present study, the dead wood is considered as an important component of biomass and worked out to be 20% of the AGB which is contributing significantly to the total carbon. Sum of litter and dead wood biomass accounts for 2.78 Mt. The Total AGB density of the study area is 70.02±45.05 Mg ha\(^{-1}\) varies between 6.53-318.52 Mg ha\(^{-1}\) in the study area which is 95.47% of the total biomass and accounts for 53.49 Mt in the study area. Below Ground Biomass is 4.52% of the total biomass and accounts for 2.551 Mt in the study area.

The total biomass density is 73.36±47.20 Mg ha\(^{-1}\), varies between 6.84-33.69 Mg ha\(^{-1}\) in the sampled plots and accounts for 56.047 Mt in the study area. The total carbon pool density of the study area is 34.48±22.18 Mg ha\(^{-1}\) ranging between 3.22-156.84 Mg ha\(^{-1}\) in the plots sampled. **The total carbon pool of the study area is estimated 26.34 Mt.** Carbon densities in different components of the study area are as follows: trees
30.17 Mg C ha\(^{-1}\), shrubs 0.35 Mg C ha\(^{-1}\), herbs and vines 0.87 Mg C ha\(^{-1}\), above-ground live biomass 31.19 Mg C ha\(^{-1}\), litter 0.20 Mg C ha\(^{-1}\), dead wood 1.51 Mg C ha\(^{-1}\), above-ground dead carbon 1.71 Mg C ha\(^{-1}\), total above-ground biomass carbon 32.91 Mg C ha\(^{-1}\), below ground biomass carbon 1.55 Mg C ha\(^{-1}\).

Attempt made in the present study to estimate biomass density of top 10 dominant tree species revealed that 405.24 Mg ha\(^{-1}\) TABGB, out of which the major part is accumulated in the bole 98.14\% (397.54 Mg ha\(^{-1}\)) followed by branches 1.70\% (6.92 Mg ha\(^{-1}\)), twigs 0.097\% (0.39 Mg ha\(^{-1}\)) and leaves 0.045\% (0.18 Mg ha\(^{-1}\)). It is comparatively greater than reported total Above Ground tree biomass of 23 species from tropical Sal forest of Eastern Ghats (Behera and Mishra, 2006) which is 30.12 Mg ha\(^{-1}\) in 2-yr stand, 49.21 Mg ha\(^{-1}\) in 4-yr stand, 107.54 Mg ha\(^{-1}\) in 6-yr stand and 261.08 Mg ha\(^{-1}\) in 10-yr stand. Among top ten trees of the sampled inventory, *Pterocarpus marsupium* contributing more biomass and carbon followed by *Terminalia alata*, *Anogeissus latifolia* and *Lagerstroemia parviflora*. It is also found that the density values of biomass and carbon are greater in moist deciduous forests than dry deciduous forests of the study area.

While working in the represent plots inventoried for the present study it is found that man-made fires, grazing, logging, and unscientific collection of non timber forest products, logging, and pilgrimage to sacred sites are key threats to plant biodiversity and has adverse affect on carbon stocks. Hence effective conservation strategies have to be adopted to combat these threats.

From the present study, based on Sharma *et al.*, (2006); Shukla (2006) and Kishwan *et al.*, (2009), It is estimated that Nallamala forests with its carbon stocks of 26.34 Mt have the ability to reduce the Indian GHG emissions by 0.37, 0.24, 0.17 and 0.08\% for the years 1990, 1994, 2000 and 2010 respectively.