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Carbon Sequestration and Carbon Stock Potential of Major Forest Types in the Foot Hills of Nilgiri Biosphere Reserve, India

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Abstract : The present study aimed to estimate the carbon sequestration potential of major forest types present in the foothills of Nilgiri biosphere reserve. The total biomass carbon stock was estimated in tropical thorn forest, tropical dry deciduous forest and tropical moist deciduous forest as 14.61 t C ha^{-1} 75.16 t C ha^{-1} and 187.52 t C ha^{-1} respectively. The density and basal area were estimated in tropical thorn forest, tropical dry deciduous forest, tropical moist deciduous forest as 173 stems ha^{-1}, 349 stems ha^{-1}, 391 stems ha^{-1} and 6.21 m^2 ha^{-1}, 31.09 m^2 ha^{-1}, 67.34 m^2 ha^{-1} respectively. The soil carbon stock of different forest ecosystems was estimated, and the results revealed that tropical moist deciduous forest (71.74 t C ha^{-1}) accounted for more soil carbon stock when compared to tropical dry deciduous forest (31.80 t C ha^{-1}) and tropical thorn forest (3.99 t C ha^{-1}). The tropical moist deciduous forest has the maximum annual leaf litter which was 12.77 t ha^{-1} $year^{-1}$ followed by 6.44 t ha^{-1} $year^{-1}$ litter fall of tropical dry deciduous forest. The tropical thorn forest accounted for 3.42 t ha^{-1} yr^{-1} leaf litter production. The leaf litter carbon stock of tropical thorn forest, tropical dry deciduous forest and tropical moist deciduous forest found to be 1.02 t C ha^{-1} yr^{-1} 2.28 t^{-1} C ha^{-1} yr^{-1} and 5.42 t C ha^{-1} yr^{-1} respectively. The results explained that decomposition percent at the soil surface in the following order.tropical dry deciduous forest (77.66 percent) > tropical thorn forest (69.49 percent) > tropical moist deciduous forest (63.17 percent). Decomposition percent at soil subsurface was studied, and the highest decomposition percent was observed in tropical dry deciduous forest (80.52 percent) followed by tropical moist deciduous forest (77.65 percent) and tropical thorn forest (72.10 percent). The decomposition percent was higher at soil subsurface. Among the three forest type, tropical moist deciduous forest accounted for the highest bacterial (59.67 x 105cfu's g^{-1} soil), actinomycetes (74.87 x 104cfu's g^{-1} soil) and fungal (112.60 x10^3cfu's g^{-1} soil) population. The overall observation of the study helps to conclude that, the tropical moist deciduous forest has the potential of storing higher carbon content as biomass with the value of 264.68 t C ha^{-1} and microbial populations.

Keywords : basal area, carbon sequestration, carbon stock, Nilgiri biosphere reserve
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