



An Assessment of Carbon Stock for Various Land Use Systems in Aravally Mountains, Western India

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Abstract: Reducing carbon emissions from deforestation and degradation in developing countries is of the central importance in efforts to combat climate change. A study was conducted to measure carbon stocks in various land-use systems including forms and reliably estimates the impact of land use on C stocks in the forest of western India (23°3'-30°12'N longitude and 69°30'-78°17'E). The carbon stocks of forest, reforestation (plantation) and agricultural land in aboveground, soil organic and fine root within forest, were estimated through field data collection. Results revealed that the amount of total carbon stock of forests ($533.64 \pm 37.54 \text{ Mg}\cdot\text{ha}^{-1}$, simplified expression of $\text{Mg (carbon)} \cdot \text{ha}^{-1}$) was significantly greater ($P < 0.05$) than the reforestation ($324.37 \pm 15.0 \text{ Mg}\cdot\text{ha}^{-1}$) and the agricultural land ($120.50 \pm 2.17 \text{ Mg}\cdot\text{ha}^{-1}$). Soil organic carbon in the forests ($172.84 \pm 3.78 \text{ Mg}\cdot\text{ha}^{-1}$) was also significantly greater ($P < 0.05$) than the reforestation ($153.20 \pm 7.48 \text{ Mg}\cdot\text{ha}^{-1}$) and the agricultural land ($108.71 \pm 1.68 \text{ Mg}\cdot\text{ha}^{-1}$). The differences in carbon stocks across land-use types are the primary consequence of variations in the vegetation biomass and the soil organic matter. Fine root carbon was a small fraction of carbon stocks in all land-use types. Most of the soil organic carbon and fine root carbon content was found in the upper 30-cm layer and decreased with soil depth. The aboveground carbon: soil organic carbon: fine root carbon ratios (ABGC: SOC: FRC), was 8:4:1, 4:5:1, and 3:37:1 for the forest, reforestation and agricultural land, respectively. These results indicate that a relatively large proportion of the C loss is due to forest conversion to agricultural land.

Keywords: *Carbon stock, forest, reforestation, agriculture, carbon mitigation, carbon sequestration*

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