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An Assessment of Carbon Sequestration Potential of Different Land Use Systems in Leyte, Philippines

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Abstract

A system developed to reintroduce high diversity of indigenous trees in dense multi-storey structure, a so-called high-density closed canopy system is called rainforestation. The study assessed carbon storage in rainforestation, grass land and agriculture land in Leyte, Philippines. Soil samples were collected from top 10 cm and laboratory analysis was carried out to find out soil bulk density, soil pH, texture, total nitrogen. A Walkley-Black method was used to determine the soil organic carbon concentration in the soil. For the above ground carbon estimation diameter of the trees was measured and allometric equation was used.

There was significant difference ($p < 0.05$) of soil organic carbon stock and above ground carbon stock in various land use systems namely rainforestation, grassland and agricultural land. Average soil organic carbon stock of rainforestation was estimated to be 21.78 Mg C ha⁻¹, in grassland it was 24.24 Mg C ha⁻¹ and in agricultural land it was 31.02 Mg C ha⁻¹. Above ground carbon stock of the rainforestation was found 53.6 Mg C ha⁻¹ and root carbon stock was found 11.69 Mg C ha⁻¹. The above ground carbon stock of grassland in Philippine was found to be 17.15 Mg C ha⁻¹ where as agricultural field was found to be 9 Mg C ha⁻¹. Soil organic carbon concentration and stock was lowest in rainforestation. If we combine the above ground carbon and soil organic carbon the rainforestation sequesters the highest carbon and agriculture land sequesters lowest carbon. The effects on soil carbon stock and above ground carbon stock of conversion of agriculture land or pasture into forest are important to know in afforestation and reforestation project especially designated to mitigate carbon emissions through the sequestration of carbon. It is also necessary to calculate base line for cost-benefit analysis and monitoring. The key point is that the best potential for carbon sequestration in the humid tropics is above ground, not in the soil. If croplands and pastures were rehabilitated through conversion to tree-based systems of which rainforestation is one scheme, and then this would result in net carbon sequestration.

Keywords: Above ground carbon stock, carbon sequestration, humid tropics, rainforestation, reforestation, soil organic carbon stock

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