3rd INTERNATIONAL CONGRESS ON ENGINEERING AND LIFE SCIENCE
ICELIS 20-22 SEPTEMBER 2023 TRABZON-TURKIYE

ORAL PRESENTATION https://doi.org/10.61326/icelis.2023.43

Evaluation of Carbon Sequestration Capacities Across Varied Forest Types: An Empirical Study in Northern Part of Bangladesh

Md Shafiqul Bari✉, Farhana Mim, Md Manik Ali

Hajee Mohammad Danesh Science and Technology University, Department of Agroforestry and Environment, Dinajpur/BANGLADESH

✉***Correspondence**:* barimdshafiqul@gmail.com

Abstract: The aim of this study was to assess the ability of several distinct forestry systems in Bangladesh's northern region to sequester carbon. Three different agro-ecological zones (AEZs) were covered by the experiments: AEZ 1 (Old Himalayan piedmont plain), AEZ 3 (Tista meander flood plain), and AEZ 25 (Level barind tract). Experimental plots with three replications were randomly selected from each AEZ using a randomized complete block design (RCBD). Factor A, which represented five forestry models (Shal forest, social forest, eucalyptus cropland-based agroforestry, and mango and litchi orchard-based agroforestry systems), and Factor B, which represented the three aforementioned AEZs. To determine the total biomass accumulation, undergrowth vegetation (including herbs, shrubs, and crops) and tree growth parameters, like height and diameter at breast height (DBH), were studied. In terms of parameters like tree height, DBH, tree density, understory vegetation, and carbon sequestration in both trees and soil, the results showed significant differences across forestry systems. Notably, the Litchi orchard-based agroforestry system sequestered the least carbon, at 67.82 t/ha, whereas the Shal forest system did so at a rate of 2310.04 t/ha. Regarding the AEZs, AEZ 25 had the highest potential for sequestering carbon, measuring 644.98 t/ha, while AEZ 1 had the lowest potential, measuring 503.21 t/ha. Variability in carbon sequestration was also revealed by the interaction between AEZs and forestry systems. The Shal forest system and AEZ 3 were found to have the highest capacity at 2661.09 t/ha, while AEZ 1 and the Litchi orchards-based agroforestry system had the lowest capacity at 66.09 t/ha. In conclusion, the Shal forestry system demonstrated the highest capacity for conserving carbon and is, therefore, a promising strategy for reducing atmospheric carbon in the area. AEZ 25 demonstrated the best capacity for carbon sequestration of all the AEZs examined. Additionally, at $115,502/ha, the Shal forestry system provided the highest economic return on carbon sequestration. These findings suggest that the Shal forestry system should be given importance in Bangladesh's northern region for ecological reasons. Additionally, to balance carbon sequestration capacities between the zones, strategic tree planting programs should be implemented in AEZs 1 and 3.

Keywords: Carbon sequestration, Dinajpur District, Agro-ecological zones, Forestry systems.