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Woody biomass trends in Rwanda, combining stock and land cover change assessments in forests, shrublands, and farmlands

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Abstract

Forests play a pivotal role in mitigating climate change and promoting socioeconomic prosperity and ecological stability in Rwanda. Nevertheless, the extensive extraction of biomass for cooking has engendered a heavy dependence on this resource, resulting in excessive harvesting, forest degradation, and biodiversity loss. This study aims to assess the current potential of wood biomass and its trends from 2015 to 2021, specifically focusing on changes in woody biomass stock and tree cover across three distinct land-use systems (forest, agroforestry, shrubland, and wooded savannah) in the Eastern province (EP) of Rwanda. A total of 1,429 plots were randomly distributed and inventoried within the three land-use systems (LUS). The inventory findings were subsequently compared to the national forest inventory conducted in 2015. Furthermore, estimates were made regarding changes in stock resulting from variations in volume and cover.

The results reveal that the combined current stock for all three LUS amounts to 5.9 million cubic meters. Among these, the forest LUS exhibited the highest stock of 2.5 million cubic meters. The estimated total stock changes due to cover change is 1.2 million cubic meters. Forest LUS demonstrates a substantial stock increase of 1.5 million cubic meters, as a direct consequence of afforestation initiatives aimed at achieving a 30% forest cover target in the vision 2020. The total stock, influenced by fluctuation in volume within three distinct LUS, amounted to a decrease of 188,593 cubic meters. A decline was observed in both the forest and agroforestry LUSs, suggesting a significant reliance on biomass as a consequence of excessive tree extraction. The cumulative stock change resulting from both woody biomass stock change and tree cover change within three LUS amounted to 1 million cubic meters. Additionally, there is a decrease of 422,707 cubic meters in the agroforestry LUS.

This study provides invaluable insights that can inform intervention activities and decision-making processes, fostering climate change adaptation, biodiversity conservation, and landscape restoration in the EP of Rwanda.

Keywords: Cover change, Eastern Province, land use, Rwanda, stock change, wood biomass