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Abstract

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The Density of Carbon in Miombo Woodlands Subjected to Different Fire Frequency

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African miombo woodlands are concentrated in the Sub-Saharan region. The United Nations Framework Convention on Climate Change (UNFCCC) under the Kyoto Protocol recognizes the role of carbon sequestration in forests and woodlands. Due to large area coverage and inaccessibility, African savanna fires are normally left unattended hence resulting in outbreaks of uncontrolled and destructive fires commonly called wildfires. It has been reported that wildfires have both negative and positive influence on carbon sequestration in forests and woodlands. The present study was conducted in three forests namely Kitwe, Mgaraganza and Ilunde in

western Tanzania. Tree carbon density was estimated using biomass allometric model so far developed for miombo woodlands and the level of significance between the differences of carbon density was determined using ANOVA. Fire frequency of the three forests was interptreted from MODIS (Moderate Resolution Imaging Spectroradiometer) satellite imagery from the year 2001 to 2012. Tree carbon stock was significantly different among the studied miombo woodlands ($P < 0.05$). Furthermore, it was revealed that tree carbon stock was not significantly different between Mgaraganza and Ilunde forests ($P > 0.05$). In Ilunde forest, the average number of wildfires per annum was 35, while in Mgaraganza and Kitwe forests were 0.4 and 0.08, respectively. The effects of wildfires are variable and contradictory depending on the nature of the ecosystems and the existing circumstances. Frequent wildfires and spontaneous suppression resulted in different carbon density. Since fire is crucial in miombo woodlands, then prescribed burning could be prioritized to sustain sinks of carbon.

Keywords: Carbon density, fire frequency, miombo, tree, wildfires

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