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RESILIENCE OF TREE ABOVEGROUND AND LITTER DRY BIOMASS IN ATLANTIC LOWLAND RAIN FORESTS

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The biomass stock of tropical forests is a good indicator of the potential provision of ecosystem services and ecosystem functioning. However, human impacts can cause loss of tree aboveground biomass and litter biomass, hence affecting ecosystems functions. In terms of conservation plans at landscape scale, it is important to understand the potential of high fragmented areas to return to its original state. To investigate the resilience of tree aboveground biomass (AGB) and litter dry biomass (LDB) in second-growth Atlantic Lowland Rain Forests, we performed a chronosequence study using 12 secondary fragments with different ages and two mature forests. In each fragment we established ten 10x10m plots equidistant 20 m; we measured all live trees (CBH > 15 cm) and estimated their AGB; we positioned a 30x30cm quadrant in the center of each plot and collected all the litter (stems, leaves, seeds) within the quadrant's perimeter. Litter samples were dried in a greenhouse and weighed to obtain litter dry biomass. We used Generalized Linear Models (GLMs) using quasibinomial family to test for effects of successional age on LDL and tree AGB resilience. We estimated resilience based on the regression line coefficients and it was given as the time that secondary forests take to reach AGB and LDB of mature forests. According to our results, AGB and LDB increase with forest age ($p<0.05$). We predict that a secondary lowland forest would take ~81 years to reach the LDB found in mature forests and would take much more time, ~127 years to recover tree AGB stored by mature forests. Our findings suggest that disturbances result in changes in the aboveground biomass stored by forest ecosystems, but they can be resilient and gradually recover over time. Furthermore, secondary forests are potentially stocking 1.06Mg ha^{-1} yr^{-1}, thus contributing to CO_2 sequestration, an important ecosystem service.

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