

Title: Overlooked Aboveground Biomass Losses in Tropical Forests

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Project Abstract:

Tree mortality is typically considered as the only carbon output in forest systems. However, a pervasive but commonly neglected source of biomass loss is the damage to living trees (i.e., branch fall, trunk partial breakage, and/or standing wood decomposition). The dry, living, aboveground biomass (AGB) estimated from the trunk diameter of trees that are damaged but remain alive are not counted as losses in traditional forest inventories. Here we use 28 annual mortality and damage censuses to quantify AGB loss via damage on living trees and compare its relative contribution to total AGB loss (mortality + damage) in seven tropical forest plots of the ForestGEO network in the Neotropics (Amacayacu, Colombia; Barro Colorado Island, Panamá; Yasuní, Ecuador) and Asia (Fushan, Taiwan; Huai Kha Khaeng, Thailand; Khao Chong, Thailand; Pasoh, Malaysia). We found that almost half of total AGB losses were due to damage to living trees. The contribution of damaged trees to total AGB losses was highly variable across sites and over time, ranging from 13% in a lowland dipterocarp forest in Malaysia to 86% in a typhoon-prone forest in Taiwan. Our results show the importance of quantifying tree-level biomass loss through crown and trunk damage for obtaining more accurate estimates of tropical forest carbon stocks and fluxes.