EGU26-1615, updated on 11 Nov 2026
https://doi.org/10.5194/egusphere-egu26-1615
EGU General Assembly 2026
© Author(s) 2026. This work is distributed under
the Creative Commons Attribution 4.0 License.

Tree growth after a major hurricane reflects pre-disturbance vigorrather than canopy damage

Laura Boeschoten[1,2], Roi Ankori-Karlinsky[1], Gabriel Arellano[3,4], Alyssa Brown[1], Dingyi Fang[5], Veronika Leitold[6], Douglas Morton[7], Gan Yuan[8], Tian Zheng[5], Jess Zimmerman[9], and Maria Uriarte[1]

[1]Department of Ecology, Evolution and Environmental Biology, Columbia University, New York, USA
[2]Q-ForestLab, Department of Environment, Faculty of Bioscience Engineering, Ghent University, Belgium (laura.boeschoten@ugent.be)
[3]Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, USA
[4]Oikobit LLC, Albuquerque, USA
[5]Department of Statistics, Columbia University, New York, USA
[6]Department of Geographical Sciences, University of Maryland, College Park, USA
[7]Biospheric Sciences Laboratory, NASA Goddard Space Flight Center, Greenbelt, USA
[8]City University of Hong Kong, KL, Hong Kong
[9]Department of Environmental Sciences, Universidad de Puerto Rico, San Juan, USA

Tree crown damage from disturbance events can strongly influence forest demography, yet its effect on stem growth remains poorly quantified. Hurricanes provide a powerful natural experiment to examine these dynamics, as they inflict a broad range of structural damage across individuals and forest stands. Here we assess how crown damage from Hurricane Mar´ıa (2017) affected post-storm stem growth in a wet
subtropical forest in Puerto Rico by combining airborne LiDAR with field measurements for 1,082 trees. Unlike previous studies, we used a continuous, objective measure of crown damage and explicitly separated individual- from neighborhood-level effects using a causal inference framework. Across the population, stem growth rates after the hurricane were similar to pre-hurricane values. Larger and more heavily damaged trees exhibited moderately reduced growth, while neighborhood crown damage and neighborhood mortality had no detectable effect. However, these damage effects were smaller than the influence of pre-hurricane growth rates, indicating that pre-hurricane individual vigor outweighed biomass loss and competitive release
in shaping growth responses. Our findings highlight the resilience of surviving trees in sustaining carbon uptake after a severe disturbance, while challenging the assumption of a strong growth suppression following biomass loss, embedded in dynamic vegetation models.