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Preliminary Results from Intensive Annual Surveys of Tree Mortality and Damage in Tropical Forests

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Individual tree mortality is a fundamental component of the history and fate of forests. It drives forest structure and dynamics, floristic composition, and carbon and nutrient cycles. However, there is a gap in our understanding of the causes underlying individual tree mortality, particularly in tropical forests. Tree damage often precedes individual mortality, but the amount and type of this has been poorly documented or it is difficult to detect/estimate during fieldwork done at several years intervals. As part of the NGEE-Tropics project the ForestGEO designed and implemented a series of annual surveys of tree mortality/damage on a subset of trees on some of the big permanent plots in the tropics. The plots that have started with these surveys include Barro Colorado Island (Panama, 8500 stems), Amacayacu (Colombia, 5400 stems), Khao Chong (Thailand, 5000 stems), Huai Kha Khaeng (Thailand, 5000 stems), Pasoh (Malaysia, 6000 stems) and Fushan (Taiwan, 5500 stems). The protocol includes stems of different sizes and covers a representative area of individual 25-52-ha plots. The variables assessed in each intensive survey were: alive/dead, standing/broken/uprooted, living length, remaining percentage of crown, crown illumination index, leaning degree, presence of heavy liana infestation, fungal presence, wound level (1 to 3), presence of canker or deformities (1 to 3 in size), presence of rotten trunk (1 to 3 in area), percentage of defoliation, and presence of leaf damage. Other data, like lightning damage, landslides and fire damage, were also recorded when possible. A reduced version of this protocol was used to evaluate all trees ≥ 10 cm dbh at Luquillo (Puerto Rico, 18000 stems), to assess the damage caused by Maria hurricane in September 2017. Using these standardized data, we present preliminary results and inter-site comparisons on tree mortality and damage.