

ABSTRACT

Assessing the Effects of Hurricanes on Forest Dynamics, Structure and Diversity in a Lower Montane Wet Forest in John Crow Mountains, Jamaica

Denneko Yannick Luke

The effects of hurricanes on a lower montane wet forest in John Crow Mountains were assessed over the short-term, between 2006 and 2012. This involved investigating changes in (i) biotic and abiotic factors, (ii) the dynamics of different plant groups, (iii) the influence of topography and hurricane exposure on forest composition and structure, and (iv) how photosynthetic characteristics influence species response. Understory light increased ($\approx 60\%$) following Hurricane Dean in 2007 then decreased in 2009. Both seedling and adult tree densities declined; for seedling density, there was a lag effect (i.e., density reduction occurred 2 years after Hurricane Dean). Seedling density was positively related to light, and survivorship was positively related to both light and density. Overall, seedling mortality was lowest and growth highest immediately after the hurricane when the canopy was open (2007 – 2008). Seedling diversity was also lower during this period. Adult trees and lianas declined in density due to high mortality in the smallest size classes. Density of tree ferns and palms remained relatively unchanged. Tree dynamics were only related to tree fern and liana dynamics (e.g., tree mortality was negatively related to liana recruitment etc.). BA, volume and stem density all declined in the short-term. There was also a negative shift in forest stem height profile (reduction among stems $< 9\text{m}$ in height).

Forest structural characteristics were strongly related to aspect, and these structural differences were enhanced by hurricane exposure. There were structural changes at the NE sites, whereas the SW sites remained relatively unchanged. Stem density, stem mortality and understory light levels were positively related to hurricane exposure, and post hurricane species diversity was higher at sites that were exposed to repeated hurricanes. Species varied in their resistance and resilience to hurricane exposure but all exhibited intermediate levels of shade tolerance. However, there was no straightforward relationship between species post-hurricane response and photosynthetic characteristics.

Keywords: Denneko Yannick Luke; hurricanes; John Crow Mountains; forest dynamics