

Impacts of an extreme precipitation event on dipterocarp mortality and habitat filtering in a Bornean tropical rainforest

ABSTRACT

The frequency of extreme precipitation events is predicted to increase in some tropical regions in response to global climate change, but the impacts of this form of disturbance on the structure and dynamics of tropical tree communities across heterogeneous landscapes remain understudied. We determined the effects of an extreme precipitation event (EPE) in July 2006 on mortality of dipterocarps on a 68 ha permanent inventory plot in Sepilok Forest Reserve, Sabah. For stems ≥ 30 cm dbh, 12 of the 15 species of Dipterocarpaceae on this plot have significant positive and/or negative associations to habitats defined by topography and soil type. Short-term mortality induced by the EPE was much greater for individuals growing on the alluvial floodplain (13.7%) than in the mudstone (1.4%) or sandstone (0.0%) habitats, but mortality of dipterocarps did not differ among these habitats in the subsequent 5-yr interval. The likelihood of mortality in response to the EPE was highest for a small group of fast growing dipterocarps that possess low wood density and a strong association to the alluvial forest habitat. This group of species represents a high percentage of dipterocarp individuals but a low proportion of dipterocarp diversity in this habitat. We conclude that disturbance induced by high rainfall events contributes to the episodic nature of tropical forest dynamics, and that increases in the frequency of these events would disproportionately impact low-lying alluvial forest environments and some of the species growing in them.