

Selective logging in tropical forests decreases the robustness of liana–tree interaction networks to the loss of host tree species

Abstract

Selective logging is one of the major drivers of tropical forest degradation, causing important shifts in species composition. Whether such changes modify interactions between species and the networks in which they are embedded remain fundamental questions to assess the 'health' and ecosystem functionality of logged forests. We focus on interactions between lianas and their tree hosts within primary and selectively logged forests in the biodiversity hotspot of Malaysian Borneo. We found that lianas were more abundant, had higher species richness, and different species compositions in logged than in primary forests. Logged forests showed heavier liana loads disparately affecting slowgrowing tree species, which could exacerbate the loss of timber value and carbon storage already associated with logging. Moreover, simulation scenarios of host tree local species loss indicated that logging might decrease the robustness of liana–tree interaction networks if heavily infested trees (i.e. the most connected ones) were more likely to disappear. This effect is partially mitigated in the short term by the colonization of host trees by a greater diversity of liana species within logged forests, yet this might not compensate for the loss of preferred tree hosts in the long term. As a consequence, species interaction networks may show a lagged response to disturbance, which may trigger sudden collapses in species richness and ecosystem function in response to additional disturbances, representing a new type of 'extinction debt'