Climatic drivers of dipterocarp mass flowering in Southeast Asia

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Abstract

Dipterocarps, a dominant family of trees in Southeast Asian tropical forests, are remarkable in that they exhibit supra-annual mass flowering events. The flowering patterns are related to the El Niño Southern Oscillation, but the trigger that precipitates mass flowering is unknown. Here, we propose resource accumulation as an alternative to a trigger mechanism, and we test the alternate hypotheses in a meta-analysis with published flowering records. Using a variety of candidate predictor variables (precipitation, cloud cover, minimum temperature and El Niño indices) we could not find a plausible environmental trigger (median AUCs around 0.55 indicating near random predictions), while the best resource accumulation model had a median AUC of 0.70, which could be improved to 0.75 when the date of previous flowering was included in the model. We further show that simple resource accumulation by individual trees can cause inter- and intraspecific flowering synchronization leading to community-wide flowering events.