

Tropical rain forests with disturbed recruitment lose their stability - a simulation study

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Continuing logging in the tropics is making the conservation of remaining forests increasingly difficult. Furthermore, there are increasing evidences that recruitment of trees might be endangered through events such as climate change, enhanced seed predation or fragmentation. In this study we assess various impacts of tree harvesting in a Dipterocarp lowland rain forest in Sabah, Malaysia, already threatened by recruitment shortage. The results of the simulations of 56 different scenarios using the process-based forest growth model Formind2.0 were assessed. Formind2.0 [1] is based on the calculations of the carbon balance of individual trees belonging to 13 different plant functional types.

Disturbed recruitment leads to shifts in the abundances of species, to species loss, and to forest decline and dieback depending on the level of recruitment shortage (Fig. 1). Forests under recruitment shortage lose their stability, additional disturbances like logging cause permanent and severe changes in tree species composition.

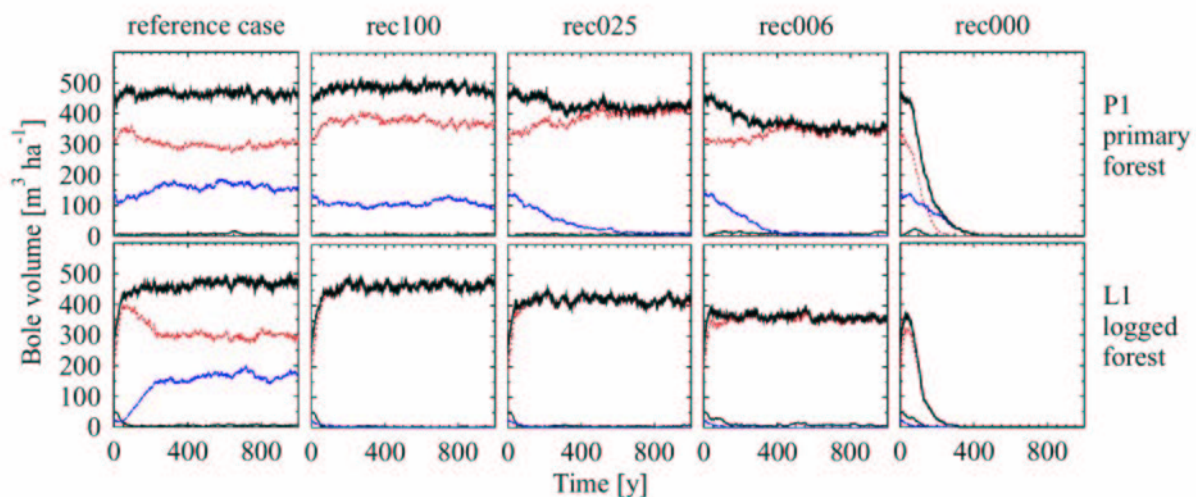


Figure 1 Selected time series of bole volume (m^3/ha) for primary and logged forest with different recruitment shortage (*reference case*: large forest; *rec100*, *rec025*, *rec006* and *rec000*: only local recruitment, recruitment rates are 100 %, 25% 5 %, 0 % of the rates assumed in the reference case). Simulation of 1000 y of an area of 25 ha. Total (bold line), early successional spp. (solid line), mid-successional spp. (grey line), late successional spp. (broken line).

References

- [1] Köhler P, Chave J, Riera B, Huth A (2003) Simulating long-term response of tropical wet forests to fragmentation, *Ecosystems* 6(2), 129-143.