1st TERRABITES Symposium
Hamburg, Germany, 9-11 February 2010
TERRABITES-67-1

Understanding impacts of fragmentation and human disturbance on tree species community in tropical forest fragments

S. Pütz (1,2), J. Groeneveld (1), L.F. Alves (3,4), J.P. Metzger (5), and A. Huth (1)

(1) Department of Ecological Modelling, UFZ Helmholtz Centre for Environmental Research (sandro.puetz@ufz.de / ++493412351476), (2) Department of Nature Conservation, UFZ Helmholtz Centre for Environmental Research, (3) Botanic Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, (4) Instituto de Botânica, São Paulo, Brazil, (5) Department of Ecology, University of São Paulo, São Paulo, Brazil

Anthropogenic land use in the tropics leads to massive habitat destruction and following habitat fragmentation, e.g. of the Brazilian Atlantic Forest (Mata Atlântica), one of the biodiversity hot spots in the world. However, fragmentation processes acting on structure and dynamics of tropical forest fragments are not the exclusive drivers, selective human disturbances as e.g. firewood extraction may act as factors, too, especially in the vicinity of dense populated urban areas. Combined impacts of different drivers may lead to increasing carbon loss compared to fragmented forest fragments, and the combined impact of both drivers may lead to interactive effects complicating our understanding of fragmentation effects on tropical tree species communities in the long-term. Such challenges can ideally be tackled with simulation models.

We present the first simulation study of remnant and secondary tropical forest fragments taking fragmentation processes, human disturbances, and external seed rain into account. Main aim is gaining an improved understanding how tree species in tropical forest fragments react both to fragmentation and human disturbances. We present simulation results analysing different levels of human disturbance intensity in combination with fragmentation processes using the individual based spatially explicit forest growth model FORMIND. We apply FORMIND with a plant functional type approach to the Brazilian Atlantic Forest at the study site Caucaia/Ibiuna at the Plateau of São Paulo.

Our results show that the whole community, and especially the shade tolerant species groups will suffer strongly from the combined impact, intermediate shade tolerant and shade intolerant species groups show a hump-shaped response at different levels of human disturbance intensity. A significant fraction of these impacts occur during transient dynamics within the first 150 years. The strong impact on community level and shade tolerant species groups may have serious consequences for carbon loss in fragmented tropical forest landscapes both on larger spatial and temporal scales.