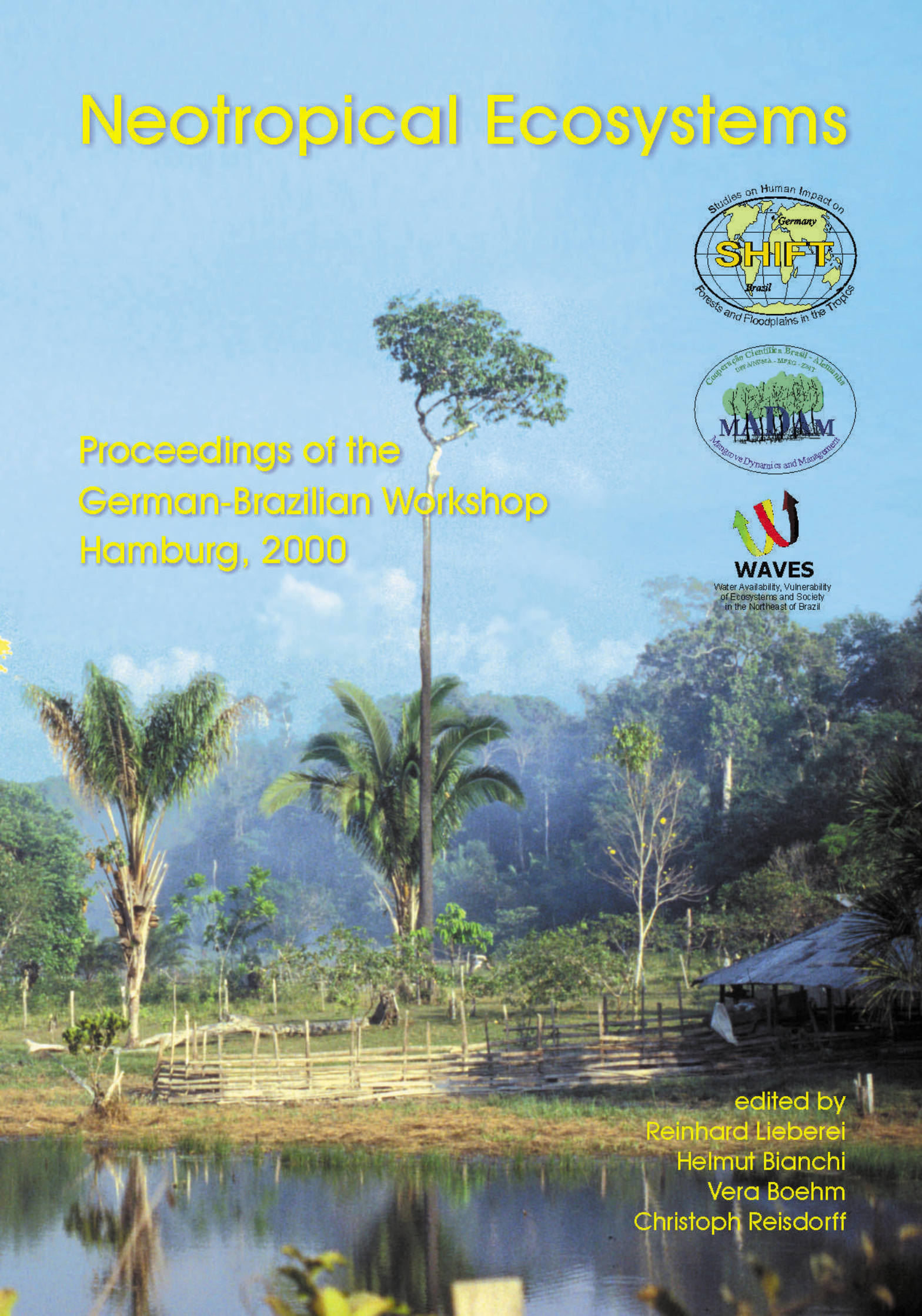
Neotropical Ecosystems



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WAVES
Water Availability, Vulnerability of Ecosystems and Society in the Northeast of Brazil

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Effect of Fallow Enrichment on the Weed Seed Bank of Shifting Cultivation Systems in the Eastern Amazon

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In traditional shifting cultivation systems weeds represent one of the major constraints that farmers have to deal with. Crop yields are reduced due to competition for light water and nutrients, and production costs are increased due to the efforts to control the weeds. Since shifting cultivation is characterized by long fallow periods the weed infestation of the consecutive crop is strongly related to the duration and the vegetation composition of the preceding fallow. In a field experiment conducted to study improved fallow systems the following fallow enrichment treatments were selected to examine the seed bank: Acacia mangium, Inga edulis, these tree species being used to enrich the spontaneous fallow vegetation at two densities of 10000 trees ha^{-1} and of 2500 trees ha^{-1}, respectively. As controls served the non enriched fallow and an adjacent 6-year-old secondary vegetation. After a two years fallow, sampling was done at the beginning of the next cropping cycle. Land preparation was done without the use of fire, by slashing chopping and mulching the fallow vegetation. The seed bank was studied in the mulch/litter layer and in three depths of the mineral soil: 0-5 cm, 5-15 cm, 15-30 cm. Most of the vital seeds were found in the top layer of the mineral soil (0-5 cm), followed by the mulch/litter layer, then by the second layer of the mineral soil (5-15 cm). Below 15 cm no seed germination was recorded. 25 species of 9 families were identified out which the most important families were: Cyperaceae, Poaceae, Rubiaceae, Compositae, Euphorbiaceae and the most important species were: *Eragrostis ciliaris, Borreia verticilata, Cyperus* sp. and *Lindernia crustaceae*. Both densities of the *A. mangium* treatment were significantly lower in the number of all germinated individuals than the two densities of I. edulis the non enriched control plot and the adjacent 6-year-old secondary vegetation. The reason certainly is the significantly lower photoactive radiation reaching the ground in *A. mangium* plots, not permitting the germinated seeds to complete their life cycle and hence suffer a reduction in their reproductive potential. This effect is supported by slow decomposition rates of the leaves, shed during the fallow phase and forming a thick litter layer already long before land preparation. Apparently the application of fallow enrichment and the right choice of the tree species can contribute efficiently to a lower weed infestation in the following crop.

Efforts Required for a Successful Restoration of a Degraded Pasture to Arable Land

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In small holder agriculture of the Eastern Amazon, pastures are often abandoned due to soil degradation, which is not being counteracted sufficiently by adequate management practices. Small farmers economic possibilities often do not permit a long-term maintenance of pasture productivity to guarantee feasible stocking rates. After abandonment, the degraded pastures mostly can not serve other purposes such as cropping, because of the competitional power of the still dominating pasture grass suppressing crops as much as upcoming natural fallow vegetation. This irreversibility of pastures is due to plowing and uprooting which is frequently implemented at land preparation and which eliminates the vegetative resprouting potential of the secondary vegetation and thus its recuperative impact. Based on previous encouraging experiences of the project SHIFT Capoeira, made with tree enrichment of secondary vegetation to accelerate fallow biomass accumulation, the same technology was thought to be appropriate to recuperate abandoned pastures towards arable land for crop production. Apart from the recuperative capacity of the trees due to nutrient recycling by deep reaching roots and biological nitrogen fixation the trees are supposed to shade out the dominant pasture grass. The question was, which minimum effort would have to be taken to establish the