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Shifts in the Swiddens with Intensification: What Evidence Exists for the Trenbath Model?

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Abstract

In the humid tropics, smallholder farmers traditionally use shifting cultivation. Increases in population density, intensification and greater market orientation have modified this system. In Cameroon, for example, farmers are recultivating fallows earlier, adopting the use of inorganic fertilisers, herbicides or weeding more frequently, and occasionally incorporating mechanised tillage, precluding the traditional retention of trees in the field. Different models predict the effect of intensification of shifting cultivation systems on soil fertility and fallow vegetation. For example, Trenbath (1985) and more recently Albers and Goldbach (2000), have postulated that with intensification, repeated cropping cycles and shortening fallow phases, a „spline point" will be reached at which tree regeneration fails completely and there will be a regime shift to a grassland domain. However, neither of these models has been tested empirically. Our objectives were: to assess impacts of intensification in shifting cultivation systems on fallow vegetation in the humid and subhumid tropics; and, to assess how strongly Trenbath's model is supported by empirical data. A systematic review in Web of Science was conducted for primary literature sources and articles analysing these effects. Most studies derived from Brazil and Madagascar with continental Africa underrepresented. With intensification, a decrease in fallow biomass was observed. Changes in species richness were not discernible, however, intensification decreased species evenness. This can partly be attributed to an increase in herb-dominance with intensified shifting cultivation, and a shift in species composition. Tree density decreased with intensification with a shift in composition towards those with a high sprouting capacity and vegetative propagation. Evidence that increased number of cropping cycles, longer cropping duration, intensified tillage practices with the application of fertilisers led to permanent grasslands, as suggested by Trenbath, was not found. Although an irreversible change was not observed, the intensification of shifting cultivation decreased biomass accumulation rates of fallows worldwide.

Keywords: Fallow succession, intensification, shifting cultivation, Trenbath's model

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