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Towards Rehabilitation of Barren Hills — How Does Fallow Vegetation Reflect Land Degradation Status?

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Abstract

Breakdown of local shifting cultivation land management systems in the highlands of Northern Vietnam, triggered by high population pressure, results in alarming spread of degraded, low-productivity land on former forest land. Despite an urge for reclamation of these degraded “barren hills” scientific basis for assessing type and severity of land degradation is lacking. An explorative interdisciplinary study on one representative land use gradient hillside was undertaken to provide preliminary information on spontaneous vegetation, soil and related land use histories. A survey of vegetation physiognomy documented floristic composition, stratification and abundance-dominance indices; forests were quantitatively assessed by point-centered quarter method. Soil type and the major physical and chemical constraints were identified. Participatory rural appraisal tools were employed to obtain land use information. Land degradation is reflected in forest degradation, overgrazing, soil erosion and invasion of non-native weeds. The total of 352 species belonging to 244 genera of 80 families describe gradual vegetation transition in a regressive succession of climax laurel forest (dominated by *Fagaceae*, *Lauraceae* and *Magnoliaceae*) towards degraded pasture of *Paspalum conjugatum*, *Axonopus compressus* and *Chrysopogon aciculatus*. Reconstruction of successional interdependencies of encountered physiognomic units as a function of land management has been proposed. Typical edificatory species and complexes of particular fallow vegetation seral stages correspond to use length of a plot, which is related to the maintenance of adjacent forest. Floristic composition, as a measure of deviation from initial forest community, is used by farmers to estimate the required fallow regeneration time till the next cropping. Concomitant soil properties, however, seem to be correlated to the structure (density) of vegetation: improved soil characteristics occur with denser vegetation cover of previous fallow and contribute to denser one of a following regrowth cycle. This apparently regular pattern of disturbance after forest disappearance is principally determined by intensity of buffalo grazing; it accounts for different physiognomies of plots of the same fallow age.

Analysis of soil and vegetation relations on fallow lands can provide insight into natural regeneration potentials and constraints, thus constituting the basis for subsequent formulation of land rehabilitation strategies.

Keywords: Land use history, succession, vegetation physiognomy