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Linking Fallow Vegetation and Soil Fertility with Farmers' Criteria for Cropping Decisions in Shifting Cultivation

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Abstract

Agriculture in the highlands of northern Thailand has been dominated by rotational shifting cultivation for centuries. However, fallow periods are shortened and intensive management practices are now used more often because of insufficient available land and increasing integration with cash crops. Land is not left fallow long enough to restore soil fertility and forest species start to become extinct in fallow areas.

This research aims at determining optimal fallow duration in different systems, sufficient for restoring soil fertility and maintaining biodiversity of forest species during cropping periods. To this end, the relationship between botanical composition of fallow vegetation and soil fertility is studied and scientific parameters are identified that could be used as indicators for fertile cropping areas. These criteria are compared with farmers' traditional knowledge and decision making criteria, when changing from the fallow to the cropping cycle. Soil fertility status and trees in fallow vegetation of different ages were studied in Nong Khao village and Bor Krai village in Mae Hong Son Province, where rotational shifting cultivation including different fallow duration is still practised by Karen and Lahu people. Data was collected from tree surveys conducted in false time series of 1-, 3-, 6-, 8- and 10-year fallow plots. Trees in 72 transect plots (6 m $\times$ 50 m) were measured for height, canopy width, girth at breast height, number of stem sprouts and identified botanically for evaluating biodiversity. For soil fertility analysis, soil samples from three different soil depths (0–30 cm) in 3 replicates were collected from rice fields, maize fields and 1-, 3-, 6-, 8- and 10-year fallow plots. Soil sample analyses included bulk density and pH, organic matter (OM), phosphorus (P), and potassium (K) as soil fertility indicators. Farmers' decision making data were obtained from focus group discussions and individual interviews using semi-structured questionnaires.

Existing links between plant biodiversity and soil fertility trends over time in crop-fallow rotations will be presented from both the scientific and the farmers' perspective and an outlook will be given how results of this study can be implemented as a decision-making component in biophysical Land Use Change Impact Assessment modelling.

Keywords: Farmers' decision making, rotational shifting cultivation, soil fertility, succession of plant community

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