UNIVERSITY OF HOHENHEIM
FACULTY OF AGRICULTURAL SCIENCES

Institute for Soil Science

Prof. Dr. Karl Stahr

STEPS TOWARDS SUSTAINABLE AGRICULTURE: AN ETHNOPEDOLOGICAL SOIL SURVEY IN A LIMESTONE AREA OF NORTHERN THAILAND

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Roberto Tinoco-Ordóñez

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5 CONCLUSIONS

Clay illuviation was recognized as prominent characteristic for soils in Bor Krai catchment. Argic horizons were confirmed after lab analysis . *Luvisol* and *Cambisol* were identified as the most common in the catchment after the Key Reference of Soil Resources (FAO, 2001). This information is based on preliminary data and should be confirmed by further and more accurate laboratory analysis, specially concerning texture. Trends in chemical and physical features are evident between soils, and relations may be established in terms of their position in landscape (see **Figure 18**)[8]. Updated information may also derive taxas to low level units. Those soils reported as *Luvisols* so far, and are darker in chroma, are mainly located on slopes of low inclination, whereas pale and mottled Luvisols (ev. *Stagnic*) are common on larger and steepest slopes. Profiles located close to the settlement showed also high anthropogenic influence due to remotion for road and other infrastructure (see new road on **Figure 9**). All soils classified as Cambisols are located on basin land (except profile 7). Phosphorous deficiency was recognized as main limiting factor for almost all soils, this has been also reported for other soils developed on Limestone in the same area defined as slope complex (Soil Map of Thailand, scale 1:1,200,000, Vijarnsorn et al. 2002.).

Lahu informants recognized 5 to 6 soil classes by local names. Colour and texture where main features considered for this; most soil features mentioned by them are restricted to the surface horizons, but others are common for deeper horizons, to which they refer frequently when describing soils. No comparison between local soil classes and the scientific soils taxa can be established so far (see section 4.5.4 for discussion concerning land use area). Special landform features are also recognized and described. This information together with crop performance is used to take decisions about type of crop system and rotation to establish (rice, maize, fallow), and/or eventually type of amendment, but to know to which extend this is considered, further work is required (field trips, on site observation and dynamics) during complete seasons. Erosion and land degradation were not mentioned directly as problems by informants; elements beyond the natural world are thought to have major influence and are expressed rather symbolically (see section 4.5.3). This was also evident when trying to approach a local concept of fertility (see **Figure 26**). This should not be interpreted as a passive attitude.

Non-crop woody and herbaceous species might be considered by Bor Krai Lahu farmers as indicators for soil quality. This is a common features for other groups practicing slash and burn and fallowing in SE-Asia. Approaching this knowledge in an integrative way might help to derive new and valuable information (see **Figure 27**). Local farmer seems to follow a script in response to temporal and spatial patterns of this natural plants. Those plants in very early succesional stages of recently cleared and burned fields are considered "weeds", and require hard work to remove manually. The remotion of these weeds might suppose an important factor of erosion. Whereas those natural species found in fallows > 1 year might be appreciated either for their use in the household.

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[8] As no published topographic map includes the last infrastructural changes for the catachment, special emphasis was given to actualize using GIS tools. Subcatchments were also identified, georeferenced and labelled.

Experimentation is a main characteristic for Lahu farmer; this makes his system very dynamic temporally and spatially. Complexity to define the local system in terms of agricultural practices has been also confirmed by previous researchers in Bor Krai (Sereke, 2002; Puginier, 2002), as for other groups performing shifting cultivation in the tropics (see section 2.2.1).

Lahu farmers seem to blend information gathered from interaction with farmers from other cultural groups (Lisu, Taiai) as well as with technicians. Their interest goes beyond the administrative limits of the village and this allows them to learn and eventually exchange information concerning management and opportunities, with those neighbouring groups, either in informal places (e.g. market places) or formal places (tambon meetings); this might help him also to establish priorities concerning production, but also to establish comparison regarding the performance of neighbouring crop land which he doesn't own. This flow of information should be potentially considered for further integrated research at different scales e.g.:

- **At a local scale and ecological level**: determine composition of population of non-crop species with emphasis on those "soil quality indicators", following "dynamic" population models i.e. not just composition of established vegetation units but also vegetation in early succesional e.g. fallows (monitoring, modelling local knowledge of plant-soil indicators?).
- **At a local scale and edaphologycal level**: determine chemical and physical properties of soils of importance for annual or permanent crop species, in combination with multipurpose naturally occurring species. This can be done either in trials following local farmer's script (e.g. after and before fire, salting).
- **At a regional scale and ethnopedologycal level**: Survey slope complex unit beyond Bor Krai, studying broader soil associations in areas located in Limestone environment but together with Lahu, Lisu and Taiai farmers, i.e. trying to establish comparison and –eventually- try to derive a common language for local soils, their properties, management per dominant systems (rice, maize, permanent and eventually fallow).
- **At a regional scale and ethnographic level**: track genealogy and history of local Lahu groups and the development of his system. Where do they come from? What were common soils and geological strata in earlier settlements? How did they cope to constraints? Did they have permanent systems before?