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in the Tropics and Subtropics**

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**Modelling the effect of soil conservation
measures on yield, runoff and soil loss in
northeast Thailand by using WaNuLCAS.**

Master Thesis

by

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Abstract

Experiments to evaluate potential and limitations of soil conservation systems are expensive, long-standing and laborious. Modelling is an effective tool to gain knowledge about multiple combinations of trees and crops. The purpose of this study was to calibrate and to validate the model “Water, Nutrient and Light Capture in Agroforestry Systems” (WaNuLCAS 3.01) for specific local conditions of hillside cropping systems in Northeast Thailand. A data set of three years (2003-2005) from a field experiment on the impact of soil conservation measures on soil and nutrient losses as well as crop and tree yield response was used for the model calibration and validation. Six treatments including control maize cultivation, leucaena hedgerows and ruzi grass strips with and without nitrogen and phosphorus fertilization were selected to test the performance of the WaNuLCAS 3.01 model simulating the impact of soil conservation measures on maize yields, runoff and soil loss. Additionally six scenarios with several cropping practices were run using the model to investigate the long term effects of land use changes. Maize grain yield and runoff amount were well simulated by WaNuLCAS during the calibration and validation process. The model outputs for soil loss were poor. Related to the scenario simulations, it can be concluded that the improved farmer practices such as no tillage, cultivation of cover legumes and use of fertilizer are important techniques to maintain the productivity and sustainability of these systems. It was concluded that after its calibration and validation, the WaNuLCAS model can be used as a tool to study, understand and explore potential management options for this specific hillside cropping systems.