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Carsten Marohn

Institute of Tropical Agricultural Sciences, University of Hohenheim, marohn@uni-hohenheim.de

Georg Cadisch

Institute of Tropical Agricultural Sciences, University of Hohenheim, cadisch@uni-hohenheim.de

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Natural resource use in smallholder environments – model tailoring to reach the right people

Carsten Marohn^a, Georg Cadisch^a

^a*Institute of Tropical Agricultural Sciences, University of Hohenheim, 70599 Stuttgart*
marohn@uni-hohenheim.de, cadisch@uni-hohenheim.de

Abstract: Our contribution describes challenges encountered during the development of the Land Use Change Impact Assessment tool (LUCIA) from a pure research instrument to a more applied tool and possible ways forward. LUCIA is a dynamic, spatially explicit landscape-scale model. Its scope is assessing impacts of land use change and management on soil productivity and fertility, biomass production, watershed functions and environmental services in small catchments emphasizing processes connecting different parts of landscapes. Over time the original target group – researchers – expanded to farmers, students and authorities. Main motivations for model use included a) plot level yield estimates, fertiliser recommendations; b) catchment-scale planning of soil conservation, carbon sequestration, land suitability; c) process understanding regarding climate change effects, erosion hotspots, social-ecological coupling. User capabilities and resources strongly differed in terms of computer literacy, knowledge of scientific terminology for crop and soil parameterisation, field data, map manipulation skills, and ability to implement changes in reality. Contrasting user profiles required specific facilitation, from (moderated) companion modelling or scenario building with stakeholders to (independent) group work and e-learning approaches. Adjustments in model appearance and modifications in the code were necessary to address users' interests and capabilities, including graphical user interface, transfer functions, test datasets, optional modules and parameters. We will present case studies covering different user groups and regions; reflect on success and success factors for model impact in different contexts. We will discuss necessary degree of details and resolutions in view of potential accuracy of model outputs; and raise the question how catchment-scale resource use corresponds to catchment-scale decision-making.

Keywords: Land use change impact assessment; model application; target groups; model impact