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Scenarios of Land Use and Land Cover Change in Sulawesi: Agricultural Expansion at the Expense of Protected Forests?

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Abstract

Globally, the remaining tropical forests are increasingly under pressure. Many forests are subject to different uses, resulting either in a (stepwise) transformation / modification or in a conversion for the establishment of settlements, agricultural land or pastures. At the regional scale, region-specific sets of interacting direct and indirect forces are driving land use and land cover change. In Central Sulawesi, Indonesia, population growth and immigration, a rising interest of local farmers in cash crops, and improved roads influence the demand for agricultural and agro-forestry land. In past decades, forest areas, including protected forests like the Lore Lindu National Park have been shrinking, due to partly illegal forest use (mainly timber and rattan) and forest conversion, during which subsistence crops like rice and cash crops have been planted. In the collaborative research project STORMA ("Stability of Rainforest Margins"), Indonesian-German research groups from different disciplines are investigating the socio-environmental system of the rainforest margins. Studies are conducted in Central Sulawesi, a mountainous research area of 7,500 km^2, with rainforest still being the dominant land cover. Based on recent STORMA results and other sources, we developed different scenarios to study the effects of both large-scale / global driving forces (economy, climate), and regional / local drivers (policy, land-use strategies) on land use and land cover change and the associated socio-environmental impacts. By embedding our regional scenarios into the global scenarios developed for the Millennium Ecosystem Assessment, we achieved consistency with large-scale and global driving forces such as demographic and climate changes, or prices for agricultural commodities. In this study we use the SITE modelling framework to quantify the scenarios. We focus on the question whether and to what extend the changes assumed in different scenarios influence patterns, spatial extend and ecosystem services of agricultural and forest areas, and how forest margins and protected lowland and mountain forests would be affected e.g. in terms of further fractionation.

Keywords: Land use modelling, MEA-compliant scenarios , protected forest, rainforest use and conversion

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