Soil Science Society of Belgium
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Rainfall - Soil moisture response in relation to land use in steep tropical enviroments: field-based research in NW-Rwanda

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The steep sloped environments of the Northern-western provinces of Rwanda are often affected by severe cases of rainfall-triggered shallow landslides. Recent studies in the region revealed that these landslides mostly occur towards the end of the wet season when the soil moisture contents seem to be the most favourable. The high demographic pressure of this area is associated with significant land use/cover changes (e.g. deforestation) and land management practices (e.g. agricultural terraces). Recent studies in the region have demonstrated that deforestation can significantly increase landslide susceptibility over a period of several years. Our field observations also show that agricultural terraces seem to play a role in the occurrence of landslides. Nonetheless, not only for Rwanda, but also in general, our insights on the impacts of land use/cover changes and land management practices

on the soil moisture conditions that lead to rainfall-triggered landslides remain very poorly quantified. This is especially true in the tropics. The goal of our research is to better quantify and understand the relation between rainfall and soil moisture and how it is influenced by weather patterns, soil characteristics, land use/management and topography. More specifically, we work at the level of six experimental hillslope transects with contrasting soil types (i.e. clayey or sandy soils). For each soil type, three hillslopes with different land uses and land management practices are investigated: cultivated hillslope, terraced hillslope, and forest hillslope. In total, we installed sixty access tubes, eighteen sensors, five rain gauges and six piezometers to monitor/measure the spatial-temporal variation of soil moisture content, rainfall and groundwater fluctuations. Both automatic and manual measurements are carried out, bringing accurate daily to sub-daily data for all the sites. The acquisition of the data was initiated during the wet season that started at the end of 2021. Preliminary results show important contrasts in the patterns of rainfall-soil moisture conditions. These data from the field measurements will be used to better analyze the variation of rainfall-soil moisture response of potentially landslides susceptible slopes. In the long run, these data will contribute to the development of better landslide early warning systems and other disaster risk reduction strategies.