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Using Soil-Vegetation-Atmosphere Models and Downscaled Global Climate Scenarios to Assess the Impact of Climate Change in Morogoro Region, Tanzania

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Abstract

ReACCT (Resilient Agro-landscapes to Climate Change in Tanzania) aims at assessing the regional impacts of climate change on agriculture and environment in the Morogoro region of Tanzania and at designing adaptation strategies and practices for small-scale agriculture and land use.

The sub-project crop-soil modelling concentrates on model based estimations of climate change impacts on current land use systems and practices. At three research sites, distributed over the project region and with distinct climates, field trials are conducted to assess the yield potential of widely-used maize and sorghum varieties. The data obtained from the study are used to calibrate multiple soil-vegetation-atmosphere models ranging from rather simple to process-oriented models, which are able to simulate the bio-geophysical interactions between climate, soil and vegetation. These models are sensitive to changes concerning soil hydrology, nutrient cycling, and crop response to assess combined climate change and management effects on crop production, water resources and soil fertility. Combined with downscaled global climate scenarios, these models evaluate the best management practices for future climatic conditions. In another approach tested at sites at the Sokoine University in Morogoro the effects of including trees into the farming systems are investigated. Here the maize and sorghum varieties taken into account are cultivated at one site under standard conditions, whereas at the second site the plants are shaded by native Acacia trees. The effects of the shading on growth and development are measured *in situ* as well as the water use of trees and crops to quantify water competition between the plants. The interrelationship of these processes is modelled using the Water, Nutrient and Light Capture in Agroforestry Systems (WaNuLCAS) model, which has been developed at the World Agroforestry Centre.

Keywords: Adaptation, agroforestry, climate change, crop modelling, global climate scenarios, Tanzania