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## Assessing smallholder drought risk dynamics under climate change and government policies

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The effectiveness of governmental disaster risk reduction policies in East Africa is influenced by how smallholder farmers react to droughts and adopt drought adaptation measures. In recent research on socio-hydrological feedbacks and the role of farmers' adaptive behaviour in drought management, agent-based models (ABM) were found to be powerful tools. In this study, we developed an innovative agent-based drought risk model (ADOPT) that explicitly takes into account the two-way relationship between heterogeneous individual agricultural adaptation decisions and the agro-hydrological system (modelled using AquacropOS). ADOPT is able to evaluate the effect of drought risk policies on the dynamics of poverty, food security and relief needs, and was applied to a case in Kenya.

First, we conducted a multi-method data survey among stakeholders and households in semi-arid Kenya to better understand the drivers and barriers, such as knowledge of adaptation measures, fear of droughts, and perceived vulnerability, that determine the adoption of drought adaptation measures in this context. This information was used to calibrate the decision rules in ADOPT. We then applied ADOPT to simulate how drought policy interventions, such as improving extension services, improving early-warning systems, distributing ex-ante rather than ex-post cash transfers, and widening access to credit markets, influence the drought risk and adaptation of smallholders. We found that a holistic approach, including all these measures combined, can reduce the poverty rate with 66%, food insecurity with 70%, and aid needs with 75%, on average over six potential future climate scenarios.