



Water as a crucial driver in a community's development, elucidating human - water feedbacks in the Upper Ewaso Ngi'ro basin, Kenya

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In Kenya, as in all of East/Southern Africa, agriculture is dominated by smallholder farmers. Small scale farming systems produce a significant amount of food contributing up to 70 % of the world's food need. Thus despite the increase in large-scale farming systems, smallholder farms have a continued role to play in feeding our growing world population. At the same time, farmers are subject to multiple stressors including resource uncertainty and pressure due to population growth threatening the livelihood of these communities. Informed by a rich empirical data set at household level collected in the Upper Ewaso Ngi'ro basin, Kenya in 2013, we take a socio-hydrological approach to improve our understanding of the interplay between water and society in regard to these smallholder systems. Stepwise, we identify the system's main drivers and the community's adaptive responses. We conceptualize the system using the state variables soil moisture (S), wealth (W), memory (M) and crop fraction (C). We find a gradual positive relation between water availability and the proportion of shallow rooted crops. Also, agricultural income is higher for those who cultivate shallow rooted crops, although here the transition is discontinuous. These findings suggest that although water is not a sufficient condition to obtain a better income, it currently seems a necessary feature. One of the goals of Kenyan IWRM water policy is to accomplish an equitable division water in times of scarcity to ensure the sustenance of all people including the most vulnerable. The chance to successfully achieve this goal will greatly increase when farmers that currently depend on the higher water availability to maintain their wealth are, at the same time, able to individually and collectively find ways to improve the efficiency of water use.