Adaptation & Resilience to Climate Change in eastern Africa project

Introducing ARCC

The occurrence of atypical weather extremes, linked to anthropogenic climate change, are increasing in frequency and magnitude. Unpredictable environmental conditions within and around the Greater Serengeti Ecosystem (GSE) in Tanzania present complications to future economic development. Food security, socio-political functioning, human health and biodiversity. Adding to these complications is the fact that existing conservation and sustainable development policies are compromised by a lack of information on historic climate, land cover and land use dynamics. The ARCC project addresses this challenge by collating and generating new data on how people and landscapes in the GSE have responded to changes in socio-economic and environmental conditions over the last 300 years. Additionally, ARCC will combine local perspectives with the ‘expert’ data sets the project is producing to better assess how various land use strategies will either lead to the realisation or dissolution of socio-economic development goals and sustainability targets. The ARCC project will apply a novel methodological approach called KESHO to analyse diverse future land use scenarios. Using the KESHO framework, qualitative, quantitative and spatial outputs of future land use in the GSE will be developed both for and by researchers, policy makers, and local stakeholders to improve the breadth of engagement and level of knowledge directed towards charting more resilient and adaptive paths to the future.

The ARCC approach

ARCC aims to enhance understanding of the variable degrees of resilience among human and wildlife populations within and adjacent to a key Protected Area network in Tanzania, and to facilitate the transfer of this knowledge to diverse audiences including researchers, stakeholders, and policy makers at local, national and global levels. To achieve these ambitious scientific and training objectives the ARCC project takes a multi-disciplinary approach with a core team comprised of palaeoecologists, ecologists, archaeologists and scenario analysts.

Palaeoecology

Environmental dynamics operate on a range of scales, including those that extend far beyond the temporal limits of ecological field studies, documentary sources and oral histories. The ARCC project is thus heavily invested in sampling geochronaries from across the GSE, focusing especially on understudied yet ecologically and culturally relevant landscape features. Analysing stratified sediment deposits for pollen, phytoliths, microcharcoal, invertebrates, fossils and chemical elements will provide a better understanding of change and continuity in vegetation, hydrology, biodiversity and fire regimes across central northern Tanzania on decadal, centennial and millennial time scales.

Archaeology

To varying degrees of success, people play a key role in transforming the landscapes they inhabit and societies are likewise ever adapting to their changing environments. To better understand the long-term settlement and land use history of the GSE, the ARCC project is conducting systematic archaeological surveys. This fieldwork will entail identifying and characterising cultural landscapes from historical aerial photos and test-excavating promising sites in areas that have been devoid of archaeological exploration to date, such as the western Serengeti. Our archaeological results, in combination with archival and oral historical sources will be used to elucidate the changing nature of land use during the late Iron Age and into the colonial period. Ultimately, this research aims to reconstruct the long-term ecological footprints of varied land use strategies and reframe older narratives that portray ‘baseline’ pre-colonial ecological conditions as essentially devoid of human influence.

Scenario Analysis

Researchers are challenged with exploring and understanding the future of socio-ecological systems whilst addressing their inherent uncertainty. Consequently, scenarios are widely used to explore consistent and realistic narratives of possible future land cover/use change patterns, to disseminate co-produced land cover/use change information, to inform policy, and enact positive change. The ARCC project incorporates the KESHO framework for the participatory modelling of ‘land use change scenarios’. Insights generated from a series of workshops held in Karatu, Mawenzi, Magumu and Amboseli are being used in combination with existing climate projections and ecological data to model potential future land use change trajectories at 2030 and 2063. These date were selected as they connect to the UN Sustainable Development Goals and the African Union Development agendas. The iterative process in which these model outputs are created, which includes their presentation to workshop participants for feedback and recalibration, is facilitating deep consideration of the implications and outcomes of land use change on biodiversity, ecosystem services and human well-being.

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