Southampton

BRECCIA

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'We are delighted to see the first six Small Research Projects launched!'

BRECcIA is focused on developing research capacity and strengthening existing research capabilities in Kenya, Malawi, and Ghana in the related areas of water and food security. We have adopted a development-first rather than science-first approach, which is being implemented within a set of research themes and across our partners from a wide range of academic institutes and regional centres, thus promoting inter-disciplinarity and collaborative partnerships. We have also encouraged co-design with stakeholders and end-users to evidence the desire for the research and the potential impact its outcomes could lead to.

In practice, the research is being implemented through a series of Small Research Projects (SRP), the first six of which are summarized in this newsletter. The SRPs are able to access a programme Flexible Innovation Fund (FIF) to enhance their development and implementation through a variety of activities, such as collaborative research, field work, stakeholder engagement and outreach.

The SRP proposal development process provides the project team, including Early Career Researchers in sub Saharan Africa and the UK, with an opportunity to gain valuable experience in developing research questions and proposal writing, and receive feedback through a formal iterative assessment process. This has promoted collaboration, codevelopment and co-production of ambitious and inter-disciplinary research within equitable partnerships within and outside the BRECcIA programme.

The initial set of SRPs have been framed around current development challenges, which reflect the priorities of stakeholders in the regions, and the strength and breadth of quality research in the organisations and individuals involved. These include understanding the effects of land use change and climate variability on vegetation dynamics in Kenya and using remotely piloted aircraft to assess small-scale irrigated cropland in Malawi. As these projects start to develop results, we will encourage comparative analysis across projects and countries, which will enable deeper understanding and will lead to the development of cross-cutting themes, such as how results can be transferred or upscaled to other contexts. We look forward to seeing the outcomes of these SRPs and to the development of further ideas and collaborations.

Principal Investigator: Professor Justin Sheffield - University of Southampton

Find out more about our first six SRPs in this newsletter:

Evidence to Support Policy Amendment of Water and Food Security in Drylands of Malawi

Management of water and food security in the drylands of Malawi remains a challenge due to limited capacity to manage disasters, risks and uncertainties associated with climate change. Anecdotal information suggests that conflicting policies and the omission of specific information on food and water security in drylands is a root cause. This project will support the security of food and water in the drylands of Malawi through the provision of evidence-based information that can feed into policy amendments to ensure sustainable water and food security in these drylands.

The aim of the research is to understand fundamental capacity gaps that contribute to low adaptive capacities and weak resilience among dryland communities. The study sites are Balaka, Ntcheu and Salima Districts. The research will include a review of legal and institutional frameworks, focus group discussions with local leaders, including Village Development Committees (VDC), Area Development Committee (ADC) and lead farmers, informant interviews with policy makers, biophysical assessments and hydrological mapping to generate water profiles and livelihood mapping to assess the conditions of livelihood supporting assets.

Team members

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Lake Chilwa completely dries in 2018

Evaluation of land use change on water and food security in Lagha Bor Catchment, Wajir County, Kenya

Kenya has a varied ecological environment, which is characterized by differences in agricultural potential and in patterns of food production. Wajir county has faced increasing food deficits, and high rural poverty levels, a fact attributed to high population growth, environmental degradation and limited sources of livelihoods. However, this problem is more prominent in arid and semiarid lands (ASALs) which constitute about 80% of the total land mass in Kenya where pastoralism is the main livelihood activity. This project seeks to understand the effects of land use change and climate variability on vegetation dynamics (vegetation, soil and water balance) in the Lagha Bor catchment area of Wajir County in Kenya. Furthermore, it will seek to understand the impacts of long term land use including water development and settlement; on sustainable livestock livelihooda. This will inform possible technological interventions for improved water and food security in the region.

Team members:

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Lagha Bor Griftu inside the Lagha (Photo Credit Moses Muriuki)

Comprehensive assessment of small-scale irrigation cropland using Remotely Piloted Aircrafts (RPAs) technology – Case of Lake Chilwa Basin, Southern Malawi

This research aims at utilizing Remotely Piloted Aircrafts (RPAs) as an affordable source of remote sensing data for precision agriculture

Assessment of the level of water utilisation with a special focus on small-scale irrigation using RPAs will help to quantify the total size of land under irrigation and the size of food output to feed the growing population. Geographical Information System (GIS) and Remote Sensing (RS) based approaches will be used for processing and interpretation of the drone imagery. The drone capacity as a remote sensing data collection platform will add a new dimension in RS capabilities for managing water and food security.

The research will be implemented at Lake Chilwa basin in Southern Malawi and will be scaled out to drylands in Ghana and Kenya.

The potential impacts include improved research capacity in the use of drones, improved access to information by smallholder farmers and dryland pastoralists on resilience building to climate and evidence based policy changes regarding the acceptance of technology (drones) for problem solving in the these countries.

Team members

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Drone image depicting threatened water resources interfacing with poorly managed smallholder parcels of land in Southern Malawi (Photo credit: Mathews Tsirizeni, March 2018)

Predicting water and food security in dry-land regions of Kenya from spatiotemporal trends of rain-induced land surface processes

In the dry-land regions of Kenya, agriculture and livestock breeding remain the main sources of livelihood. Limited surface and sub-surface water sources coupled with erratic rainfall patterns required to sustain the livelihoods is often a source of competition and conflict among the rural communities. Furthermore, there is inadequacy of information about food supply chains and limited access to markets for those who may opt to buy and sell. Over time, these factors have contributed to increased water and food insecurity in arid and semi-arid regions of Kenya. Developing sustainable strategies for addressing the eminent food and water insecurity in such regions will require application of scientific methods that appreciate the complexity of the existing environmental vs human conditions. We will pilot a study that seeks to combine methods using remote sensing data sources, hydrological modeling approaches and socio-economic assessment techniques to assess the security of water and food, as a function of environmental change effects in Kajiado county of Kenya. The methods and output from this work will be replicable and intend to address key scientific questions on the potential predictors of food and water security in dryland areas, while contribute towards developing sustainable policy for integrated water use that caters for the needs of both crop and livestock producers in such areas.

Team members

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Mr. Steve Omondi (Regional Center of Mapping of Resources for Development-RCMRD, Kenya)



Kajiado landscape

Monitoring agricultural land use change and its linkage to food security in Sub-Saharan Africa

To ensure food security, we must first understand where the food grows, how the agricultural land area changes and why these changes happen. This information and understanding is scarce in sub-Saharan Africa.

This project therefore aims to monitor spatial and temporal changes in agricultural land area in relation to land use and land cover change. By using high spatial resolution satellite images we will develop an algorithm for classifying agricultural area and land use types. We will monitor changes in agricultural areas at country scale in Malawi, Ghana, and Kenya with a spatial resolution of 30m.



Fragmented smallholder agriculture versus medium-scale commercial farming in Kisumu, Kanya. Smallholder agriculture is dominated in Sub-Saharan Africa, however the mediumscale commercial farms are growing.

This research will generate agricultural extent maps, which are the first step in evaluating food production and to improving agricultural productivity. This research will also detect agricultural areas undergoing rapid changes and potentially explore the factors responsible for these changes, which possibly will be delivered to policy makers and provide guidance on areas where attention is needed. The research output will also help to understand how the specific policies affect changes in agricultural area and eventually food security in Sub-Saharan Africa.

Team members:

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Analysis of the contributing factors to food insecurity and the coping strategies amongst rural communities in the arid regions of Marsabit, Kenya

In sub-Saharan Africa, climate change is one of the drivers of vulnerability of the livelihoods of local communities. To alleviate the impacts of climate change, communities have developed adaptive strategies and practices. However, increased intensities and frequencies of climate-induced hazards have overstretched the existing adaptive and coping capacities of rural communities in arid and semi-arid areas making it necessary to either revise or devise new strategies to address the impacts of change, particularly those that relate to water and food security. Exploring the linkage between predictors of food insecurity and community-based coping strategies during climate shocks is fundamental in developing and improving evidence-based adaptation strategies. This research seeks to understand how climate variability in arid regions has influenced food security and how in turn the variability in food security affects existing social structures. This pilot study is implemented in a typical rural community in Marsabit county of Kenya. The study adopts novel scientific approaches to capture local knowledge and to generate outputs that can provide evidence, which is necessary to effectively design, deliver, monitor and evaluate community resilience in the face of climate variability. The output from this study will provide a basis of developing sustainable community-driven policy to promote food security in dry-land regions. The findings could potentially be up scaled to other arid (semi) regions facing similar challenges in the Sub-Saharan Africa.

Team members:

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Source: NDMA, 2019





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