FUTURE CLIMATE FOR AFRICA

COUNTRY BRIEF

February 2020

How can we improve the use of information for a climate-resilient Malawi?

Overview

This brief presents the main research findings from the Future Climate for Africa UMFULA project that are relevant for policy and practice on how to integrate climate information and increase resilience to climate change in Malawi. The research team is grateful to all the stakeholders who informed and helped shape these results and hope that this summary note is of value in planning a more climate resilient future for Malawi.

Key messages

- Understanding the likely future nature of climate risk is necessary for adaptation and long-term climate-resilient planning via the National Resilience Strategy and essential for the National Planning Commission.
- Malawi's geographical location, between the east and southern African climate systems, means that future climate (particularly rainfall) is challenging to predict accurately – although there are areas of agreement in climate models, notably higher temperatures and higher likelihood of extreme weather events.
- Given future uncertainty, it is important to design robust management options that work across the plausible range of future climate conditions, especially for large investments with long life-times, significant impacts and irreversibility, such as water-related infrastructure (e.g. hydropower or irrigation) & agricultural investments in crop-breeding.
- Decision-making under uncertainty approaches help to understand trade-offs for decisions such as meeting water needs and allocating water for irrigation, energy production and environmental services.
- Careful planning is needed for the agricultural sector that is highly sensitive to temperature changes, including both subsistence and commodity crops (such as tea and sugar).
- Greater efforts should focus on the uptake of climate information by smallholder farmers – Participatory Scenario Planning has the potential to generate credible, legitimate and salient information that is both useable and used by farmers.
- Achieving coherence between sectoral policies requires a more supportive institutional environment for sustainable and resilient decision-making.
- Co-design and use of capacity-building activities, taking into account institutional needs, is essential for effectively responding to climate change.
- Modelling studies show that Tanzanian catchments contribute over half of the water to Lake Malawi in some years. This requires careful trans-boundary management of water resources in coming decades to avoid a situation where there is no outflow from Lake Malawi into the Shire River.

About FCFA

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What will the future climate look like in Malawi?

Changes in climate are already being experienced in Malawi. Temperatures have increased in all seasons and throughout the country. There is an overall drying trend, although there is a lot of variability in rainfall amounts and seasonal patterns.

In the future, climate models predict ***warming to continue*** (Figure 1). We expect higher evaporation with higher temperatures, with significant implications for agriculture and water sectors. We see a ***higher likelihood of extreme rainfall events*** in the future – both dry spells and drought, but also flooding (Figure 2). This means that extreme conditions that we have seen in recent years, such as flooding in 2015 followed by the 2016 El Niño-related drought and the flood damage associated with Cyclone Idai in 2019, are predicted to become more common.

Patterns of change in rainfall are unclear at a national scale (Figure 3) with initial indications suggesting that rainfall in the north may increase, whilst in the south a decrease is likely in the area where dry spells and droughts are already having a significant impact.

Figure 1: Future temperature, evaporation and rainfall projections (source: Mittal et al, 2017).

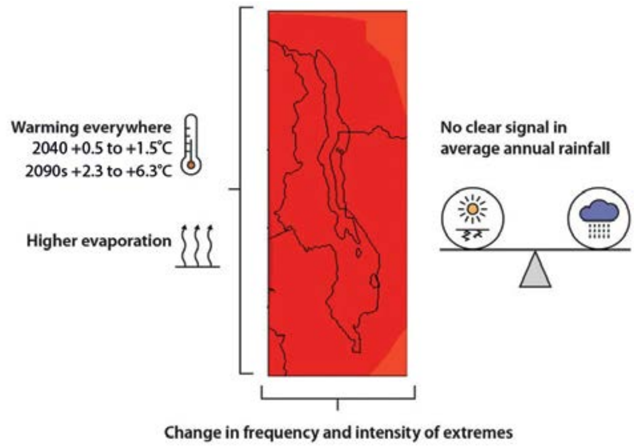


Figure 2: Future extreme events (hot days and dry spells) (source: Mittal et al, 2017).

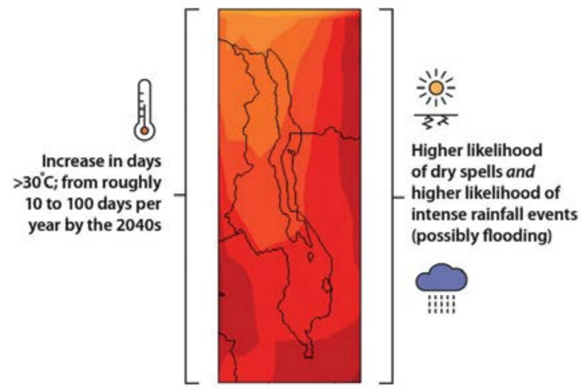
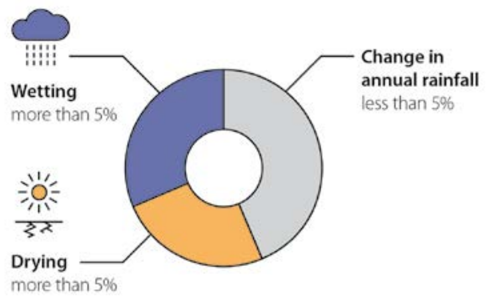


Figure 3: Split of future national rainfall projections across 34 CMIP climate models (source: Mittal et al, 2017).

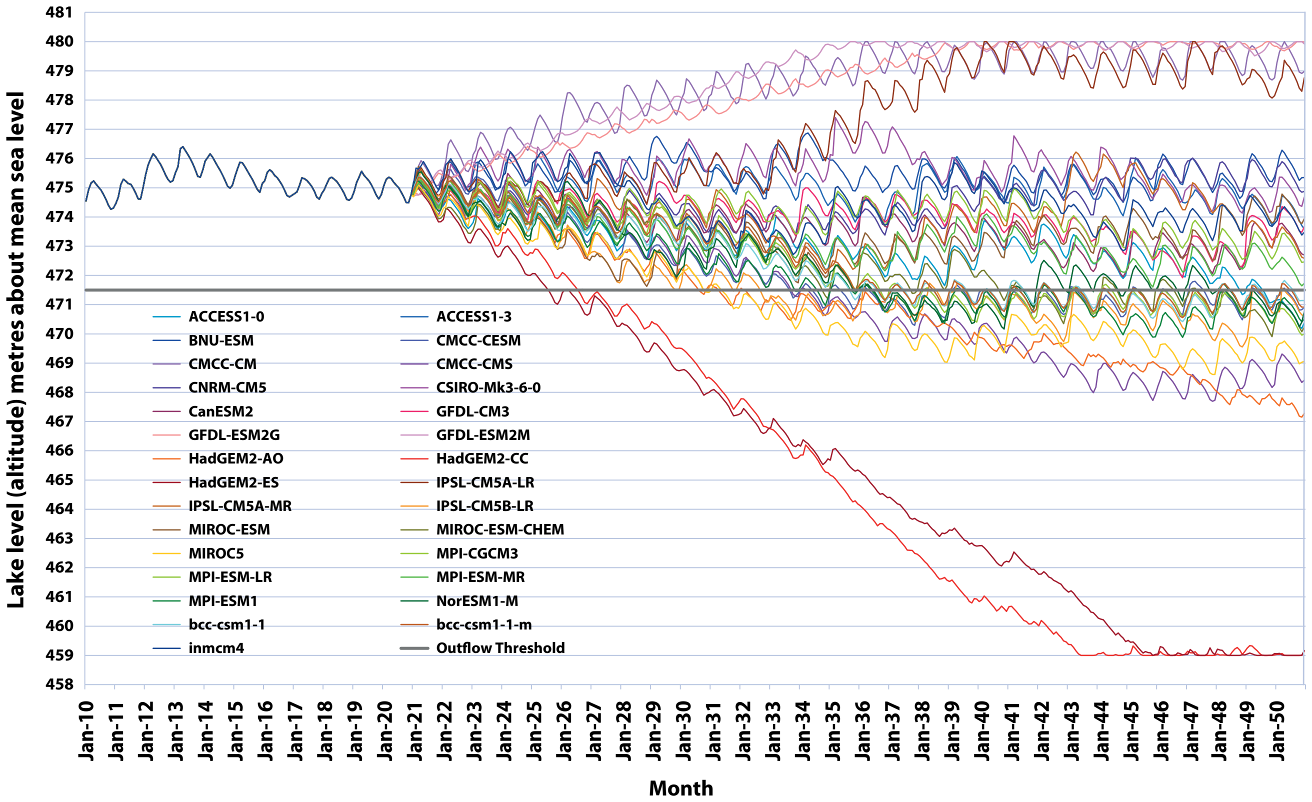


What will this mean for water availability from Lake Malawi and the Shire River Basin?

Outflows of water from Lake Malawi into the Shire River are critical to support major elements of the economy in the form of hydropower and irrigation, as well as biodiversity and environmental flows, which are essential to human wellbeing.

Running an open access Water Evaluation And Planning (WEAP) model customised for Malawi shows ***a range of potential future lake levels for 2021-50*** (Figure 4 based on a range of global climate models run under a high emissions scenario). One group of projections shows very high lake levels leading to potentially severe downstream floods. Some projections lead to a substantial decline in lake levels that will lead to lake levels dropping below the Lake Malawi Outflow Threshold which would dramatically reduce hydropower generation and irrigation water supply in the Shire River Basin. However, some projections show lake level fluctuations similar to what has been experienced in recent decades. These important differences in model results are not apparent when looking only at an ensemble mean.

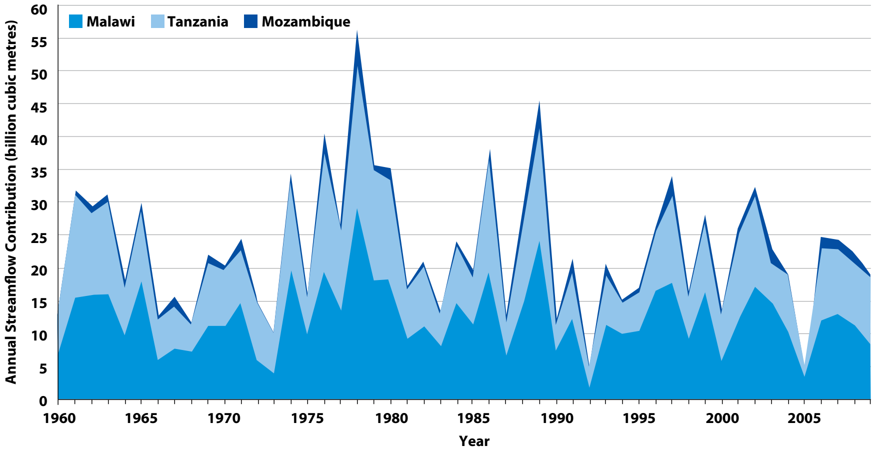
Figure 4: Climate change impacts on Lake Malawi levels based on 29 Global Climate Model projections (source: Bhave et al, 2019).



Historical runs of the WEAP model also show that Tanzanian catchments contribute a significant amount of water to Lake Malawi (Figure 5) requiring careful trans-boundary management of water resources.

When making planning decisions relating to water ***it is important to identify and apply robust management options that are sustainable*** across the full range of projected increases or decreases. Our inclusion of historical variation in lake levels makes such findings more relevant to decision-making, for example by considering this range in the operation and management of the Kamuzu barrage.

Figure 5: Sources of water to Lake Malawi (Malawi, Tanzania, Mozambique) (source: authors).

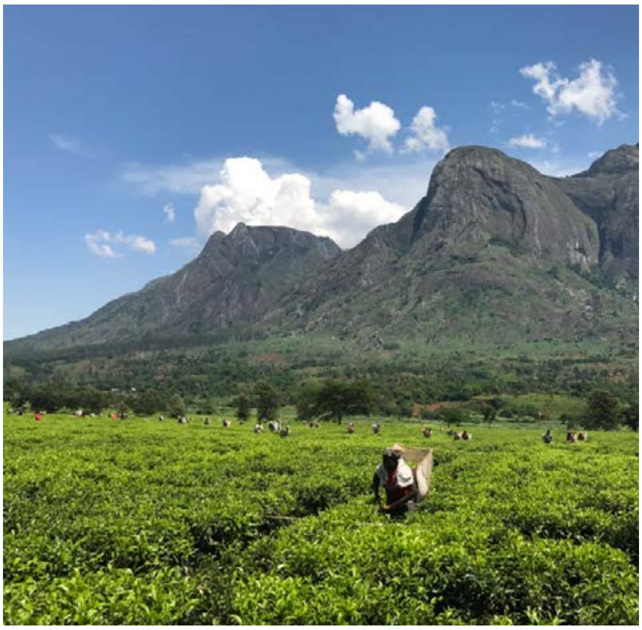


What will this mean for the tea and sugar sectors?

Tea and sugar are key sectors for both the economy and livelihoods of people in Malawi, but the ***crops are sensitive to temperature and at risk of heat stress.*** Tea is particularly sensitive during the dry season (May to November) as seen in the 2019 heatwave (Figure 6). Sugarcane requires 30-32°C during the main growing season and cooler winters to slow down the growth and increase sugar storage.

Future temperature projections show an increase in heat stress conditions and night temperatures for the 2050s compared to observations. The ***nature of adaptation required varies depending on place and the specific projection of future climate.*** More warming is projected for tea producing sites at Mulanje, meaning new tea cultivar varieties will be critical for future adaptation – compared to Thyolo where irrigation will be vital, due to increases in the number of consecutive dry days. Adaptation in sugar producing areas is particularly challenging for outgrower schemes due to lower preparedness for extreme events. Outgrowers would thus benefit from increased support to adapt, including the use of climate information.

Figure 6: Mulanje tea bushes, October 2019 (left), compared to December 2016 (right).



How can we ensure climate information is used by smallholder farmers to reduce risk?

The uptake of climate information among local users relies on the information being useful and usable. Participatory Scenario Planning (PSP) is a technique to co-produce interpretations of seasonal weather information and has been used in several districts. Although there are challenges in co-production, ***PSP has the potential to generate credible, legitimate and salient information*** that is both usable and being used, particularly by farmers. PSP can further assure that the less advantaged (women and elders) get access to, and understand climate information for improved adaptation.

Despite nationwide implementation, the numbers of recipients remain few and implementation is only taking place on a project basis. The recently-approved Meteorological Policy does not include the provision to support PSP. 2019 marked the first National Climate Outlook Forum providing sector-specific advisories based on seasonal forecasts, which is an important practice worth sustaining.

Figure 7: Timelines of operation of selected approved legislation and policies relating to agriculture, environment, water, climate change, energy and disaster management (source: authors).

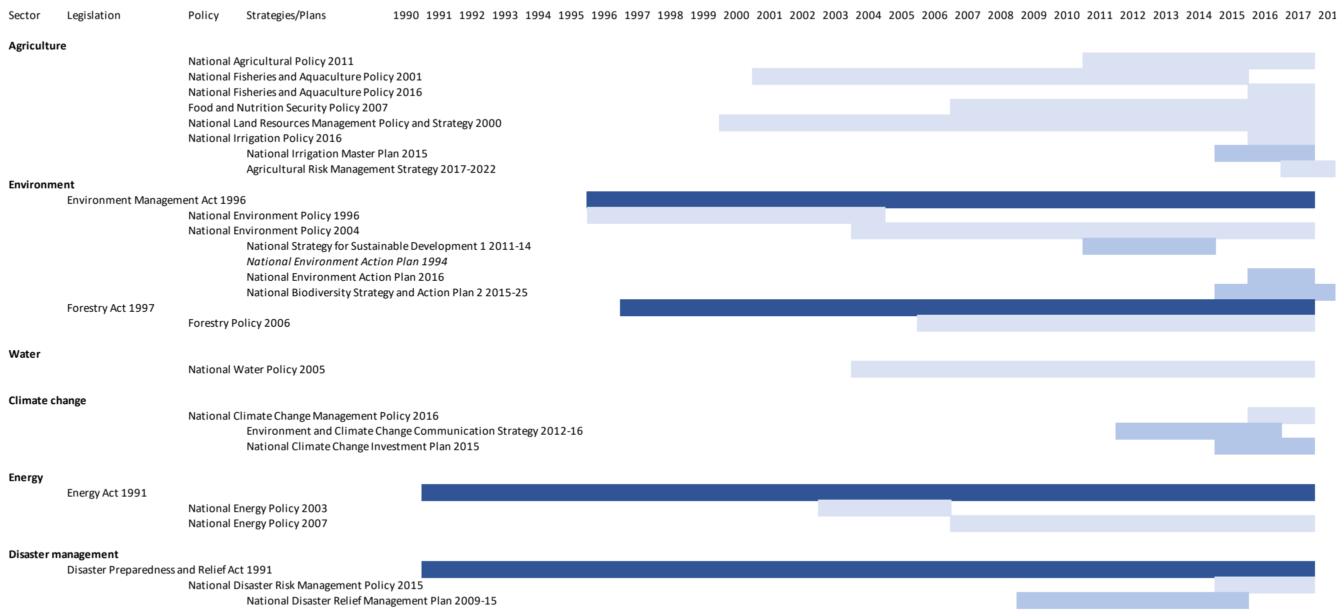
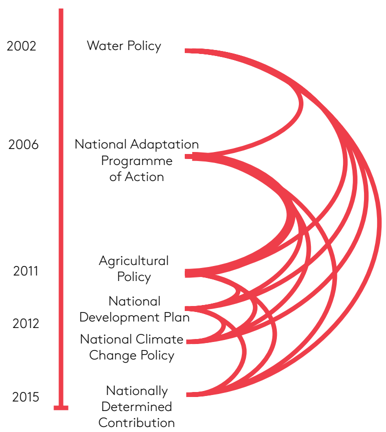


Figure 8: Coherence and sectoral policy linkages around climate, water, energy and agriculture in Malawi – thick line shows good coherence, thinner line shows partial coherence (source: Curran et al, 2018).



How can we create a policy and institutional environment that supports the use of climate information to reduce risk?

Despite the typical lifespan of policies being five years, the ***timeframe of policy development and the limited occurrence of reviews limit the coherence*** around climate, water, energy and agriculture (Figures 7 and 8). Figure 7 shows that certain key policies have been in operation for nearly 20 years.

Analysis of political economy shows that ideas, power and resources converge in different ways to create institutional environments that either support or constrain the pursuit of climate change policy ambition and targets. ***Change in leadership, and the oft-concurrent cabinet reshuffles, changes in ministerial mandates and rotation of high-level civil servants, leads to a focus on short-term planning***, rather than the required focus on long-term building of resilience strategies and climate adaptation investments. Reliance on donors can contribute to barriers to coordination for coherent cross-sectoral approaches.

External reliance also undermines a sense of autonomy and agency to act among staff in the ministries, even when technical capacity and individual motivation exists.

How can we design capacity building for effective climate change adaptation?

Significant investments in training have not effectively built capacity to respond to climate change. ***Long-term education and short-term training have complementary roles in influencing the design and implementation of successful adaptation practices.*** Short-term training workshops are most useful when customised to the particular needs of participants, are participatory in design and implementation and tailored using context-specific examples. Action planning, on the job training and mentorship after training are effective but rarely used.

In addition to training design, the inadequacy of training needs assessments and the organisational structure in which trainees attempt to put their skills and knowledge into practice impede effectiveness of training.

More rigorous coordination and monitoring of training efforts and appropriate institutional support for action following training sessions are essential to enhance effectiveness of adaptation planning.

Capacity-building is not necessarily about running more training courses – but providing autonomy and operational budget to government staff so that they can effectively implement adaptation policy across multiple sectors.

Figure 9: Collaborative discussion forum between UMFULA researchers and stakeholders, November 2017, Lilongwe, Malawi.

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About Future Climate for Africa

Future Climate for Africa (FCFA) aims to generate fundamentally new climate science focused on Africa, and to ensure that this science has an impact on human development across the continent. This brief was written by members of the UMFULA research team: Andy Dougill, David Mkwambisi, Katharine Vincent, Emma Archer, Ajay Bhave, Rebecka Henriksson Malinga, Diana Chanika Mataya, Neha Mittal and Dorothy Tembo-Nhlema.

For further information, contact Dr David Mkwambisi, Malawi University of Science & Technology (dmkwambisi@must.ac.mw).

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www.futureclimateafrica.org e: info@futureclimateafrica.org t: +2721 4470211