



Summary: Future climate projections for Tanzania

Introduction

The UMFULA research team of the Future Climate for Africa (FCFA) programme has analysed 34 Global Climate Models that provide projections for Tanzania to try to distil robust messages and some key trends that may help planning and decision making. Because each model simulates atmospheric processes slightly differently, they show a range of different outcomes for temperature and rainfall. We first look at recent trends, before considering what the future climate might hold. This is a summary of a longer brief on future climate projections for Tanzania¹.

Past climate

The following is evident from recent climate trends in Tanzania:

- Annual temperatures are increasing (warming is occurring)
- There is a lot of variability in rainfall amounts and seasonality (i.e. when the rain falls). We can discern drying in parts of northeast and much of southern Tanzania, moderate wetting in central Tanzania, and stronger wetting trends in the northwest

Future climate

Based on analysis of 34 models of climate projections, what might the future climate look like in Tanzania?

warming throughout the country. By the 2090s, we see a stronger projected trend for warming (Figure 1).

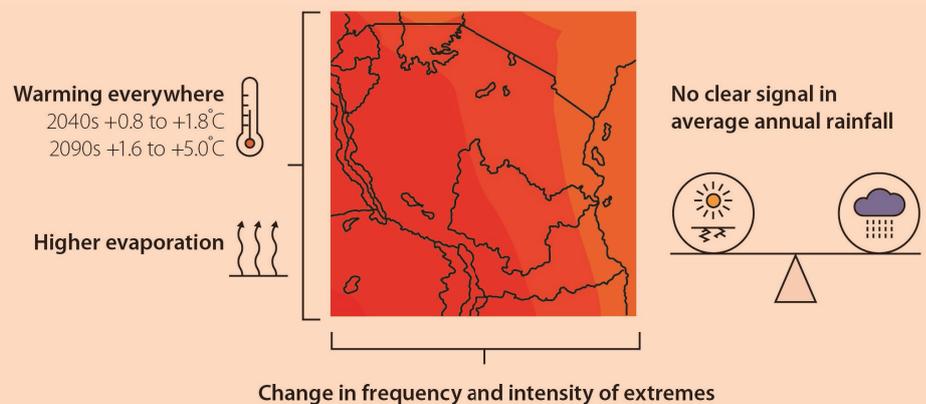
Temperature

In temperature, we see strong agreement between the models, implying that these are robust projections. By the 2040s, we see

Other things being equal, warmer temperatures are likely to increase evaporation from soil and open water.

Figure 1: Summary of climate changes in Tanzania

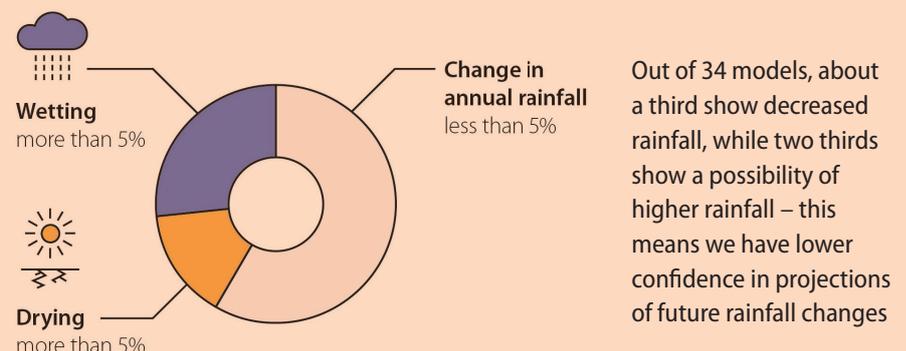
Map shows warming is evenly distributed across Tanzania, with a smaller increase along the coast



Rainfall

In terms of annual total rainfall, the models are highly varied (Figure 2).

Figure 2: Proportions of climate models projecting small changes (less than 5%), drier and wetter conditions across Tanzania



However, it must be emphasised that these are averages across Tanzania, and across the whole year. Tanzania is highly diverse in its physical characteristics, and different parts of the country experience different climates at the present time. Country-wide averages disguise this geographical variation.

Taking an average of the 34 models, we are able to see some differences in rainfall across the country, with projections suggesting that the north could become slightly wetter by the 2040s and the south slightly drier.

If we average over 34 models, we see small changes by the 2040s. We see stronger trends if we look at seasons.

For October-November-December (late spring/early summer), a critical time for agriculture, we see a possibility of drying of up to 9%.

For March-April-May (autumn), we see a possibility of increased rainfall of up to 9%. By the 2090s, we see larger projected changes.

What does this mean for planning?

No model is able to predict the future with 100% certainty. Climate projections are useful to consider in planning, particularly for activities that are sensitive to temperature and water availability, such as agriculture and hydropower. The high level of agreement between models on temperature increase means that we are confident in this projection. Promoting a crop that is heat sensitive and already near the margins of tolerance for growth, for example, is likely to be unsustainable in the long run.

There is less agreement between models on rainfall, but there are some characteristics for which we have confidence. One is for a drying trend in October-November-December in southern Tanzania – a critical time, for example, for the agricultural sector. Awareness of this means that longer-term agricultural decisions can be planned accordingly to avoid crop failure due to reduced length of the growing season and/or water availability.

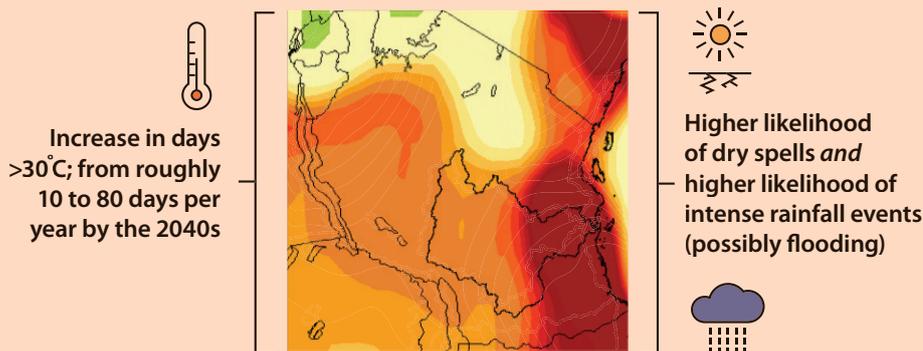
Taking climate change projections into account for particular planning decisions, and considering the range of futures, can support sustainability.

Extreme events

As climate evolves we will see an overall increase in the frequency and intensity of heatwaves. All models show an increase in the number of days with temperatures above 30°C (Figure 3).

Figure 3: Summary of changes in extremes across Tanzania

The map shows the pattern of increase in number of days above 30°C (darker shading indicates greater increase)



Endnote

- 1 FCFA (2017) *Future climate projections for Tanzania*: Cape Town: Future Climate for Africa. www.futureclimateafrica.org/resource/future-climate-projections-for-tanzania/

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: Declan Conway, Neha Mittal, Emma Archer van Garderen, Joanna Pardoe, Martin Todd, Katharine Vincent and Richard Washington. You can find out more about their work under 'research teams' on www.futureclimateafrica.org. The authors thank the individuals and organisations in Tanzania who have commented on early versions of this brief.



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