

# TAMSAT-ALERT for Impact-Based Forecasting



**Session 2: Validation of TAMSAT-ALERT for impact-based forecasting**

# Overview

## 1. Listen-along presentation (20-30 minutes)

- What is needed for effective impact-based forecasting?
- Does TAMSAT-ALERT meet these needs?



## 2. Check your understanding (10-15 minutes)

- Multiple-choice questions

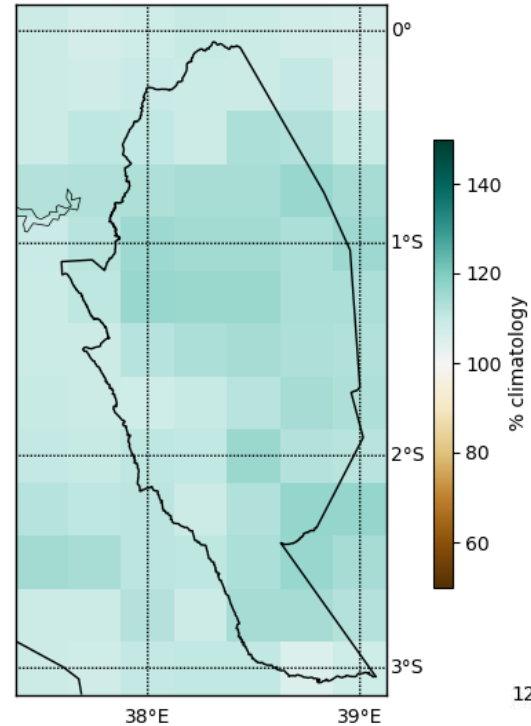


# Learning objectives

1. **Explain TAMSAT-ALERT soil moisture and WRSI as a drought impact-relevant metric**
  - TAMSAT-ALERT soil moisture metrics relate to the impacts of drought
  - TAMSAT-ALERT forecasts provide sufficient lead-time for early action
  - There are caveats associated with the use of TAMSAT-ALERT soil moisture forecasts
2. Understand modelling of soil moisture and WRSI
3. Understanding TAMSAT-ALERT approach to forecasting
4. Ability to interpret TAMSAT-ALERT soil moisture and WRSI forecasts
5. Ability to produce TAMSAT-ALERT forecast plots and/or bulletins

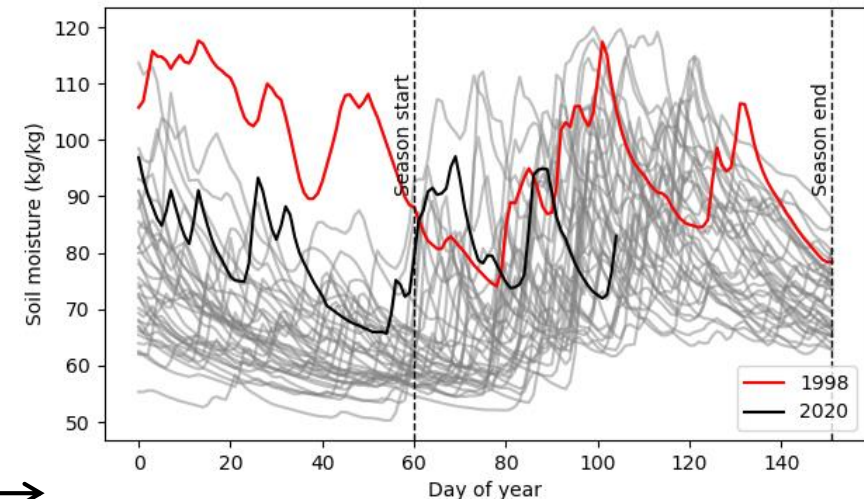
# TAMSAT-ALERT soil moisture forecasts

- TAMSAT-ALERT forecasts mean seasonal soil moisture
- Historic dataset (1983-present) provides a baseline against which to compare
- Soil moisture particularly relevant for drought forecasting
- Supporting FbA in agricultural and humanitarian sectors



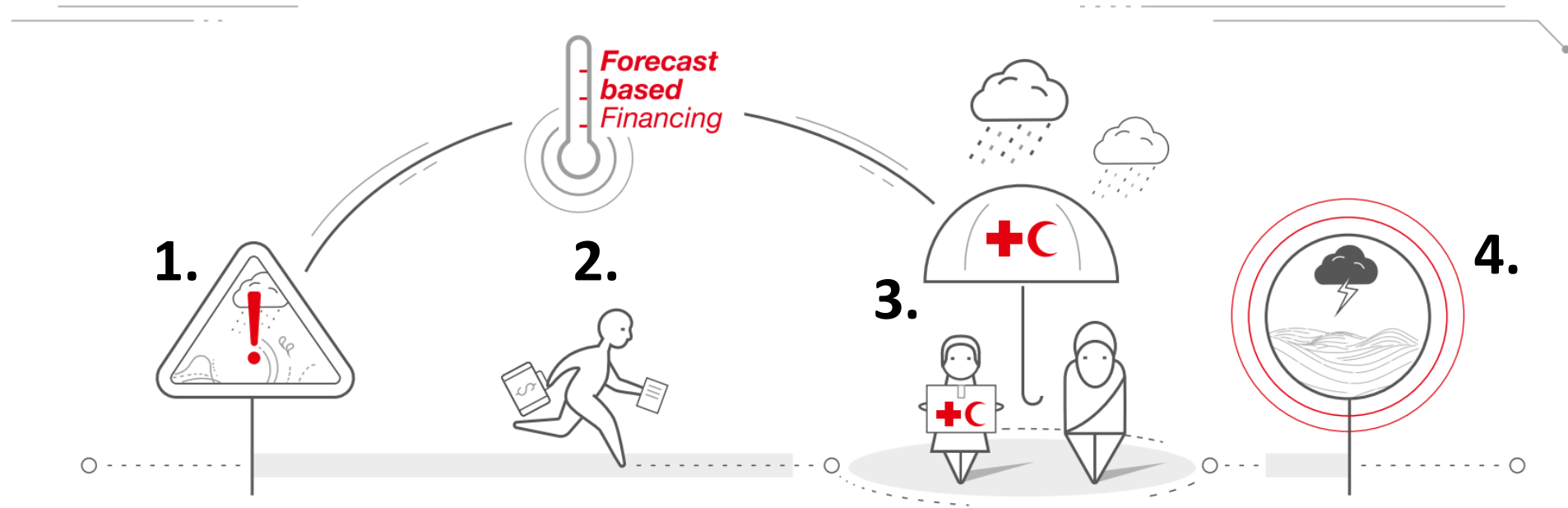
← **Mean MAM soil moisture forecast for Kitui County, Kenya.** Issued on 15<sup>th</sup> April 2020. Presented as the percent difference from the historical mean (climatology). Blue colours indicated that mean soil moisture is expected to be above average for the 2020 MAM season.

**Soil moisture timeseries.** Issued on 15<sup>th</sup> April 2020. Each grey line indicates a single year in the historic dataset. The red line shows 1998 (following heavy rainfall during the 1997 OND season). The black line shows this year, 2020.

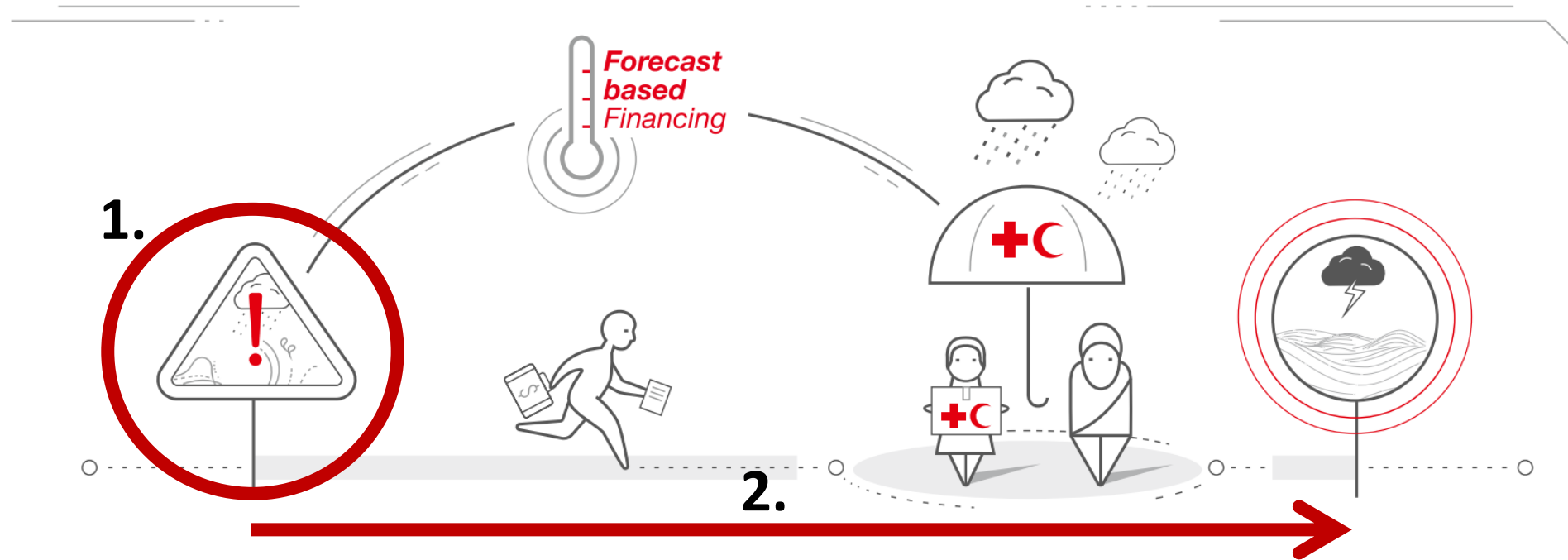




# What is FbA?

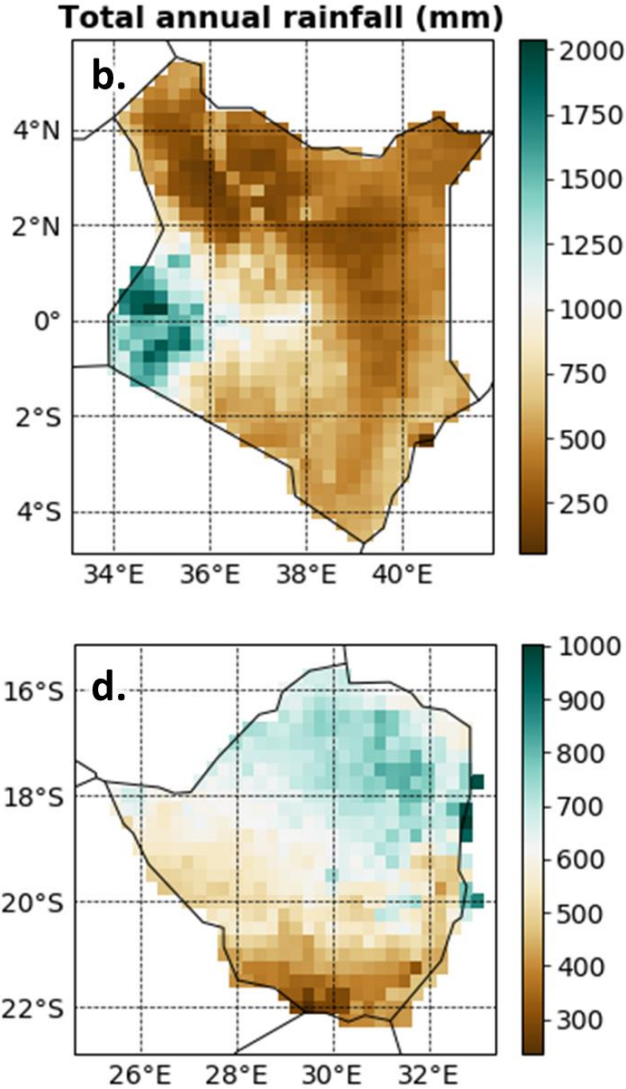
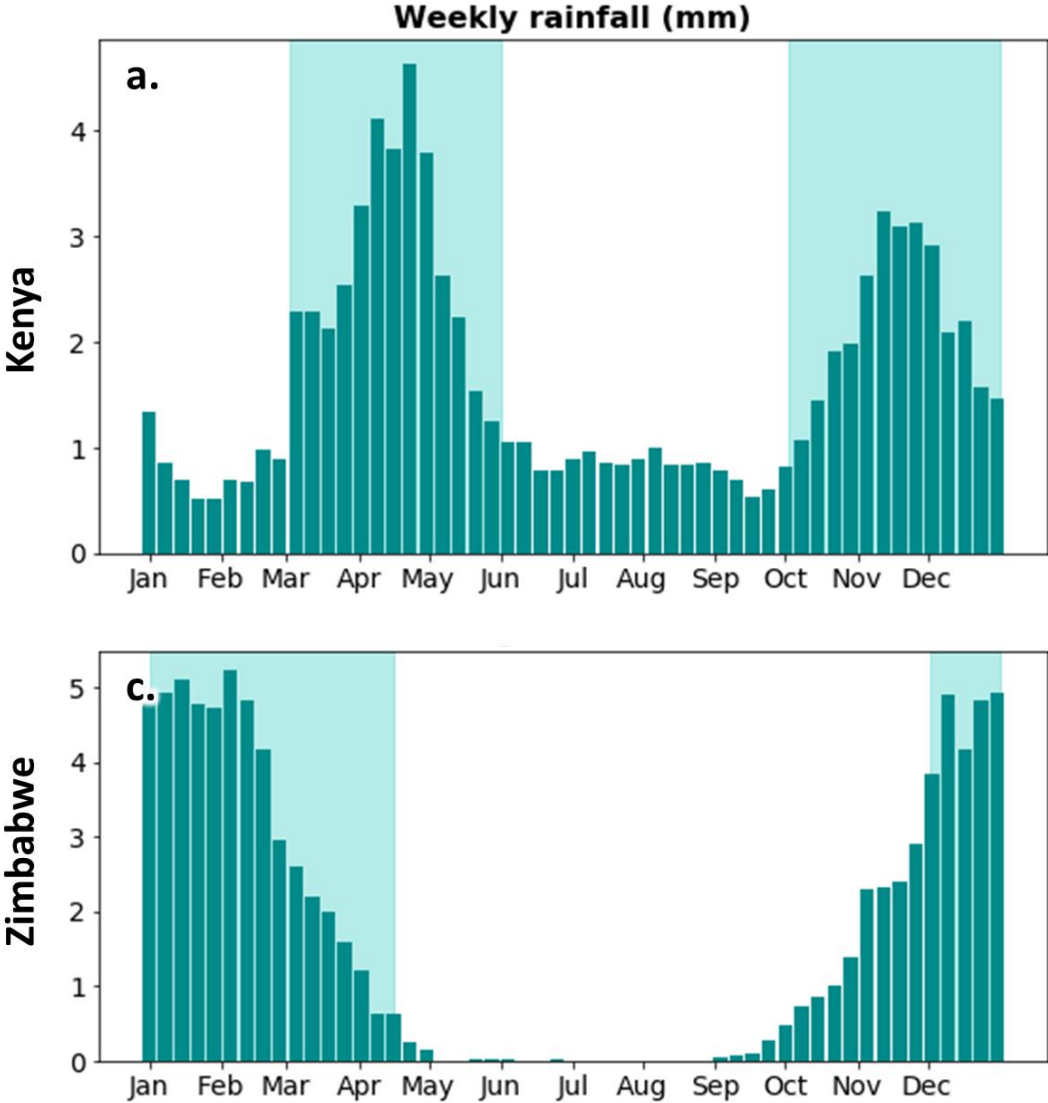


# What is needed for FbA?



1. Forecast metric must be relevant to the impacts of drought
2. Forecast must be reliable with sufficient lead-time

# Study countries



**The distribution of rainfall in space and time for study countries.** In Kenya, rainfall is largely restricted to two wet seasons: the October-November-December 'short rains' and the March-April-May 'long rains' (a). Mean total annual rainfall is widely below 800mm with the exception of western counties (b). In Zimbabwe, rain falls almost entirely within the December-to-April rainy season (c). There is a clear north-south gradient in mean annual rainfall totals, with northern regions receiving more rainfall on average than southern regions (d).



# 1. Forecast metric must be relevant to impacts of drought

## FOOD INSECURITY

Pasture availability

Vegetation Condition Index (VCI)

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Soil moisture



Crop yield

Maize production

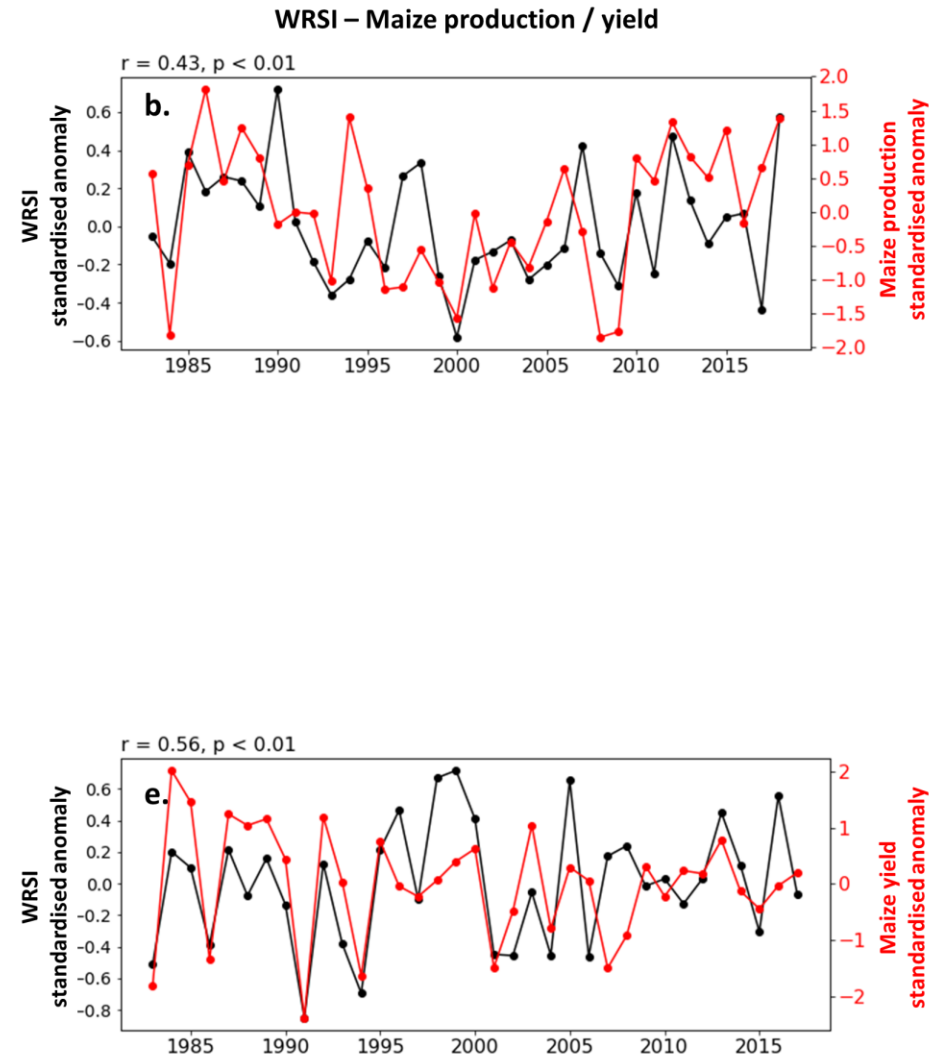
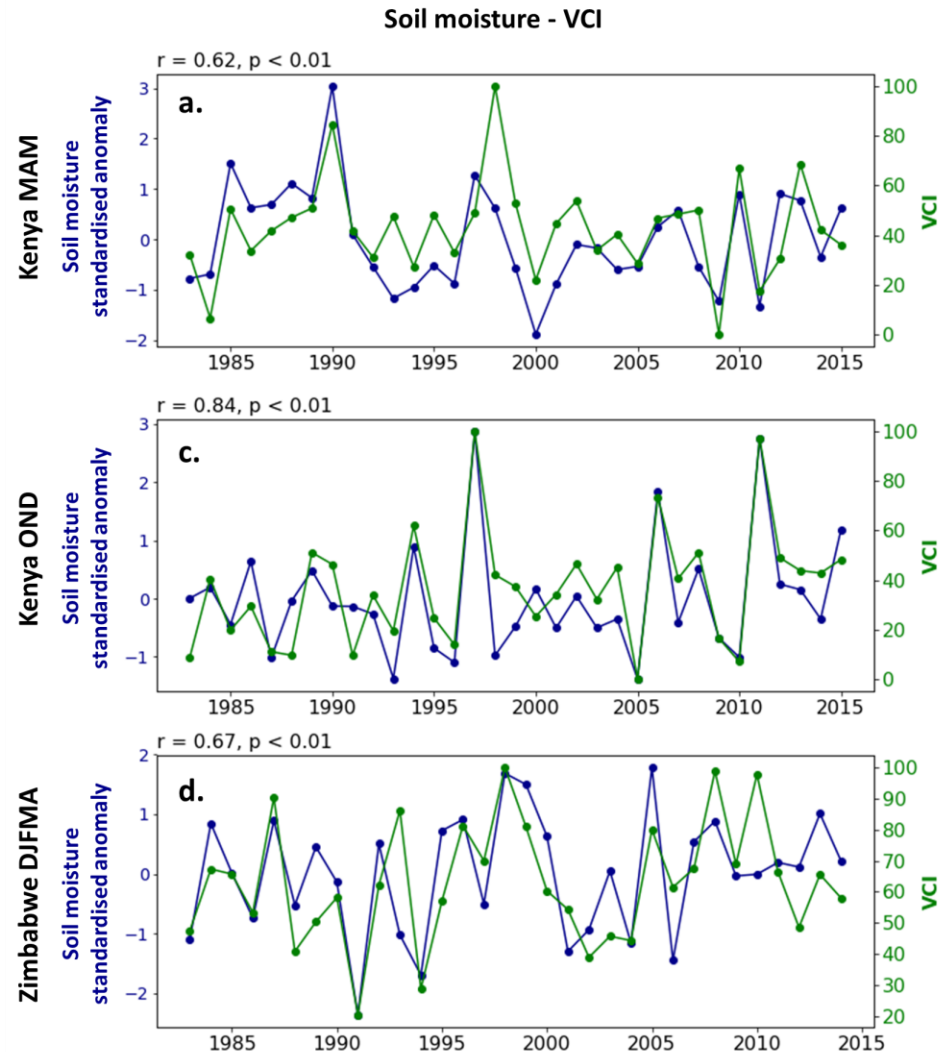
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Water Requirement Satisfaction Index (WRSI)



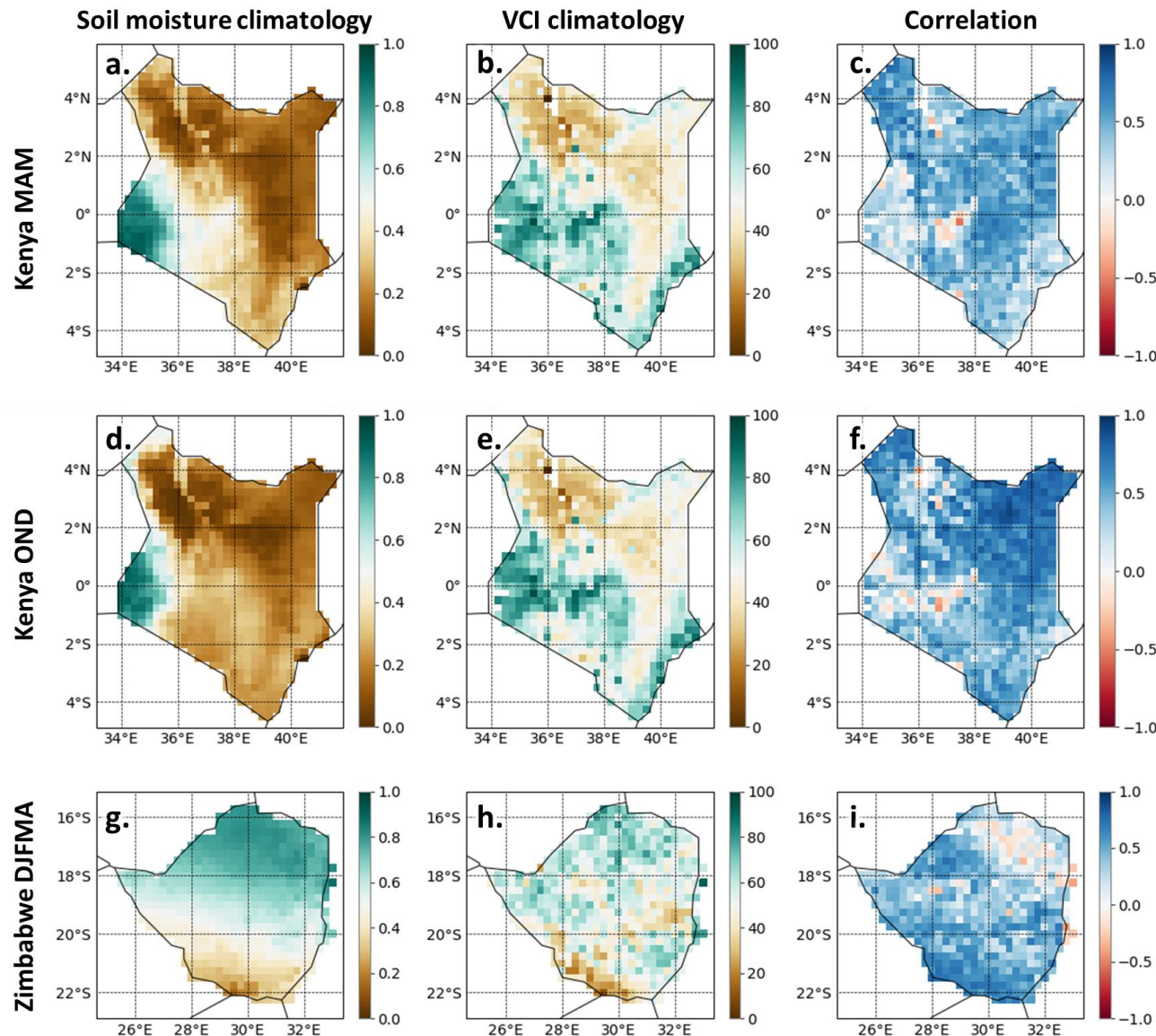


# 1. Forecast metric must be relevant to impacts of drought



**Time series of soil moisture estimates compared to vegetation indices.** All metrics are averaged across the season with the exception of yield, which is an annual total. Soil moisture, WRSI and yield anomalies have been standardised. Pearson's correlation coefficients are presented above each plot. For both regions and all seasons, soil moisture and vegetation indices are significantly and positively correlated.

# 1. Forecast metric must be relevant to impacts of drought



A comparison of soil moisture and VCI climatology across Kenya and Zimbabwe for each wet season. Pearson's correlation ( $r$ ) is presented in the third column, where darker blue colours show a strong positive correlation and red shows a negative correlation.



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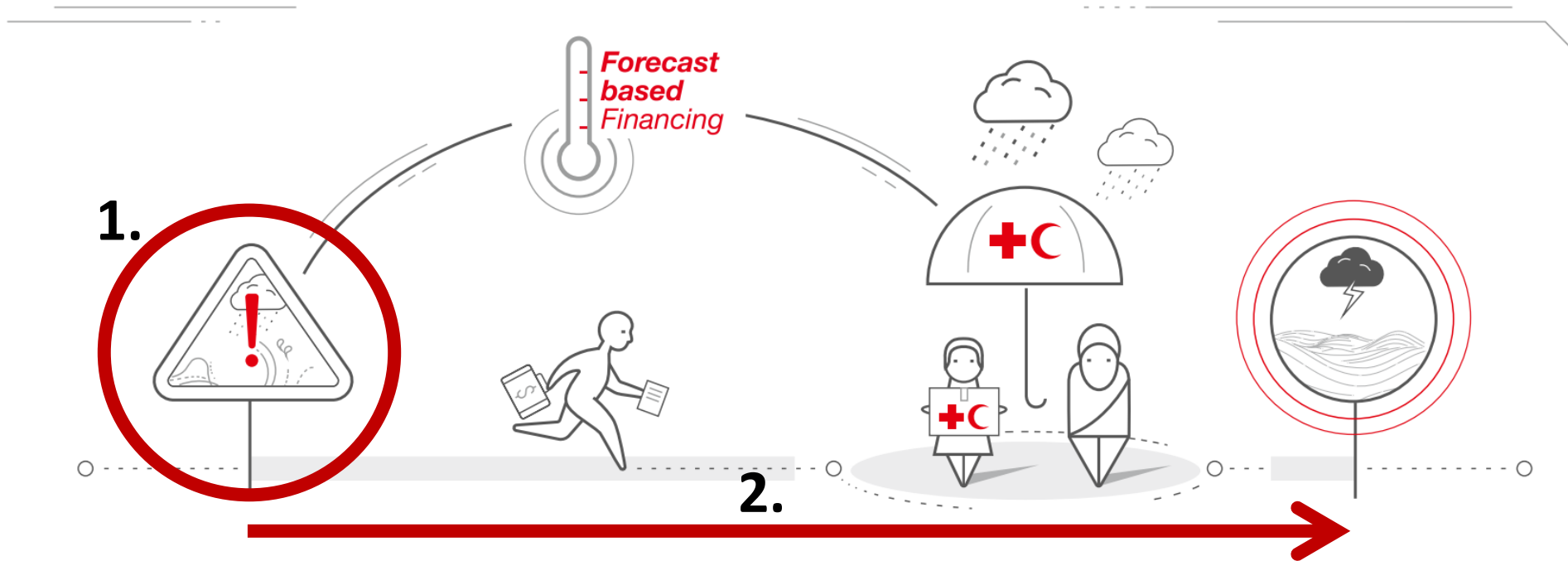
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Water Requirement Satisfaction Index (WRSI)

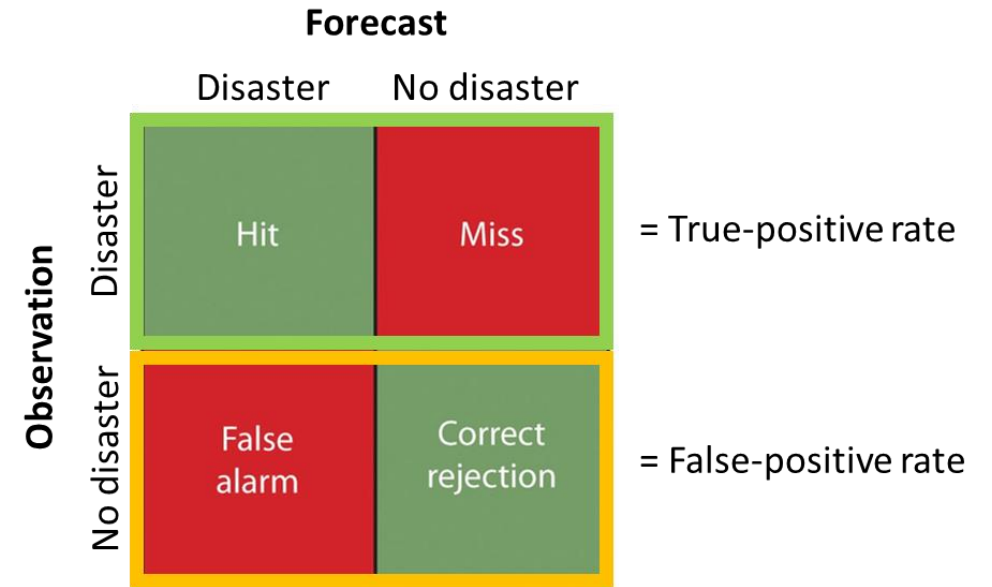
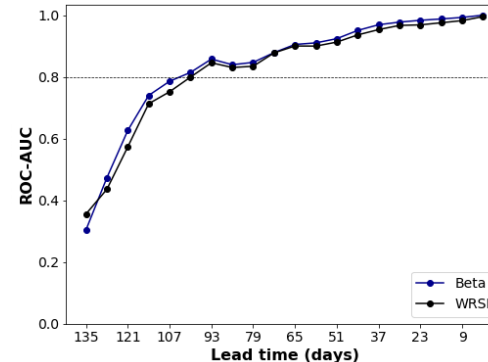
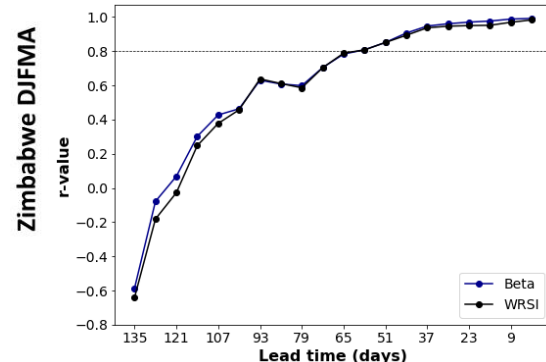
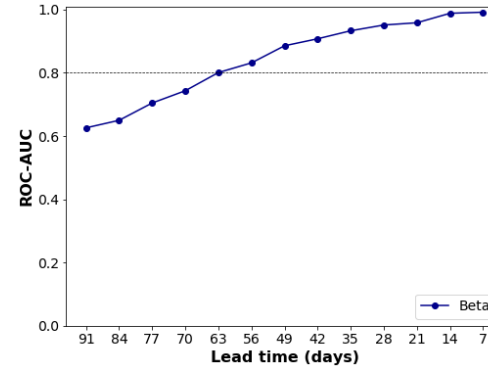
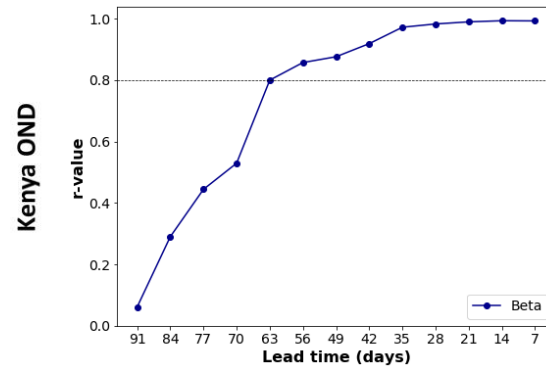
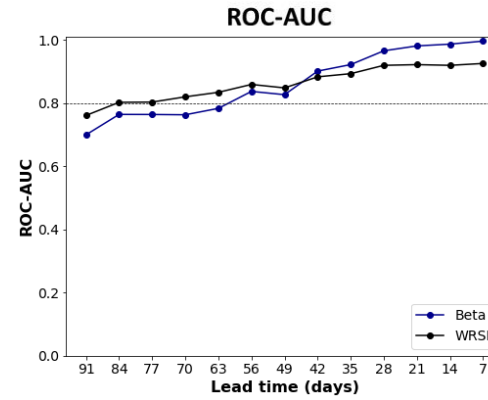
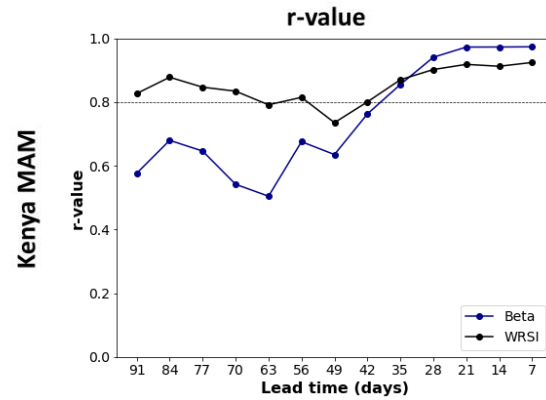




## 2. Forecast must be reliable with sufficient lead-time

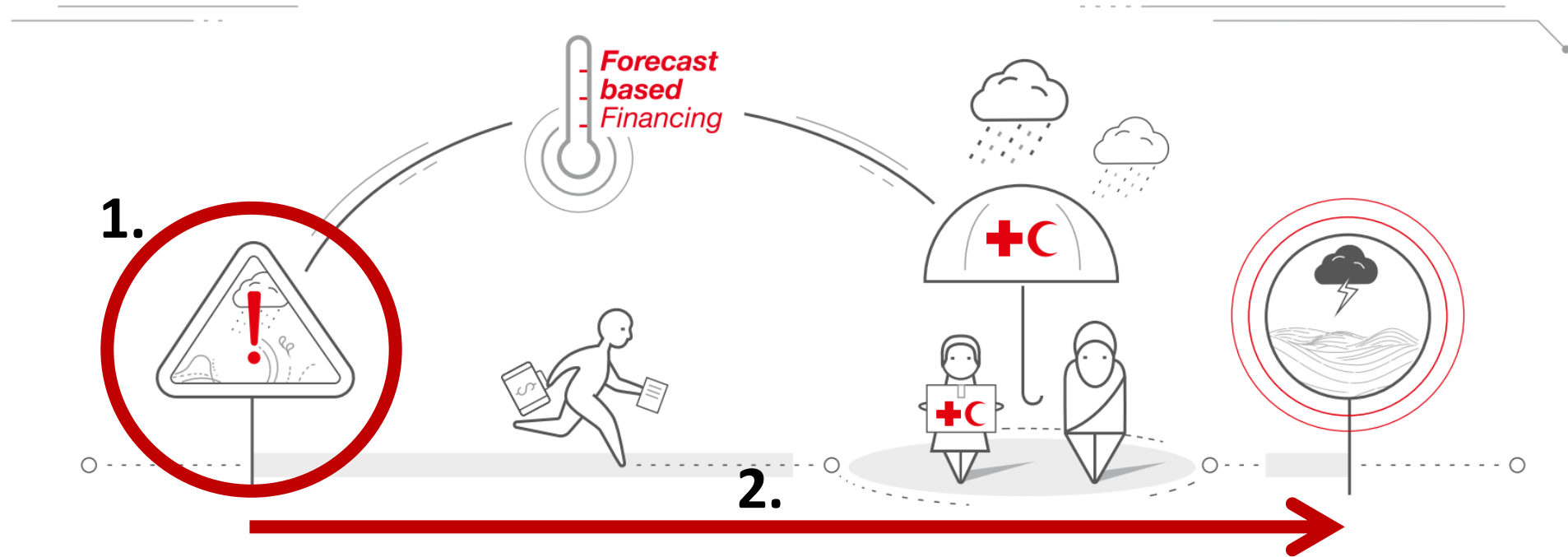


## 2. Forecast must be reliable with sufficient lead-time



**Skill of TAMSAT-ALERT soil moisture forecasts as the season progresses.** The first column shows the correlation between mean seasonal soil moisture, WRSI, VCI and yield against the forecast soil moisture ensemble mean. The second column shows the ROC scores of the ensemble mean for identifying <20th percentile seasonal soil moisture, WRSI, VCI and yield, at a range of lead times.

# Summary

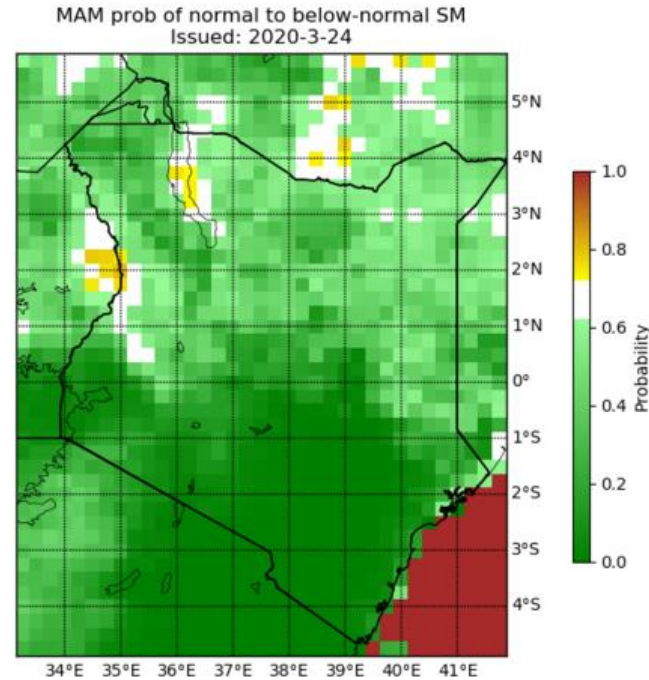
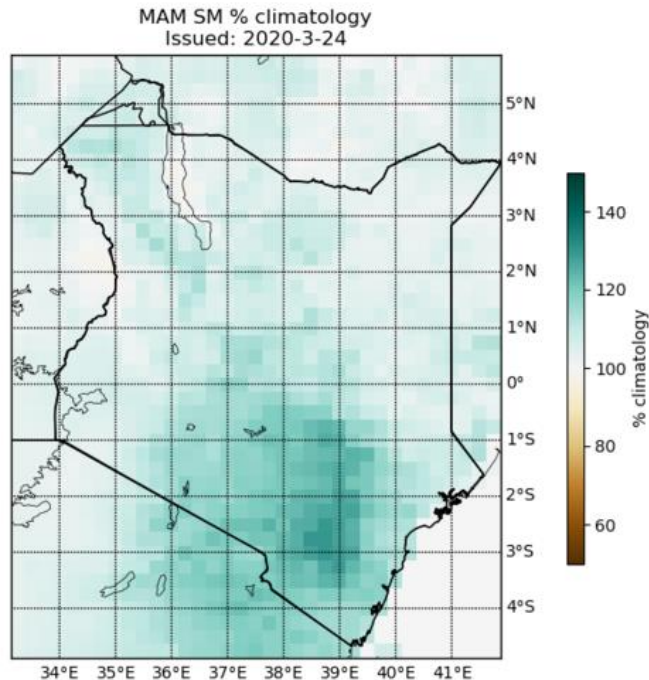


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# Operational forecasts

- Forecasts updated every 5 days
- Monitor probability of drought
- Trigger early action



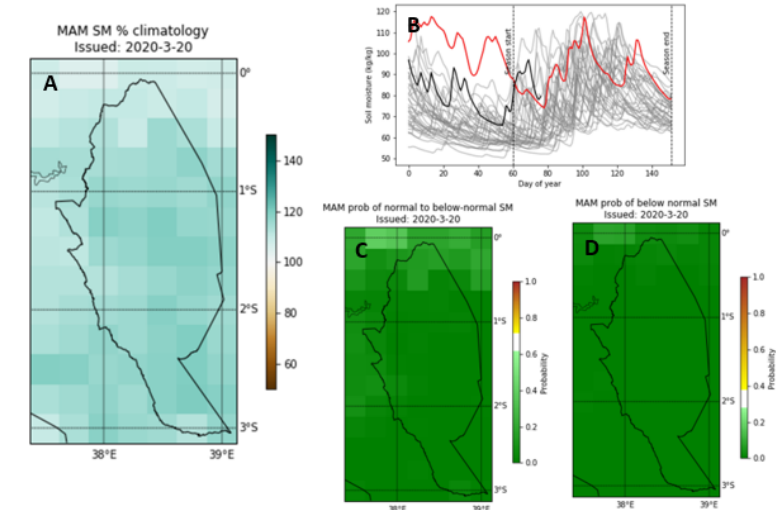
## TAMSAT-ALERT Soil Moisture Forecast for Kitui MAM 2020

Date issued: 26<sup>th</sup> March 2020

Meteorological tercile forecast: B0.30, N0.35, A0.35 (GHACOF 54)

Soil moisture tercile forecast: B0.01, N0.06, A0.93

- At this early stage in the season, the MAM forecast for Kitui County is for above average (enhanced) soil moisture conditions.
- The soil moisture forecast reflects 1) the GHACOF 54 statement forecasting slightly above normal rainfall conditions for the MAM season, and 2) the current state of the land surface, which remains wetter than usual after heavy OND rains and continuing rainfall throughout the short dry season.
- Since the previous forecast was issued, the onset of the rains has elevated soil moisture.
- Given the early stage in the season, there remains much uncertainty in the forecast. Whilst the probability of normal (<67<sup>th</sup> percentile) or below normal (<33<sup>rd</sup> percentile) soil moisture conditions are low at this [stage](#), it is too early to tell whether Kitui will experience drought conditions this MAM season.



Figures:

- A) Forecast MAM soil moisture anomaly.  
B) 2020 soil moisture (black line) compared to historic years 1983-2019 (grey lines). Red line = 1998 following heavy 1997 OND rains.  
C) Probability of normal or below normal (<67<sup>th</sup> percentile) MAM soil moisture.  
D) Probability of below normal (<33<sup>rd</sup> percentile) MAM soil moisture.

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## 2. Understand modelling of soil moisture and WRSI

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# What's next?

1. **Check your understanding:** Session 2 – Check your understanding
2. **Get in touch**
  - End-of-week clinics (Friday 8<sup>th</sup> May @ 10:00 - 11:30am)
  - Email me ([v.l.boult@reading.ac.uk](mailto:v.l.boult@reading.ac.uk))
3. **Next session:** TAMSAT-ALERT methodology