CRAFT
Climate resilient value chains for improved livelihoods

SNV Impact that matters

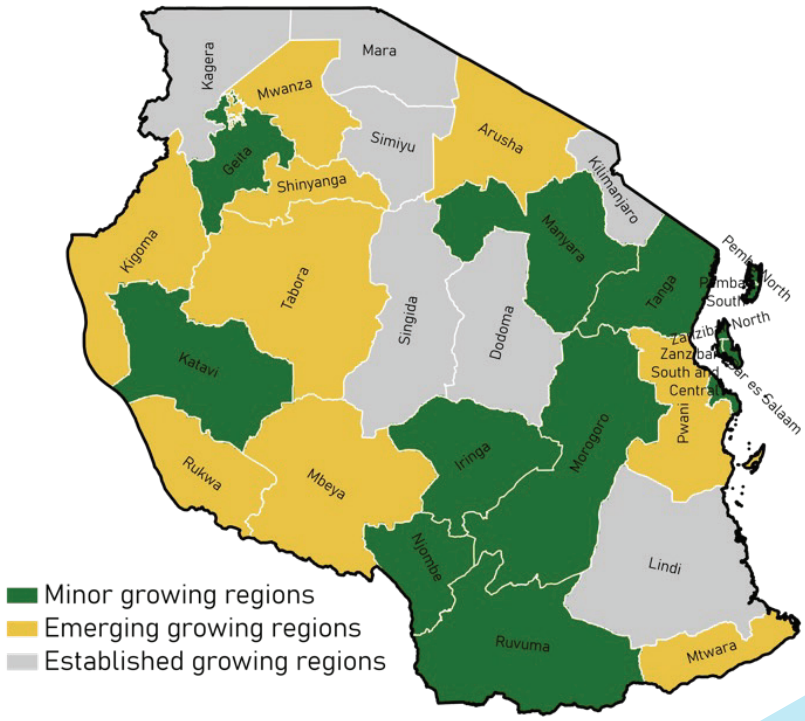
Climate Risk and Opportunities

Sorghum in Tanzania

In Tanzania, sorghum is the third most widely grown cereal after maize and rice, with a total of 834,284 ha. The average acreage at the national level per household was 1.65 acre in 2017. 90.4% of sorghum grain was used for consumption and 9.6% was used for commercialization at the national level.

In the country, sorghum is grown in almost all regions but mainly grown in Dodoma, Singida, Simiyu, Mara, Kilimanjaro, Lindi, and Kagera.

Rukwa, Kagera, Shinyanga, Njombe, Iringa, and Arusha regions are the primary producers, with an average yield of 4.9 bags /acre (1 bag ~100 kg). Rukwa has the highest productivity with an average yield of approx. 4131 kg/ha (16 bags/acre).



Note: RCP 8.5 emission scenario has been used to assess the climate change events and impacts. For future analysis, the 2050s (2006-2050) timesteps were used. For the current, the period 1981-2005 had been used. MAM refers to March, April, and May. OND refers to October, November, and December.

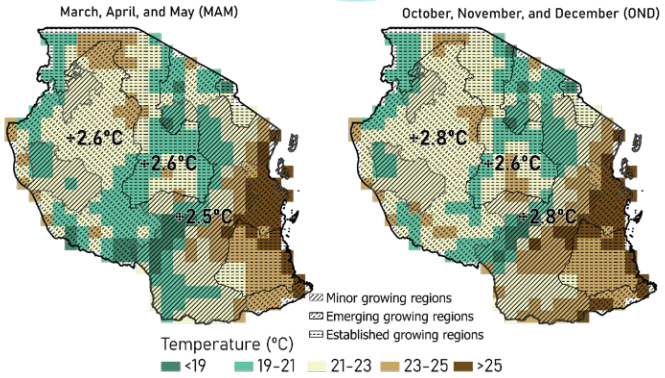
Data source: Ensembled CORDEX data.

Future climate under climate change conditions

Temperature: In the 2050s, the temperature is expected to increase in both growing seasons.

In the March, April, May season the temperature is expected to increase by +2.5°C / +2.6°C

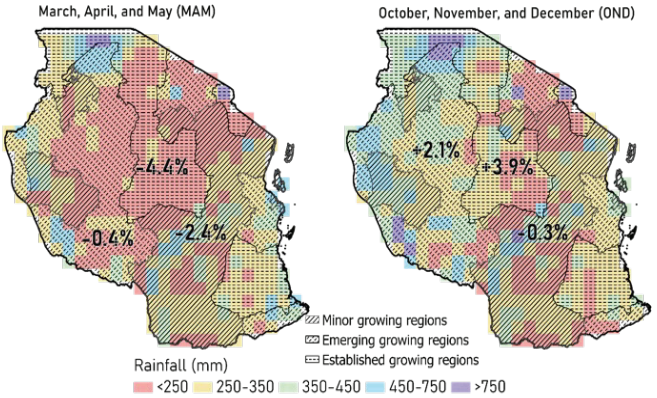
In the October, November, December season, the increase in temperature is slightly higher than in the first season (+2.6°C / + 2.8°C). Mbeya, Njombe, Ruvuma, Katavi, Rukwa, Iringa, and Singida will probably face a temperature increase of +2.9 °C.



Note: The map shows the current seasonal temperature (°C) and the changes (°C) in the future (the 2050s) for the SSP3-RCP8.5 climate change scenario for various crop-growing regions

Rainfall: Overall rainfall in the 2050s is expected to slightly decrease in most of the sorghum growing areas in the March, April, May season. Kigoma and Mwanza will probably face a -4% reduction in rainfall, but Manyara, Dodoma, Singida, and Pwani may face a +7% increase in the March-April-May season.

Likewise in the October, November, December season, the change in rainfall varies between regions. Njombe, Morogoro, and Mbeya are expected to have a -4% reduction, and Mwanza, Geita, and Mara are projected to have a +10% increase.



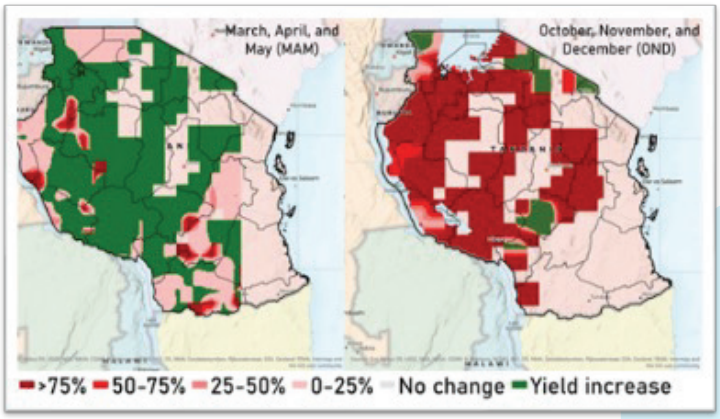
Note: The map shows current seasonal rainfall (mm) and the changes (%) in the future (the 2050s) for the SSP3-RCP8.5 climate change scenario for various crop-growing regions

A likelihood of more dry spells and late-onset of rainfall may result into more frequent drought in the Western, Southeastern, and some parts of the Central sorghum growing areas. In contrast, the Northeastern sorghum growing regions are expected to experience early-onset and longer lengths of the growing spell and more days of wet spells, which could lead to extreme rainfall events in the region.

Sorghum crop productivity changes (%) in the future

In the 2050s, sorghum yield in the country is expected to increase in a few counties from the major growing counties. Machakos, Embu, Nyeri and Laikipia are likely to face an increase in productivity (>50% yield increase).

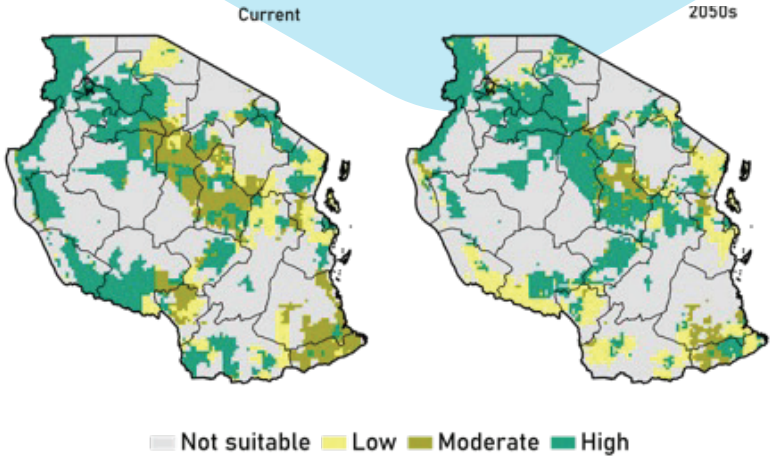
Other sorghum growing areas, however, will probably face a decrease in production such as Turkana (> 50% yield decline) and Homa Bay, Kisumu, Siaya, Busia (25-50% yield decline).



Overall, the yield decline is likely to be more severe in the MAM season than in the OND season due to higher rainfall in the OND season.

Sorghum crop-growth suitability

Overall, the change in suitability in existing sorghum-growing areas over time varies between regions. Mbeya and Rukwa become less suitable for sorghum production, whereas the Central regions change from being moderately suitable to be highly suitable for sorghum production.



The probability of drought risks risks

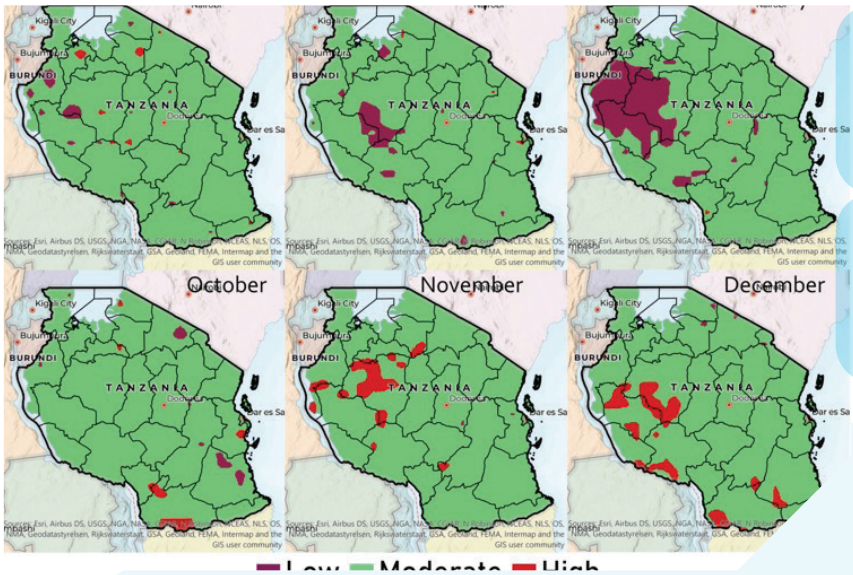
In March, the Southwestern part of Tabora and some parts of Kigoma, Geita and Mwanza are expected to face high drought risks.

In April, the Southern part of Tabora, Northeastern area of Katavi and Northwestern part of Mbeya are expected to experience high drought risks.

In May, major part of Kigoma and Katavi and western part of Tabora will probably face high drought risks.

In October, the Southern part of Ruvuma is expected to face high drought risks.

In November, the Central and Northwestern part of Tabora will probably experience high drought risks.



In December, Southern Tabora, and small parts of Mbeya, Lindi and Katavi are projected to be under high risk.

The probability of drought risks has been analyzed based on the Standardized Precipitation Index (SPI). The calculation of SPI is done based on the record of long-term precipitation for 45 years (2006-2050). To assess the risk, we calculated the occurrence of droughts over 45 years (2006-2050) for each month in rainy seasons (MAM and OND) and then calculated the probability by applying the following formula:

$$\text{Probability of drought risks} = \frac{\text{No. of droughts)}}{\text{Total years (45)}} \times 100$$

Note: In drought analysis, more than 30% of drought occurrence are classified as high-risk region, 10 to 30% of occurrences are classified as Moderate risk, and less than 10% of occurrences has been classified as Lower Risk.

Climate change adaptation strategies

Adaptation measures are listed based on the discussion with the CRAFT team from Tanzania under the following objective, *"To establish suitable adaptation strategies that will increase the adaptive capacity and resilience of the actors within the value chains."* The listed adaptation measures mainly focus on the sorghum value chain in Tanzania.

Climate risks/ impacts	Adaptation measures	Impact on resilience
Drought 	Improved drought resistant seeds.	• Reduction in risk of crop failure • Increased resilience
Onset Variation	Promote CSA practices (weather forecast appropriate crop management) and modification of cropping calendar to ensure critical plant growth stage do not coincide with bad weather condition.	• Reduction in risk of crop failure • Increased soil fertility • Increased water holding capacity • Increased resilience
Excessive rain and soil erosion	Use ridges and intercropping with cover crops.	• Increased drainage capacity • Increased soil fertility • Increased resilience farmers.
Soil degradation	Inter-cropping with cover crops especially legumes to supply more nitrogen during vegetative growth. Conduct soil testing. Use of organic manure	• Reduction in nutrient losses • Increased soil fertility • Increased water holding capacity • Crop diversification • increased resilience

Acknowledgment

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