






# Policy Brief: Climate Risk Analysis for Identifying and Weighing Adaptation Strategies in Niger's Agricultural Sector

## Climatic Changes

	<p>Depending on the scenario, <b>temperatures</b> in Niger are projected to <b>rise between 1.3 °C and 1.9 °C by 2050</b>. Further increases until the end of this century will occur with continuously high future emissions. <b>Extreme temperature events will increase</b> in all parts of the country under both emissions scenarios (Figure 1).</p>
	<p>Precipitation trends are uncertain but project an <b>increase in mean annual rainfall sums and extreme rainfall events</b>. Models hint at an <b>earlier onset of the rainy season</b> under both emissions scenarios until 2030 (Figure 2).</p>
	<p><b>Niger River</b>, the largest river of the country, is <b>projected to carry 8 % (low emissions scenario) to 12 % (high emissions scenario) more annual discharge</b> until 2040. <b>Groundwater recharge will increase mainly under the high emissions scenario</b>.</p>

The study provides a detailed assessment of projected climate parameters and related impacts on agriculture and livestock under different climate change scenarios (called Representative Concentration Pathways (RCPs) and Shared Socioeconomic Pathways (SSPs)). SSP1-RCP2.6 represents a low emissions scenario that aims to keep global warming likely below 2 °C above pre-industrial temperatures; SSP3-RCP7.0 represents the high emissions scenario built upon the assumption of continuously high future greenhouse gas emissions.

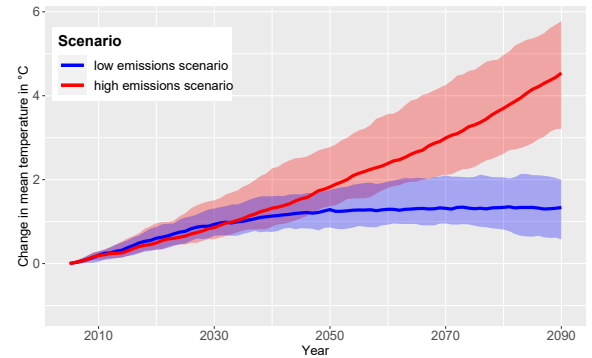


Figure 1: 21-year running mean of change in mean annual temperature in Niger.

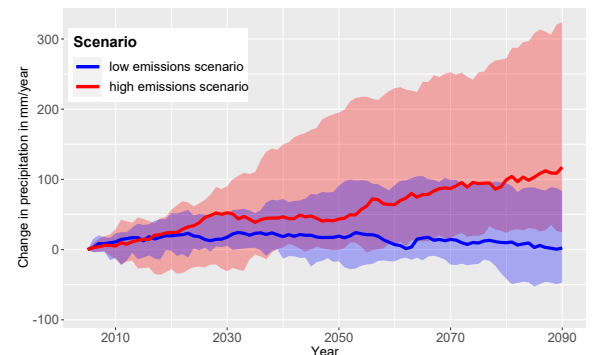


Figure 2: 21-year running mean of change in mean annual rainfall sum in Niger.

## Impacts on Agriculture

Crop suitability will shift due to climate change. More specifically, the following climate change impacts on agriculture in Niger are projected:



Under current climate conditions, 13 % of Niger's territory is considered suitable for sorghum production. **Sorghum yields on national level are projected to increase** until 2090 under both emissions scenarios.



Maize can be grown optimally only in small parts of the country under current climatic conditions. Overall, this is projected to remain the same with regional variations. In the southern parts of **Zinder and Maradi, for example, suitability is projected to increase until 2050, then decrease**.



Millet production is suitable on 6.4 % of the country under current climatic conditions. **In the northern part of Niger an increase in millet suitability is projected but for most parts of the country millet suitability will not change**.



Under current climatic conditions, 9.8 % of the country is optimally suited to grow cowpeas. Overall, the **suitability of cowpea acreage in Niger will remain stable under climate change conditions, but the optimal suitability of regions will shift**. For example, suitability will decrease in the Zinder region and increase in the Tahoua and Tillabery regions.



**Projected changes in grazing potentials show no clear, uniform trend for Niger** over the course of the 21st century. Under both future emissions scenarios, there is a **slightly decreasing trend for the south and a slightly increasing trend in grazing potentials for the central areas of the country up to 2050**. By 2090, there is an increase in grazing potential projected under the high emissions scenario for the whole country.

## Key Recommendations

As Niger's regions will be impacted by climate change differently, adaptation should be location- and context-specific. **Adaptation strategies that are well-designed for the local context can reduce yield losses induced by climate change.** In addition, they can have **various positive economic, social and environmental co-benefits** and **can contribute to combating land degradation.**

The following adaptation strategies carry the potential to mitigate the projected climate change impacts on agriculture:



**Agroforestry** in Niger is mostly practiced in the form of **Farmer Managed Natural Regeneration (FMNR)** and offers **high potential for risk mitigation with various socio-economic and environmental benefits**, as well as a **high upscaling potential**. To encourage further FMNR practices, investments and actions related to the "Great Green Wall" initiative could be leveraged.



**Integrated Soil Fertility Management (ISFM)**, especially traditional practices like Tassa and half-moons, is a promising adaptation strategy that holds great **potential for climate change adaptation with various co-benefits**. To promote the uptake of ISFM, policies towards **sustainable land use intensification** as well as the **rehabilitation of degraded soils** and the necessary mechanisms to implement and evaluate these, are recommended.



**Irrigation** has the potential to mitigate climate risks in Niger and to help diversify diets and ensure food security. **Low-cost irrigation options with low maintenance requirements** can be promoted across Niger, where water resources are available. However, to avoid over-exploitation of already scarce water resources, **raising awareness of water-efficient irrigation management** is crucial to ensure long-term responsible use of natural resources. Additionally, **mechanisms** to settle **disputes** should be implemented to **address potential conflicts between upstream and downstream users**.



**Improved fodder and feed management for livestock** shows a **high risk-mitigation potential** as well as the **shortest pay-back period (together with ISFM)**. Providing **innovative, low-cost, low-maintenance equipment for fodder storage and production** can improve the often difficult packaging and transportation of fodder crops.

## General recommendations

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- Carefully assessed **combinations of multiple adaptation strategies** can be a good option to tap into the merits of more than one strategy.
- Planning for adaptation should always be **inclusive, participatory and location-specific**, as different areas and farmer groups in Niger will be impacted by climate change differently.
- Policymakers should pay special attention to **conflict dynamics** and the needs of marginalized communities in agriculture.
- Transhumance infrastructure is key to elevating much of the underlying intercommunal tensions. Farmers may need support with initial investments until the adaptation strategy becomes profitable.
- **Smart adaptation incentives** built around land tenure systems, credit accessibility and market access are key to induce the uptake of suitable adaptation strategies.
- **Trainings and extension services** should be provided to farmers to support them with the implementation of the adaptation strategies.
- Improved soil and water management should be mainstreamed in all adaptation activities to ensure a **sustainable use of resources and leverage climate change mitigation co-benefits**.

The policy brief is based on the Scientific Report "Climate Risk Analysis for Identifying and Weighing Adaptation Strategies in Niger's Agricultural Sector" prepared by the **Potsdam Institute for Climate Impact Research (PIK)** for the **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** GmbH on behalf of the **German Federal Ministry for Economic Cooperation and Development (BMZ)**.

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