Testing of Adapted Varieties in Mayahi Department, Niger



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Context – Niger

- Landlocked country in West Africa
- HDI 2014: 187
- 16,5 million people with a annual growth rate of 3.6 per cent
- More than 80 % of the population is engaged in the agriculture and livestock sector
- Only 15 % of the country are arable and located mainly along the southern border with Nigeria
- Millet, sorghum and cowpea are Niger's principal subsistence crops
- Rainfall is 200mm – 450mm on average, but with considerate annual variability
- 1 year in 3 is associated with poor food security conditions

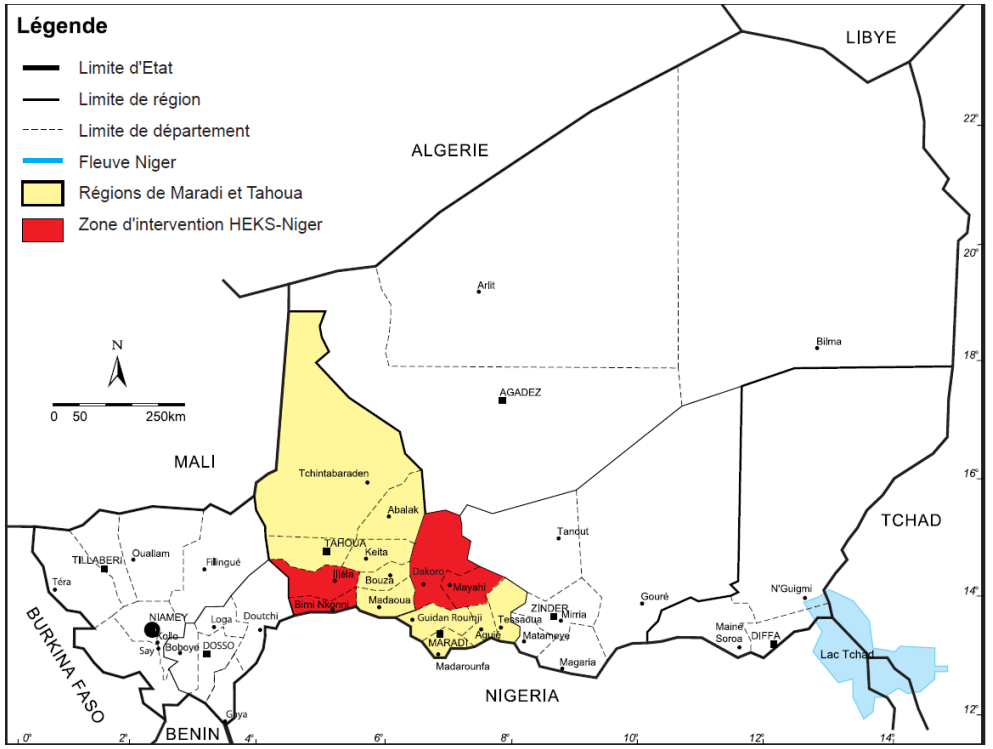

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Figure 3: Impacts of climate change in Africa[30]

Key

- Food production
- Livelihoods, health and/or economics
- Rivers, lakes, floods and/or drought
- Terrestrial ecosystems
- Wildfire
- Marine ecosystem
- Glaciers, snow, ice and/or permafrost

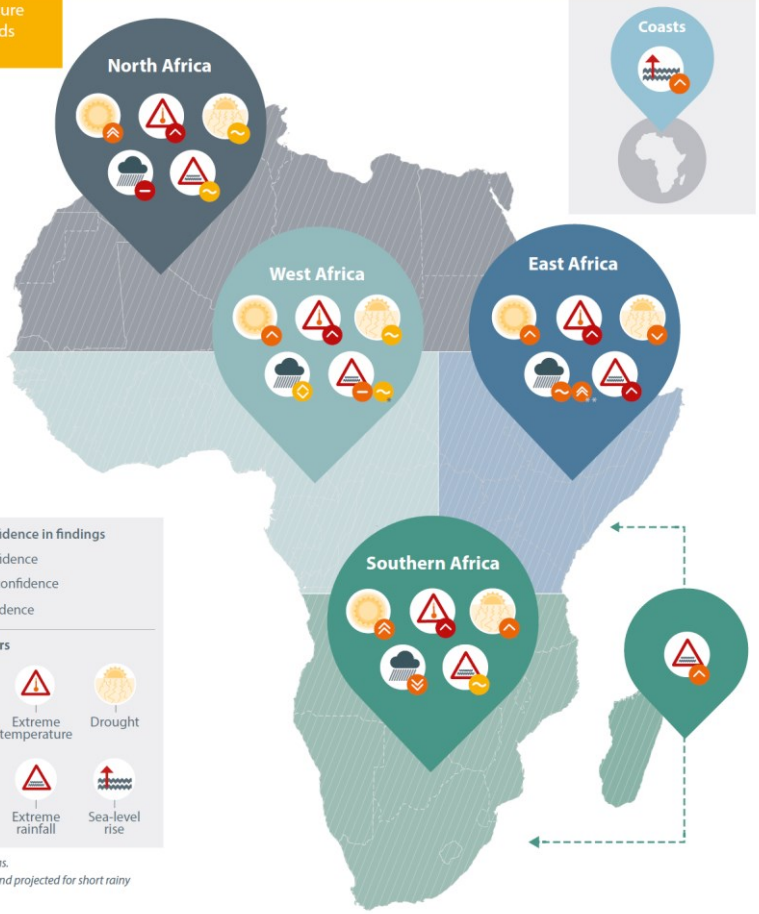
Major contribution of climate change

Minor contribution of climate change

Confidence in attribution to climate change

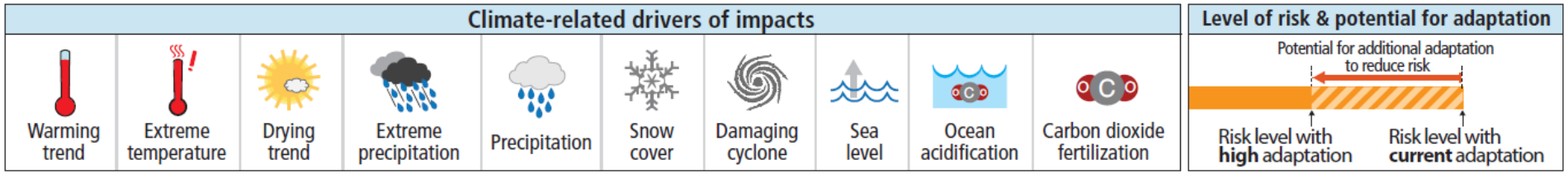
Very high | Medium | Low | High | Very low

Figure 4: Future climate trends for Africa



Symbol	Rainfall	Temperature	Extreme rainfall, extreme temperature, sea-level rise
	up to 30% increasing trend	1–6°C increasing trend	–
	up to 10% increasing trend	1–4.5°C increasing trend	increasing trend
	both increasing and decreasing trends	–	both increasing and decreasing trends
	up to 10% decreasing trend	–	decreasing trend
	up to 30% decreasing trend	–	–
	inconsistent trend	inconsistent trend	inconsistent trend
	no or only slight change	inconsistent trend	inconsistent trend

Adaptation Strategies for Africa



Africa

Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Compounded stress on water resources facing significant strain from overexploitation and degradation at present and increased demand in the future, with drought stress exacerbated in drought-prone regions of Africa (*high confidence*) [22.3-4]	• Reducing non-climate stressors on water resources • Strengthening institutional capacities for demand management, groundwater assessment, integrated water-wastewater planning, and integrated land and water governance • Sustainable urban development		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	Very low – Medium – Very high
Reduced crop productivity associated with heat and drought stress, with strong adverse effects on regional, national, and household livelihood and food security, also given increased pest and disease damage and flood impacts on food system infrastructure (*high confidence*) [22.3-4]	• Technological adaptation responses (e.g., stress-tolerant crop varieties, irrigation, enhanced observation systems) • Enhancing smallholder access to credit and other critical production resources; Diversifying livelihoods • Strengthening institutions at local, national, and regional levels to support agriculture (including early warning systems) and gender-oriented policy • Agronomic adaptation responses (e.g., agroforestry, conservation agriculture)		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	Very low – Medium – Very high
Changes in the incidence and geographic range of vector- and water-borne diseases due to changes in the mean and variability of temperature and precipitation, particularly along the edges of their distribution (*medium confidence*) [22.3]	• Achieving development goals, particularly improved access to safe water and improved sanitation, and enhancement of public health functions such as surveillance • Vulnerability mapping and early warning systems • Coordination across sectors • Sustainable urban development		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	Very low – Medium – Very high

Climate Risks in Niger

- ***Droughts*** area a major driver of vulnerability in terms of food insecurity and malnutrition
- Niger is currently experiencing an increase in overall precipition, however,
  - → Increase of extreme precipitation events
  - → Increase of anomalies among rainy seasons
- Increase in temperature by more than 0.7°C over the past century
  - → Impact of temperature increase on soil productivity and moisture is unlikely to be compensated by the raise in precipitation

Figure 2: Impacts of shocks on agricultural and livestock production in Niger (1980-2010)
Source: World Bank [4]

Issues regarding food insecurity in Mayahi department leading to the project choice

- Population growth
- Small plots with no possibility for expansion to increase production
- Small yields: average 503kg/ha for millet and 200kg/ha for cowpea in Mayahi district
- Loss of harvest due to pests (fungi, moths, plant louses)
- Loss of stored cowpeas to weevils
- Rain variability, particularly a shortening of the rainy season
- Recurrent drought

- **General Objective:**

  Contribute to food security and farm incomes of producers in the department of Mayahi by increasing the production of millet and cowpea

- **Outcomes:**

– Increase the use of improved varieties which are adapted to the climatic conditions of the intervention area

– Establish demonstration units showcasting promising agricultural technologies to increase yields of millet and cowpea

– Strengthen the capacity of farmers in the production and sale of animal feed from agricultural by-products

Activities related to adapted seed varieties

- Promotion of adapted seed varieties: Millet HPK (expected yield 800 kg/ha) and cowpea IT90k272 (expected yield 1500 kg/ha) → local improved variety; fast maturing, no GMO, no hybrids
- Demonstration plots for testing the new varieties are installed by 1000 farmers in 10 villages → 3 ways of production: pure millet /cowpea; planting in Zaï; planting in rows of millet and cowpea
- Pilot farmers document plant development, growth and yields
- Sensitization of wider farming community of the department through open days and media campaigns

Other project activities (NRM, pest control and post-harvest management and income generation)

- Training in natural resource management: use of Zaï, tillage, compost, water harvesting
- Production and use of natural pesticide made from the Neem tree and the use ichneumon wasp
- Use of PICS bag (improved crop storage bag) for efficient postharvest management
- Production of multi-nutrition fodder blocs made of harvest byproducts enriched with phosphor and salt which can be sold for additional income

First Project Results

- **Pure cultures (57 farmers):**

– Millet: yields vary from ***336 to1296 kg/ha*** with an ***average of 739 kg/ha*** with a yield increase of 47% compared to average yield of Mayahi department (503 kg/ha).

– Cowpea: yields vary from ***108 to 660kg/ha*** with an average of ***288 kg/ha*** with a yield increase of 44% compared to the average yield of the department (200kg/ha).

- **Planting in Zaï for unproductive soil (20 farmers):**

– Millet: yields vary from ***360 to 1140 kg/ha*** with a mean of ***661 kg/ha.***

- **Planting in rows - 4x4 rows millet/cowpea (40 farmers):**

– The yield for millet ranged from ***190 to 2376 kg/ha*** with an average yield of ***1063 kg/ha*** for millet. The yields for cowpea ranged from ***334 to 831kg/ha*** with an average of ***502 kg/ha*** for cowpeas. Total average production yield: ***1565 kg/ha***.

First Project Results

Further activities conducted in 2014:

- Formation in soil and water conservation techniques
- Formation in conservation agriculture: compost making, production and use of pesticide from the Neem tree, use of ichneumon wasp
- Formation on postharvest management & distribution of PICS bags
- Formation on the production of multi-nutrition fodder blocs and formation of production units
- Open day in one project village

→ *The effect of these techniques on the yields of millet and cowpeas has yet to be explored*

Lessons Learnt and Challenges

- First tests show that it is possible to increase the yields with the use of improved varieties adapted to changing climatic conditions as well as measures of conservation agriculture → Test area is still small and needs to be increased for more robust test results
- Plantation in rows 4x4 millet/cowpea proves to be particularly successful for farmers with small and unproductive (sandy soils) fields
- Variation of yields between the farmers is still very high → this needs to be further investigated
- Business mentality of farmers still missing: More sensitization of producers on why to invest in technology to increase yield and the marketing of surplus production or by-products (fodder blocs) is needed