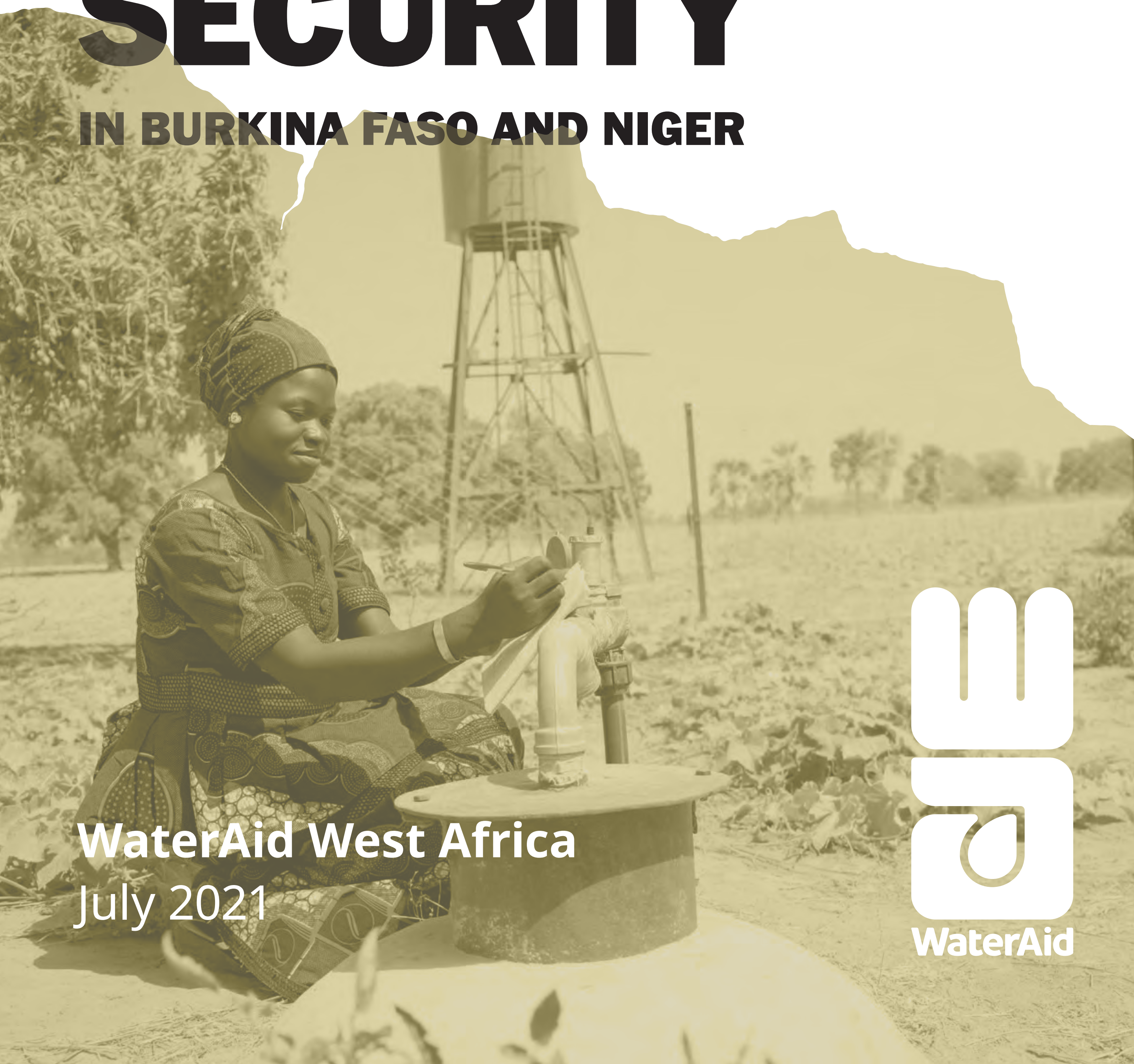
CLIMATE CHANGE AND WATER SECURITY

IN BURKINA FASO AND NIGER



WaterAid West Africa
July 2021

WaterAid

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Map 1: West African Countries.

ACRONYMS AND ABBREVIATIONS

ABN	Autorité du Bassin du Niger (The Niger Basin Authority)
ABV	Autorité du Bassin de la Volta (The Volta Basin Authority)
AfDB	African Development Bank
AMMA	African Monsoon Multidisciplinary Analysis
WRCC	Water Resources Coordination Center
CILSS	Inter-State Committee for Drought Control in the Sahel
CISE	Comité Inter Service sur l'Eau (Inter-Department Committee on Water)
CNEau	Conseil National de l'Eau (National Water Council)
CNEDD	Conseil National de l'Environnement pour un Développement Durable (The National Council of the Environment for Sustainable Development)
CTE	Comité Technique de l'Eau (The technical Committee on Water]
DGM	Direction Générale de la Météorologie Nationale (The General Directorate of National Meteorology)
DGRE	Direction Générale des Ressources en Eau (The General Directorate of Water Resources)
ECOMOG	Economic Community of West African States Cease-fire Monitoring Group
ECOWAS	Economic Community of West African States
EDSN	Enquête Démographique et de Santé et à Indicateurs Multiples (Multiple Indicator Demographic and Health Survey)
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GHG	Greenhouse Gases
HDI	Human Development Index
INSD	Institut National de la Statistique et de la Démographie (National Institute of Statistics and Demography)
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
JISAO	Joint Institute for the Study of the Atmosphere and Ocean
JRC	Joint Research Center

LAME	Laboratoire d'analyse mathématique et d'équations (The Laboratory of Mathematical Analysis and Equations)
LCBC	Lake Chad Basin Commission
MDG	Millennium Development Goal
NAP	National Adaptation Plan
NAPA	National Action Program for Adaptation to Climate Variability and Change
NEPAD	New Partnership for Africa's Development
OECD	Organization for Economic Cooperation and Development
OMVG	Organisation pour la Mise en valeur du fleuve Gambie (Organization for the Development of the Gambia River)
OMVS	Organisation pour la Mise en valeur du fleuve Sénégal (Organization for the Development of the Senegal River)
ONEA	Office National de l'Eau et de l'Assainissement (National Office for Water and Sanitation)
OSS	Observatoire du Sahara et du Sahel (Sahara and Sahel Observatory)
PAGIRE	Plan d'Action pour la Gestion Intégrée des Ressources en Eau (Action Plan for Integrated Water Resource Management)
PNDES	Plan National de Développement Economique et Social (National Economic and Social Development Plan)
PNGIRE	Programme National pour la Gestion Intégrée des Ressources en Eau (National Program for Integrated Water Resources Management)
RCM	Regional Climate Models
RGPH	Recensement Général de la Population et de l'Habitat (General Census of Population and Housing)
SDAGE	Schémas directeurs d'aménagement et de gestion de l'eau (Master plans for water development and management)
SDG	Sustainable Development Goal
SPI	Standardized Precipitation Index
SWAC	Sahel and West Africa Club
TCN	Third National Communication
WAEMU	West African Economic and Monetary Union (also abbreviated to UEMOA)
UICN	International Union for Conservation of Nature
UN	United Nations Organization
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
WANWATCE	West African Network of NEPAD Centers of Excellence for Water Science and Technology
WASH	Water, Sanitation and Hygiene
WAWRP	West Africa Water Resources Policy
WB	World Bank
WHO	World Health Organization
WRI	World Risk Index

INTRODUCTION

West Africa has experienced a 2°C temperature increase since 1950, and the Sahel region is undoubtedly one of the most vulnerable areas to climate change in the world.

There has been a series of droughts since the 1970s with a general decline in rainfall. This situation greatly compromises key development sectors such as agriculture and endangers the well-being of the more than 340 million people living in the area (Unesco, 2019).

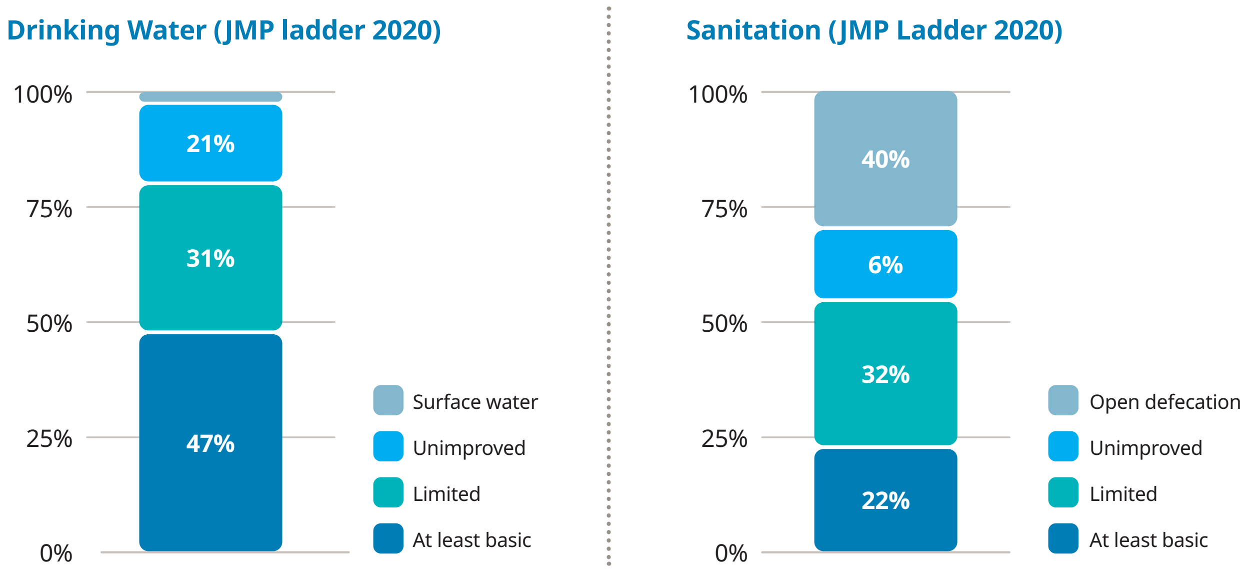
The region has significant water resources, and yet access to drinking water and sanitation remains a concern for 40% and 60% of the population respectively (IUCN, 2018). Many people still rely on surface water sources, such as rivers and ponds, which are vulnerable to climate shocks and disasters.

It is expected that the demand for water in the West African region will continue to increase due to population growth, economic development and changes in water consumption by sectors such as agriculture, domestic needs and industry. According to the World Bank report (2016) “water scarcity exacerbated by climate change could lead to GDP declines of up to 6% in some regions, and cause migration and conflict”.

Variations in monthly and annual rainfall have direct impacts on water availability in rivers and lakes. In a context of rapid urbanization, water supply to large cities will remain one of the main challenges of resource management in West Africa in the years to come.

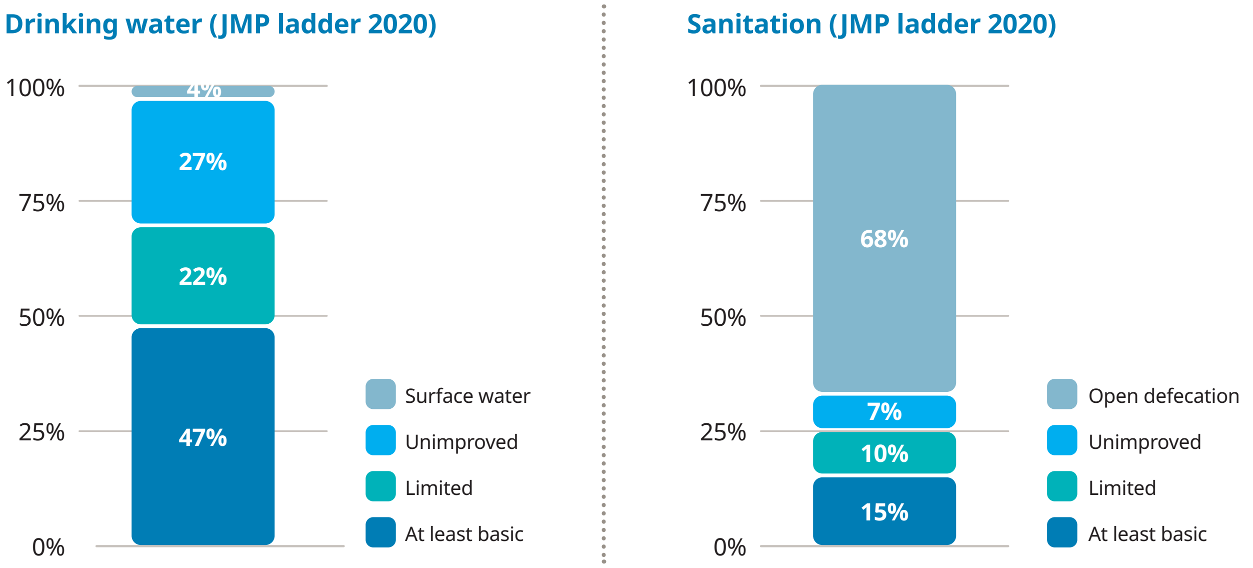
Thus, Burkina Faso still remains at a more or less low level with a water access rate of **48,7% in 2015**, despite the efforts made to increase the level of access to water for the population. Moreover, this rate dropped slightly in **2020 to 47%**, which can be probably attributed to rainfall variations.

Figure 1: Drinking water and sanitation in Burkina Faso.



Source: (JMP 2020).

Figure 2: Drinking water and sanitation management in Niger.



Source: (JMP 2020).

Niger has enshrined the sustainable management of water resources in its 2010 constitution. Efforts over the past two decades have raised the national rate of access to drinking water from 48.7% in 2015 to 50% in 2017 but declined in 2020 with an access rate of 47%.

However, Niger is still among the countries with the lowest level of access to sanitation in the UEMOA region, which is partly due to a predominantly rural population spread over a vast territory. According to recent JMP data, 68% of people in 2020 do not have access to basic sanitation

We all need clean water to survive.but right now, climate change is making life harder for the poorest people in West Africa who are already struggling to access it.

The effects of climate change are negatively impacting the availability of drinking water (increased water stress) as well as the quality of water resources. These factors aggravate the living conditions of these already vulnerable populations and will increase and strain the resilience of communities, exposing them further to the effects of climate change.

With climate change making rainfall less predictable and flooding more likely, the need to reach everyone with safe WASH services is more urgent than ever. Without climate-resilient services, communities will struggle to adapt to climate change and withstand natural disasters.

Water insecurity is also determined by interrelated non-climatic factors, such as geographic location, demography, water availability, use and management, legal frameworks for water management, governance structures and institutions, and ecosystem resilience.

This study focuses on the situation in two Sahelian countries: Burkina Faso and Niger, with the main objective of better understanding the present and future impacts of climate change on water resources, particularly in terms of water security. It makes recommendations to governments for policies and programs that integrate water security and climate change adaptation to ensure access to WASH services for all, everywhere by 2030.

WaterAid is campaigning for better integration and financing of WASH as a means of adaptation to climate change and for its inclusion in National Adaptation Plans to accelerate the achievement of SDGs.

Methodology

This study is based on a desk review and an analysis of hydro-climatic data. Different methods and tools are used to analyse the climate and highlight its annual and seasonal dynamics. In addition, various software packages were used to detect climate change and to determine the present and future impacts of climate change on water resources.

However, requests for data sent to the various ministries were often not acted upon. This has had a major impact on our ability to update and interpret the data.

◀ Moustapha checking water level at the sand dam constructed accross the riverbed. The sand dam is used to improve water retention and recharging of groundwater, in the village of Sablogo, in the Commune of Lalgaye, province of Koulpelogo, Region of Centre-East, Burkina Faso. February 2018.

Statistics West Africa

Area: 6,140,000 km²

Number of countries: 16

Economic activity: Agriculture, pastoral livestock and, to a lesser extent, the exploitation of forest products (OSS, 2018)

Population: 391 million

Rivers: Niger, Senegal, Gambia and Volta

Environment: Hot intertropical zone

Water access rate: 69.8% (JMP 2019)

Climate: Dry season and wet season. Arid (Sahelian) or sub-humid (Sudanian to Sub-Guinean) climate

Sanitation access rate: 32.7% (JMP 2019)

Fatimata Coulibaly, 29, a member of the Benkadi women's group who is in charge of water monitoring and management, taking a reading of the water meter of the water tower, Kakounouso, Samabogo, Circle of Bla, Segou Region, Mali. February 2019.

Water governance in West Africa

Niger Basin Authority

The Niger Basin Authority (ABN) is the body that has been ensuring concerted management of water resources with nine-member states since 1980, including Burkina Faso and Niger. Since its creation, it has ensured sustainable access to water for communities and protected them from conflict situations in the basin.

Water Resources Coordination (WRCC)

The Economic Community of West African States (ECOWAS) has implemented a regional water policy to reduce poverty and contribute to sustainable development. The Water Resources Coordination Centre (WRCC) is responsible for monitoring and supervising ECOWAS activities in the field of water management, through the implementation of the Water Resources Policy for West Africa (WAPA) and its Regional Action Plan. WRCC's objective is to promote integrated water resources management (IWRM) practices, coordinate and monitor regional actions in order to make IWRM operational in West Africa, in accordance with ECOWAS statute, policies and programs.

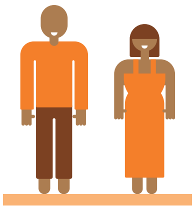
Volta Basin Authority

The Volta region has also been the subject of inter-state cooperation since 2007, bringing together six (6) states, namely Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali and Togo. Projects have been completed and others are underway to introduce measures to ensure sustainable transboundary water resources management (ABV Report, 2013).

STATISTICS FOR BURKINA FASO

Area:

274,200 km^2

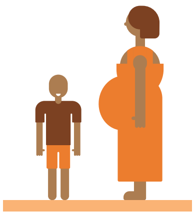


Population in 2019:

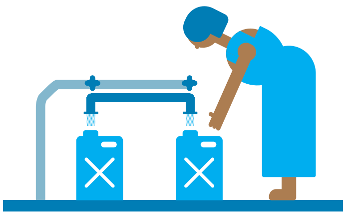
21,510,181

Population growth rate:

3.1% per year

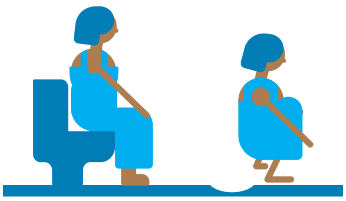


Percentage of the population with basic access to:



water

47%



sanitation

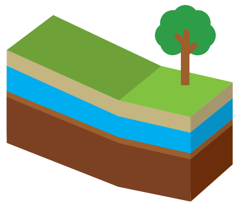
22%

Practicing open defecation

40%

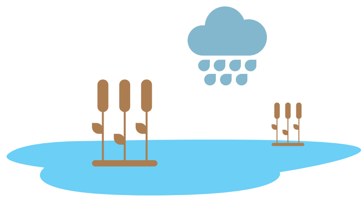
Surface water resources:

8 km^3/year



Groundwater resource:

9.5 km^3/year



Renewable water resources per capita

690 km^3/year

Dependency index

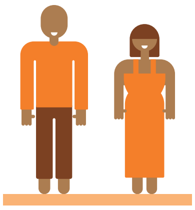
0%

Source: (JMP 2020).

STATISTICS FOR NIGER

Area:

1,267,000 km²

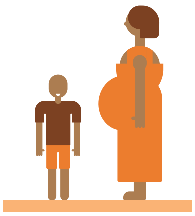


Population in 2019:

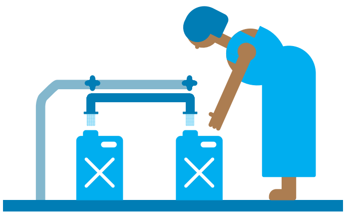
21,477,181

Population growth rate:

3.9% per year

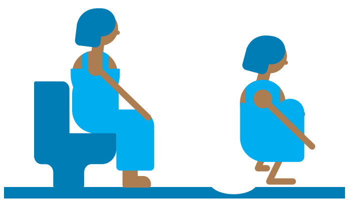


Percentage of the population with basic access to:



water

47%



sanitation

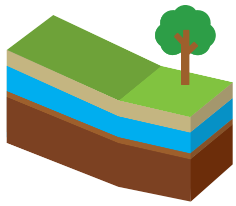
15%

Practicing open defecation

68%

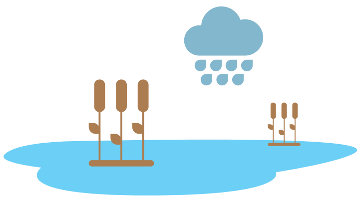
Surface water resources:

30billion m³/year



Groundwater resource:

33.65 km³/year



Renewable water resources per capita

2m³/year

Dependency index

90%

Source: (JMP 2020).

1. CURRENT CLIMATE TRENDS IN BURKINA FASO AND NIGER

1.1. Declining trend in cumulative annual rainfall and decreasing number of rainy day

Rainfall in Burkina Faso has shown a downward trend in the number of rainy days index. An increasing trend in the number of consecutive days without rain (46 to 57 days) per decade in the localities of Dédougou, Farakoba and Ouahigouya was also observed[1].

The trend in rainfall is downward at the reference weather stations of Dori (Sahelian zone), Ouagadougou (Sudan-Sahelian zone) and Bobo-Dioulasso (Sudanian zone) over the period 1960-2011.

This variability in rainfall is also noted for Niger. Although the trend over the period 1960-2010 indicates a resumption of rainfall surpluses since 1990, the country remains marked by alternating dry and wet winters, which greatly increases the inter-annual variability of rainfall.

In Niger, the spatial distribution of the number of rainy days is highly differentiated, with less than 20-30 days in the eastern part of the agricultural zone to 40 or even 50 days in the extreme south of the country, such as the Gaya zone.

Several parts of the country show an increasing trend in the number of days with cumulative average maximum rainfall, which is now three consecutive days with values between 50 and 90mm of rainfall.

For the period 1991-2000, **the rainy season had a late start and an early end with often extreme rainfall breaks, thus constituting "false start" situations for the crops**.

1.2. Increase in the number of extreme events

In Burkina, long-term observation of temperature extremes indicates an **increasing trend in hot days and hot nights, with the exception of the south-western regions where there is a decreasing trend in hot nights**[2].

Annual temperature extremes (annual minimum and annual maximum temperatures) show a general upward trend in both the Sudanian and Sahelian zones. However, this increase is more pronounced for annual minimum temperatures than for annual maximum temperatures.

As with Burkina Faso, Niger is also experiencing an **increasing and continuous rise in temperature**. This situation has been very noticeable since the 1980s for minimum temperatures and 1990 for maximum temperatures. **During the period 1991-2010, we observe an increase in minimum temperatures of +1.2°C compared to +0.48°C for minimum temperatures.**

An analysis of temperature indices during the periods 1961-1990 and 1991-2010 was conducted in the agro-climatic Atlas framework on climate variability and change in Niger (2015). It shows a generalised warming with a decrease in the frequency of cold nights from an average of 10 to 5 between the period 1961-1990 and the recent period 1991-2010.

It further shows an increase in heat waves from an average of 6 days over the period 1961-1990 to more than 20 days in the current period.

1. The analysis of the National Meteorological Directorate (DGM).
2. In Burkina Faso's National Climate Change Adaptation Plan (2015).

2. TWO COUNTRIES IN WATER STRESS

2.1. Burkina Faso: a water-stressed country

In the West African Economic and Monetary Union (WAEMU) region, Burkina Faso is the country with the least amount of renewable freshwater (690 m^3 per capita), placing it in a situation of water scarcity (the threshold is 1,000 m^3/year/person).

The exploitable water resources in Burkina Faso are of the order of 4,750 km^3/year or 280 m^3/year per capita for the population in 2013 and come solely from surface water, in its current state of degradation and as long as the aquifers are not renewed, groundwater should be treated as useless or even non-renewable resources[3].

Estimates of Burkina Faso's groundwater resources remain highly variable according to studies. According to a recent study (WB, 2017a, b, c), Burkina Faso's total groundwater potential is estimated at around 302 billion m^3.
The internal renewable groundwater resources are 9.5 km^3/year.

Estimates of available water resources in the four national basins and the ever-increasing demands indicate that Burkina Faso is in a situation of scarcity in the sense of sustainable resource management (Climate Analytics, 2015).

The water supply of large urban areas in a context of rapid urbanization will remain one of the main resource management challenges for Burkina Faso in the coming years. Indeed, according to AMCOW water availability is about 899 m^3/year per person (2018).

Regarding water quality, in 2011, an alarm bell was rung: "if, on a national scale, it can be said that the water quality monitoring network managed by the DGRE is insufficient, at the level of the Mouhoun, Comoé and Banifing sub-basins, the situation is even more deplorable[4]".

Table 1: Renewable water resources in Burkina Faso.

Renewable water resources			
Average rainfall (long term)	–	748	mm/year
Long-term average annual precipitation in volume	–	205, 100	Million m^3/year
Internal renewable water resources (long term average)	–	12, 500	Million m^3/year
Total renewable water resources	–	12, 500	Million m^3/year
Dependency index	–	0	%
Total renewable water resources per capita	2013	738	m^3/year
Total dam capacity	2011	5, 287	Million m^3

Source: FAO, 2015

3. According to FAO (2015).

Table 2: The renewable water resources of Niger.

Renewable water resources			
Rainfall (long-term average)	–	151	mm/year
Long-term average annual precipitation in volume	–	191 300	Million m^3/year
Internal renewable water resources (long-term average)	–	3 500	Million m^3/year
Total renewable water resources	–	33 650	Million m^3/year
Dependency index	–	89.6	%
Total renewable water resources per capita	2011	2 094	m^3/year
Total dam capacity	2012	76	Million m^3

Source: FAO, 2015.

2.2. Niger: heavy dependence on border flows

Although 75% of the country is covered by the Sahara Desert and has the lowest average national rainfall in the WAEMU region (190 mm/year), Niger has significant quantities of water resources (groundwater and surface water). Niger's renewable surface water resources exceed 31 km^3 per year. However, Niger has a very high dependency index: **89.6%**[5]. The country depends mainly on Mali (28 km^3/year), Burkina Faso (1 km^3/year) and Nigeria (0.2 km^3/year) and on transboundary flows (1.15 km^3/year) from the Sokoto River tributary bordering Benin and Nigeria.

Despite the harsh climate, Niger has significant groundwater reserves. Although only 2 per thousand of the groundwater is renewed annually, so far the exploitation of these aquifers remains insignificant. The Sahara and Sahel Observatory estimated in 1995 that Niger was using less than 10% of its total groundwater resources. In 2003, this figure was estimated at 20% (National Environment Council for Sustainable Development). In addition, some of the groundwater in Niger is highly mineralised, due to heavy evaporation and/or the age and dissolution of the minerals in the aquifer. There is a year on year decrease in the flow of the River Niger and the silting up of watercourses.

The challenges of water management in Niger are contributing to wider problems of development and mobilisation of water resources, regulation of surface water flows, and equitable allocation of the resource in periods and years of pronounced deficits.

Very little regular and reliable data on the physico-chemical and bacteriological qualities are available on the River Niger. An analysis of the data on suspended solids shows that during the rainy period (June – September) levels of around 2 g/l of suspended solids are obtained[6]. This indicates the flow of rainwater into the river, well loaded with silt, clay and other fine particles of various solid waste.

4. (COWI, 2011b).
5. Water dependency ration: portion of total renewable water resources originating outside the country. A country with a dependency ratio equal to 100% receives all its renewable water from upstream countries, without producing any of its own.
6. However, SEEN7 takes samples and conducts daily analyses.

3. CLIMATE VULNERABILITY: ALARMING FORECASTS

3.1. Burkina Faso: a peak of 1.7°C or even 2.2°C in 2050

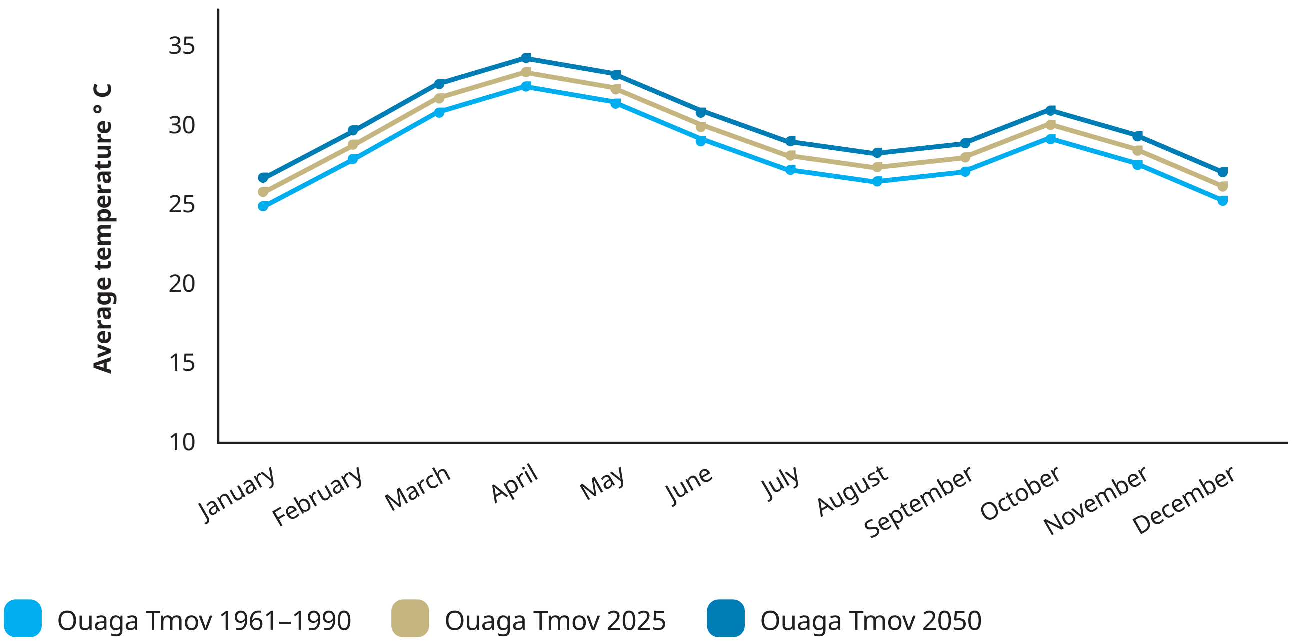
The World Risk Index (WRI), which represents the degree of vulnerability of a human community to natural disasters, is estimated at 9.62 for Burkina Faso (median of 3.41).

In 2005, the Government of Burkina Faso developed a National Action Programme for Adaptation to Climate Variability and Change (NAPA) which was adopted in 2007. In 2015, Burkina Faso published its National Climate Change Adaptation Plan ((NAP), in which three climate stations were considered: Dori (Sahelian zone), Ouagadougou (Sudano-Sahelian zone) and Bobo-Dioulasso (Sudanian zone).

The values adopted by the Government in the framework of the NAP(2015) indicate that the country could experience a temperature increase of 0.8°C on average, and a peak of 1.7°C or even 2.2°C in 2050 over the entire territory of Burkina Faso, although there will be disparities according to the climate domain (MRAH, 2013).

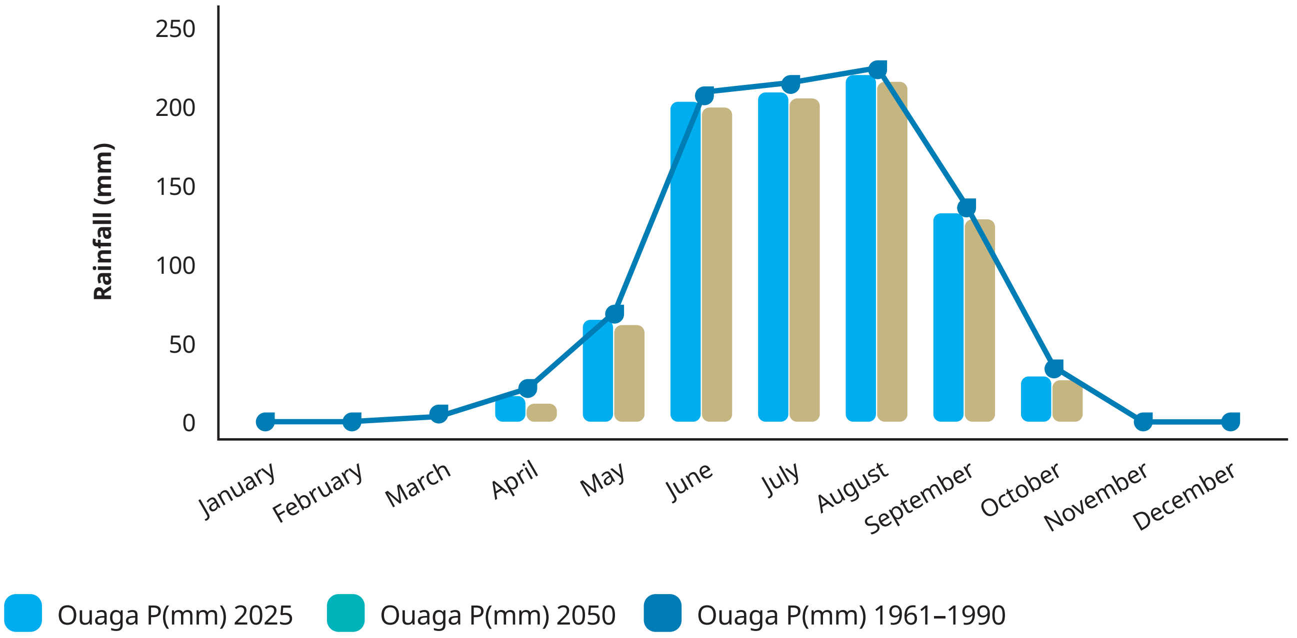
The Sahelian domain will undoubtedly be the most affected, with an average rise of almost 2°C, compared to an average of 1.5°C in the Sudanian domain. The rise in temperature will lead to an increase in extreme climatic phenomena (droughts, floods) and hydro-climatic disasters in terms of frequency and intensity (Touré et al, 2013).

Figure 3: Average monthly temperatures observed and simulated in Ouagadougou (MAGICC/SCENGEN model).



Source: WaterAid (2020) based on updated data.

Figure 4: Average monthly rainfall observed and simulated in Ouagadougou (MAGICC/SCENGEN model).



Source: WaterAid (2020) based on updated data.

3.2. Niger: an increase of 2.0°C to 4.6°C by 2080

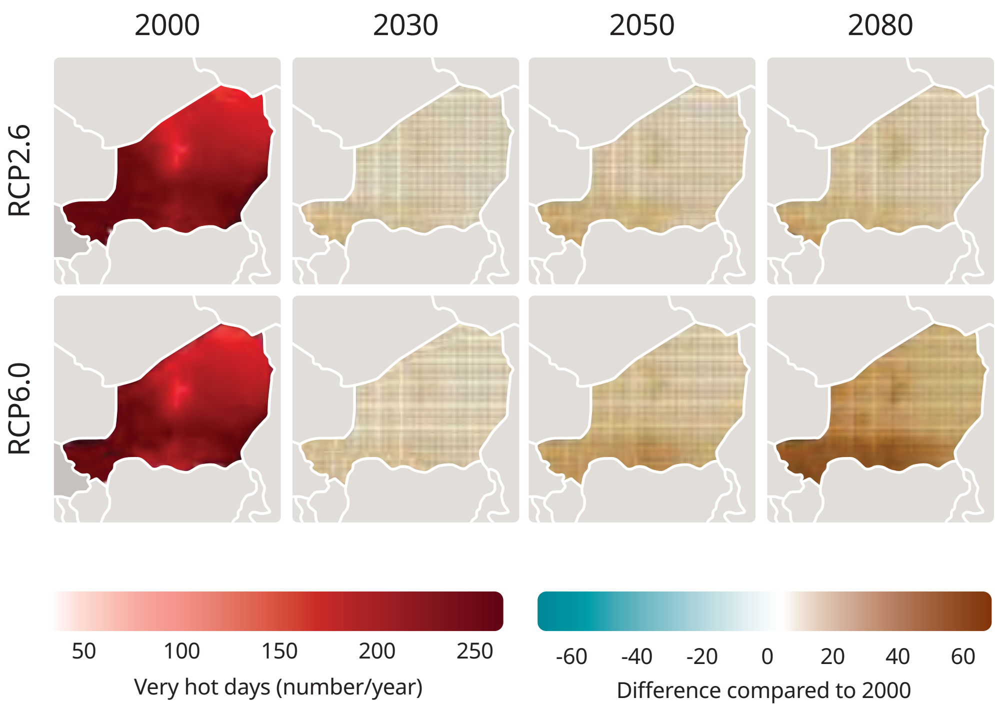
Niger's temperature is projected to increase by 2.0°C to 4.6°C by 2080 compared to pre-industrial levels, with higher temperatures and more extreme temperatures in the southwest of the country . In parallel with the increase in average annual temperatures, the number of very hot days per year (maximum temperature exceeds 35°C) is expected to rise sharply, particularly in the southwest of the country.

Under the medium to high emissions scenario RCP6.0, the median of the multi-model ensemble (averaged over the whole country) projects 16 more very hot days per year in 2030 than in 2000, 27 in 2050 and 40 in 2080.

In some parts of the country, particularly in the south-west, this equates to about 300 very hot days per year by 2080.

▼ Francois Nikiema, 31, market gardener, standing in the middle of the dried up bed of the dam of Yargho in the commune of Toece, Bazega province, south central region, Burkina Faso. February 2021.

Figure 5: Projections of the annual number of very hot days (maximum daily temperature above 35°C in Niger for the different scenarios of GHG emissions.



Source: Niger Climate Risk Profile (GIZ 2020).

3.3. Projections on uncertain rainfall

Projections for rainfall are less certain than for temperature due to the high natural variability from year to year.

In Burkina, a small relative decrease in rainfall of -3.4% in 2025 and -7.3% in 2050 is projected. This decrease in rainfall would be coupled with a very high seasonal and interannual variability of climate parameters (Touré et al, 2013). The median projection for RCP2.6 indicates that precipitation is projected to increase by 29 mm per year by 2080, while the median projection for RCP6.0 indicates a smaller annual increase of 19 mm by 2080 compared to 2000.

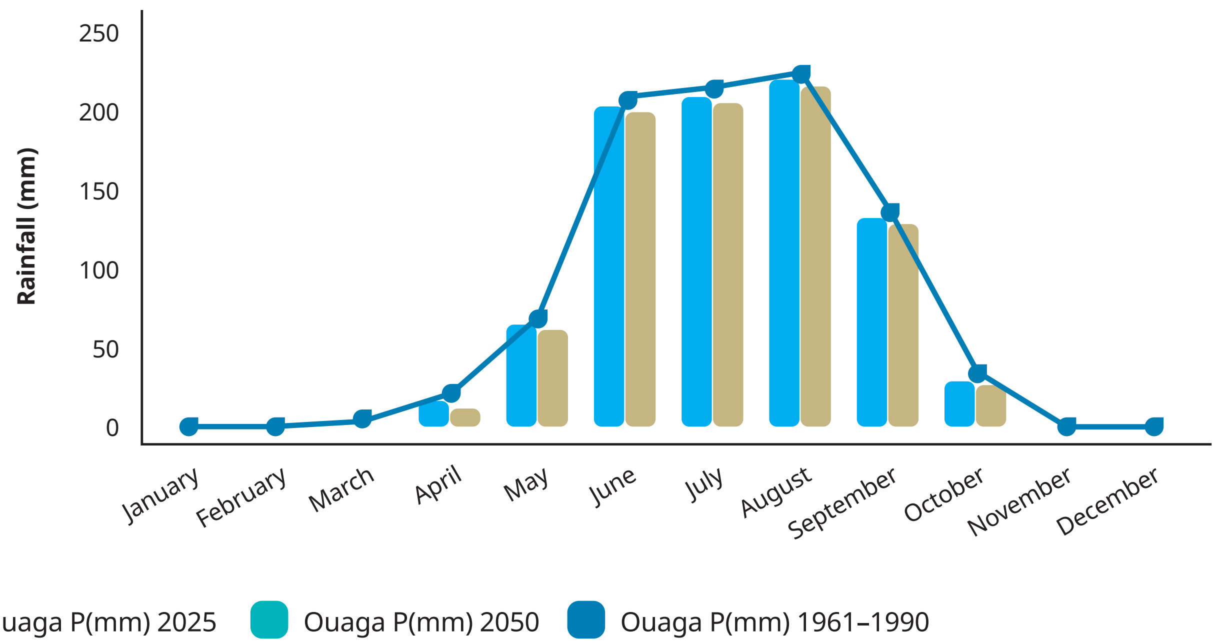
In Niger, projections of absolute changes in mean annual rainfall vary greatly from region to region. Of the four climate models on which this analysis is based, one model predicts virtually no change in mean annual rainfall in Niger, one model predicts a decrease, while the other two predict an increase.

However, climate models predict an increase in the number of days with heavy precipitation from 8 days per year in 2000 to 10 days and 9 days per year in 2080 under RCP2.6 and RCP6.0 respectively.

Overall, and regardless of the model used, it is clear that climate variability and change are a very constraining reality for both countries in the study.

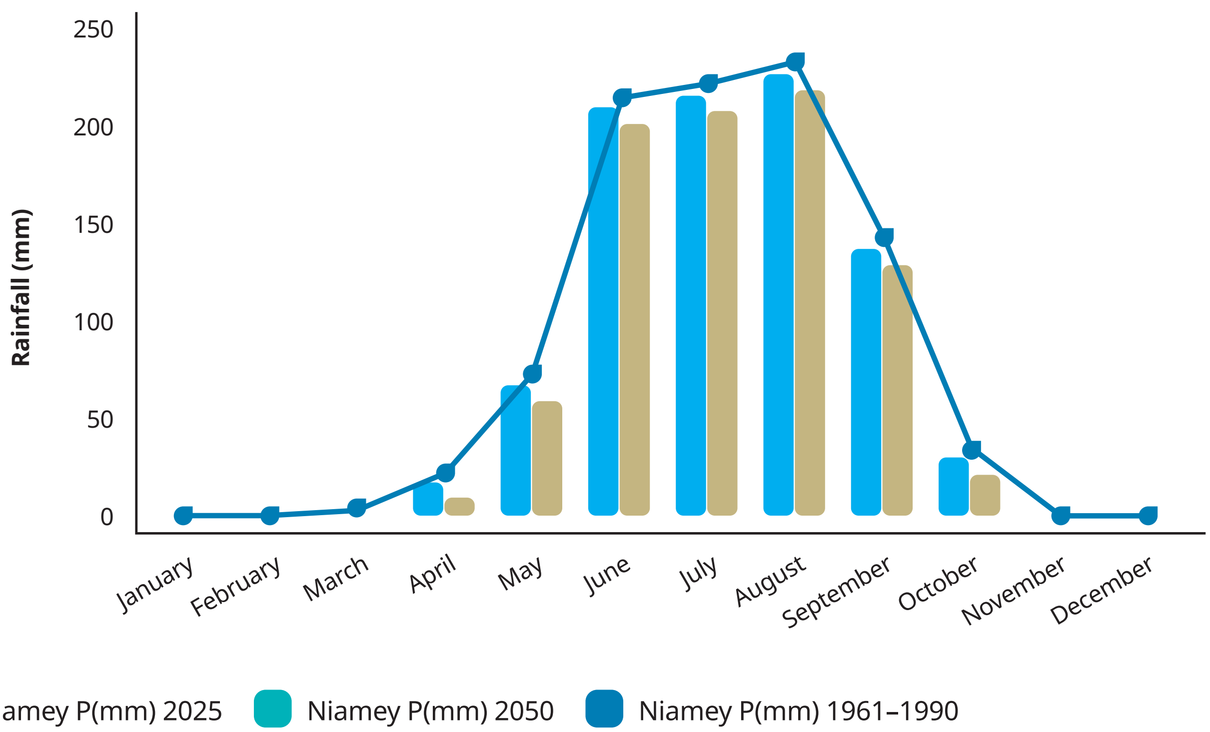
For Burkina Faso, very significant impacts are expected on major economic sectors such as agriculture, water resources, livestock and forestry, with very considerable socio-economic, health and psychological consequences for vulnerable groups (PANA, 2007). The country's vulnerability to floods and droughts is expected to increase as the frequency and intensity of extreme weather events increase.

Figure 6: Rainfall in Ouagadougou in 2025 and 2050.



Source: WaterAid (2020) based on updated data.

Figure 7: Rainfall in Niamey in 2025 and 2050.



Source: WaterAid (2020) based on updated data.

4. WHAT WILL BE THE IMPACT ON WATER RESOURCES BY 2050?

Surface water resources will be weakened by several years of drought, desertification and the resulting silting. Climate change will most likely exacerbate their deterioration.

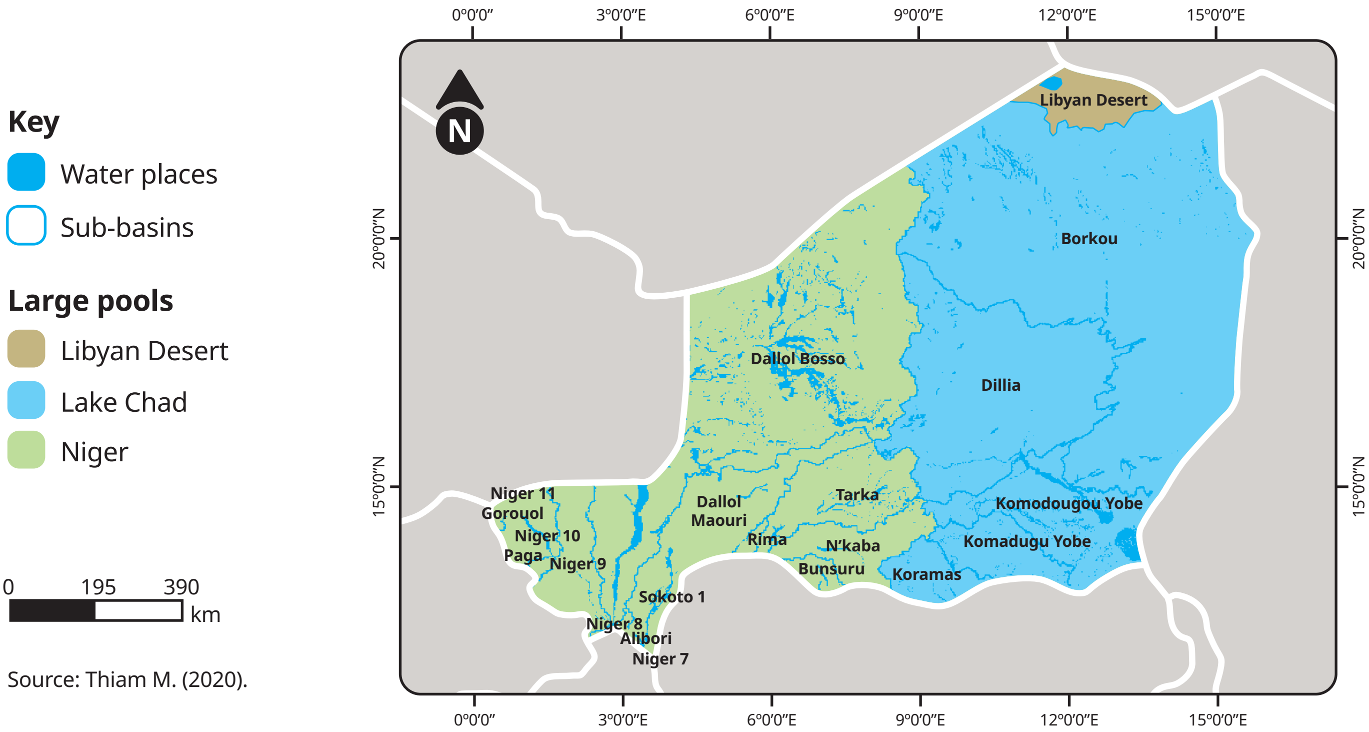
4.1 Niger: demand lower than renewable water resources

Demographic data is an important parameter for the proper handling of the projection of water resources availability. In Niger, the growth rate increased from 3.3% per year for the period 1988-2001 to 3.9% per year for the period 2001-2012. Fertility reached a level of 7.1 children per woman.

Annual withdrawals to meet the various water needs by 2025 will be more than 9.2 billion m^3. They remain well below the renewable water resources estimated at more than 32.5 billion m^3 per year.

Total surface and groundwater abstractions may reach up to 1700 million m^3/year by 2025, according to a trend projection. In reality, the adequacy between water resources and needs is thwarted by the problems of availability and/or quality (salinity, pollution) that may arise locally. The distribution of water resources both in time and space does not always conform to that of their uses.

Map 2: Burkina Faso Divided into Basins and Sub-basins.



Source: Thiam M. (2020).

4.2 Burkina Faso: a clear decrease in volumes by 2050

The assessment of the availability of water resources in Burkina Faso is made according to the World Bank based on inventories and studies carried out between 2001 and 2017 by the MEE (2001), VREO, (2009, 2010), MEA (2017a) and by data from ONEA (estimates).

Different scenarios have made it possible to establish the evolution of the annual volume of water flowing in 2025 and 2050 for each of the country's four watersheds (the Nakanbé, the Mouhoun, the Niger and the Comoé) based on climate projections from the MAGICC/SCENGEN general circulation model.

Estimates of available water resources in the four national basins and the ever-increasing demands indicate that Burkina Faso is in a situation of scarcity in the sense of sustainable resource management (Climate Analytics, 2015).

Nevertheless, the country benefits from a high-water endowment. The mobilization of surface water (dams) is largely sufficient to cover the needs of the economy and households.

In 2025, the projection indicates a decrease in the annual volume of water flowing by 45.6% in the Comoé and 54.7% in the Mouhoun compared to the 1961-1990 normal. This is due to the projected high mobilization of surface water resources in these basins, the further degradation of soils and vegetation cover (currently little or moderately degraded), and the continued decline in rainfall. However, the annual volumes of water flowing through the Nakanbé and Niger basins are increasing by 35.9% and 47% respectively compared to this same normal. This apparently paradoxical situation is in fact explained by the advanced degradation of these basins, resulting in greater run-off.

The following two tables bring together the results indicating the assessment of current demand for the different sectors in 2016 and by 2030: agriculture, domestic, livestock, mining and industry.

Table 3: 2016 Water demand in $10^3 m^3$.

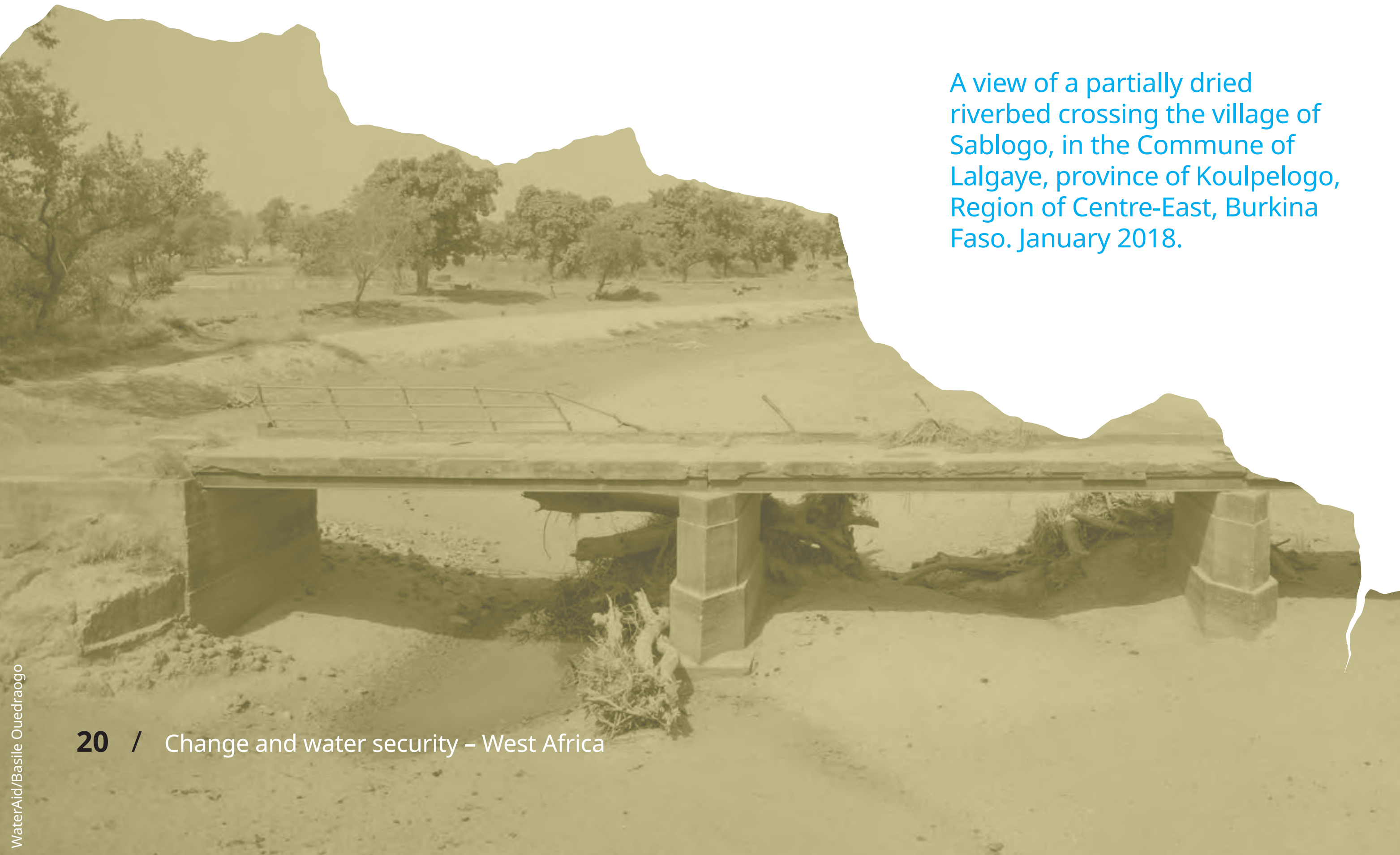
Basin	Demand for consumption purpose							Demand for other purpose
	Agriculture	*AEP by ONEA	*AEP outside ONEA	Industries	Mines	Livestock	Total	Hydropower
Nakanbé	314,006	62,047	59,011	2,200	1,000	8,991	447,256	1,300,000
Mouhoun	403,869	24,300	40,018	2,000	2,000	68,179	540,367	–
Liptako	191,230	1,520	21,431	2,000	–	73,806	289,987	–
Gourma	252,191	1,118	17,246	–	–	42,158	312,713	700,000
Comoé	188,736	2,147	5,772	–	–	18,280	214,934	91,000
Total	**1,350,033**	**91,132**	**143,478**	**6,200**	**3,000**	**211,414**	**1,805,256**	**2,091,000**

*AEP : Drinking Water Supply. Source : BM, 2017a.

Table 4: Forecasts for 2030 in 10^3m^3.

Basin	Demand for consumption purpose							Demand for other purpose
	Agriculture	Urban AEP by ONEA	Rural and semiurban AEP	Industries	Mines	Livestock	Total	Hydropower
Nakanbé	471,415	88,475	155,674	7,776	2,469	16,041	741,850	1,300,000
Mouhoun	613,747	34,651	70,863	7,070	4,938	121,634	852,902	1,937,163
Liptako	401,108	2,167	30,884	7,070	500	131,673	573,401	49,888
Gourma	514,539	1,594	24,688	–	500	75,211	616,532	700,000
Comoé	293,675	3,061	11,021	–	2, 000	32,613	342,369	91,000
Total	**2,294,483**	**129,948**	**293,130**	**21,916**	**10,407**	**377,171**	**3,127,054**	**4,078,050**

By 2050, water volumes will decrease significantly compared to the 1961-1990 average in all the basins of Burkina Faso. In particular, it is predicted that there will be a drop of 68.9% in the Comoé, 73% in the Mouhoun, 29.9% in the Nakanbé and 41.4% in the Niger.



A view of a partially dried riverbed crossing the village of Sablogo, in the Commune of Lalgaye, province of Koulpelogo, Region of Centre-East, Burkina Faso. January 2018.

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5. RECOMMENDATIONS TO ACHIEVE: SUSTAINABLE DEVELOPMENT GOALS (SDGs) BY 2030

Water security contributes to the SDGs relating to wide-ranging sectors – health, energy, agriculture, environment, mining, industry and social welfare. It also supports adaptation to climate change and disaster risk reduction, including drought and floods.

Research suggests that without a change in strategy, it will be difficult for Niger to achieve the PROSEHA targets at the different time horizons in the program. The same applies to the achievement of the PDES 2017-2021 target for rural water supply, for which 6,000 PEM Equivalents will have to be achieved each year (RAMO, 2017).

▲ A view of people washing clothes in a partially dried riverbed crossing the village of Sablogo, in the Commune of Lalgaye, province of Koulpelogo, Region of Centre-East, Burkina Faso. January 2018.

▶ Fatimata Coulibaly, 29, and Awa Dembélé, 33, both members of the Benkadi women's group, using an electric probe to measure the water level inside a well inside the market garden, Kakounouso, Samabogo, Circle of Bla, Segou Region, Mali. February 2019.

GOVERNMENTS OF BURKINA FASO AND NIGER MUST:

- Ensure that national water and sanitation policies include response strategies and plans for emergencies and conflicts. Humanitarian" and "Development" approaches are essential for the implementation of concrete solutions to crises in the long term.
- Implement integrated water resources management at all levels by 2030, including through transboundary cooperation as appropriate
- Improve water quality and the reuse of wastewater by combating all kinds of water pollution, particularly in extractive industries such as gold mining. It is imperative to develop sanitation systems adapted to local contexts that meet the standards and favour the reuse of by-products (circular economy). Nature-based solutions, including green infrastructure, can also be applied to improve water quality and resources
- Reduce water-related disease and death by controlling epidemics and pandemics and by breaking down the silos: water, sanitation, hygiene and health, nutrition, climate and environment.
- Protect and restore ecosystems through the implementation of sustainable development plans and programs that consider all freshwater ecosystems. To increase knowledge and build capacity through methods and tools that support integrative and ecosystem-based approaches to water management. National/regional policies and strategies for natural resources management (including water resources) should give particular importance to the acquisition and provision of reliable data and information for better planning.

Improve crisis resilience and adaptive capacity to extreme water-related disasters through thoughtful measures, including nature-based solutions by building social capacity for risk and emergency management by encouraging public engagement, raising public awareness of risks through education, training programs and disaster/emergency exercises, strengthening links between governments, authorities and communities at different levels.

- Develop strong technologies and innovations to supplement water needs and access; addressing the annual water infrastructure deficit on the continent. This involves improving the resilience, sustainability and balance of water infrastructure (such as dams, reservoirs, irrigation and drainage projects or facilities, sewage disposal system...), and adapting to climate change.
- Accelerate the development and financing of new climate adaptation projects through feasibility and incubation initiatives (Green Fund, Blue Fund).
- Engage effective governance models with the integration of climate issues into water use planning (IWRM, climate adaptation plans at the level of water basins and territories)
- Strengthen policies and governance for water security by strengthening sub-regional governance frameworks through reforms strong enough to meet the challenges of global change.
- Articulate stakeholder action around water security and climate change resilience.

CONCLUSION

Climate change will alter the availability of water in many regions. Burkina Faso and Niger are already facing water stress and/or water shortages.

In Burkina, the significant variation in rainfall from one year to the next and the increase in potential evaporation represent proven risks for the growth cycle of rainfed crops, notably millet and sorghum.

The scarcity of grazing land and water reservoirs will force pastoralists to migrate further and further south. The Sahelian zone is at risk of early drying up of wells and cesspools, low filling of lakes, insufficient water for various uses and worsening water stress.

Niger is also highly vulnerable to climate variability and change, as identified in its 2006 National Action Program for Adaptation to Climate Change, the main extreme weather events: floods, droughts, sand and/or dust storms, temperature extremes, high winds, locust invasions and bushfires.

These extreme climatic phenomena have become more pronounced in recent decades and have had negative socio-economic and environmental impacts on the country.

The most affected sectors are: agriculture (decrease in agricultural production), livestock (fodder deficit), forestry (reduction in the area of forest formations), health (increase in the rate of attack by certain diseases such as measles, meningitis, malaria and respiratory diseases), wildlife and fisheries resources (decrease in fish production, decrease in biological diversity) and water.

The governments of Burkina Faso and Niger took the issue of climate change into account early on in their national policies and strategies.


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▲ Setou Diallo, 45, secretary of the Benkadi women's group, walking amongst the plots of the market garden, Kakounouso, Samabogo, Circle of Bla, Segou Region, Mali. February 2019..

They have thus identified in their various policy documents (NAPAs, National Communications, NAP, etc.) future climate trends; despite uncertainties about rainfall; and the impacts of climate variability and change on key sectors of their economies.

The water resources sector thus appears to be one of the most vulnerable. West Africa is a region where demographics, economic development and urbanization are continuously increasing, with a growing demand for water.

The already high level of water insecurity in West Africa could intensify and threaten economic stability and human development if the countries concerned do not put in place adequate water resource management measures.

References

See the **long version report.**

Acknowledgements

The views expressed and recommendations suggested in this publication are those of the authors and informants who participated in the study. They do not necessarily represent the views of WaterAid West Africa.

The findings of this study will help WaterAid West Africa to promote strategies that are consistent with national and regional priorities for WASH and climate change adaptation. It will also support the global agenda to increase synergies between SDG 6 – Clean Water and Sanitation, and SDG 13 – Climate Action.

WaterAid West Africa would like to thank Professor Alioune Kane's consulting team and the country teams in Niger and Burkina Faso for their contributions.

▲ A water monitor testing a new rain gauge in her village in the commune of Tenkodogo, in the Centre-East region, Burkina Faso. June 2019.

Front cover: Fatimata Coulibaly, 29, a member of the Benkadi women's group who is in charge of water monitoring and management, taking a reading of the water meter of the water tower, Kakounouso, Samabogo, Circle of Bla, Segou Region, Mal. February 2019. WaterAid/Basile Ouedraogo.

FOR MORE INFORMATION

Please visit washmatters.wateraid.org or contact infowaro@wateraid.org.

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