Funding Proposal

FP176: Hydro-agricultural development with smart agriculture practices resilient to climate change in Niger

Niger (the) | Banque Ouest Africaine de Développement (BOAD) | Decision B.30/03

23 November 2021

GREEN CLIMATE FUND

Contents

Note to Accredited Entities on the use of the funding proposal template

- Accredited Entities should provide summary information in the proposal with cross-reference to annexes such as feasibility studies, gender action plan, term sheet, etc.
- Accredited Entities should ensure that annexes provided are consistent with the details provided in the funding proposal. Updates to the funding proposal and/or annexes must be reflected in all relevant documents.
- The total number of pages for the funding proposal (excluding annexes) **should not exceed 60**. Proposals exceeding the prescribed length will not be assessed within the usual service standard time.
- The recommended font is Arial, size 11.
- Under the GCF Information Disclosure Policy, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Accredited Entities are asked to fill out information on disclosure in section G.4.

Please submit the completed proposal to:
fundingproposal@gcfund.org
Please use the following name convention for the file name:
"FP-[Accredited Entity Short Name]-[Country/Region]-[YYYY/MM/DD]"

A. PROJECT/PROGRAMME SUMMARY

A.1. Project or programme	Project	**A.2. Public or private sector**	Public
A.3. Request for Proposals (RFP)	*If the funding proposal is being submitted in response to a specific GCF Request for Proposals, indicate which RFP it is targeted for. Please note that there is a separate template for the Simplified Approval Process and REDD+.* Not applicable Not applicable		
A.4. Result area(s)	*Check the applicable GCF result area(s) that the overall proposed project/programme targets. For each checked result area(s), indicate the estimated percentage of GCF budget devoted to it. The total of the percentages when summed should be 100%.*		
	Mitigation: Reduced emissions from: ☒ Energy access and power generation: ☐ Low-emission transport: ☐ Buildings, cities, industries and appliances: ☐ Forestry and land use: Adaptation: Increased resilience of: ☒ Most vulnerable people, communities, and regions: ☒ Health and well-being, and food and water security: ☐ Infrastructure and built environment: ☐ Ecosystem and ecosystem services:		GCF contribution: 24% Enter number% Enter number% Enter number% 66% 10% Enter number% Enter number%
A.5. Expected mitigation impact	227,551 tCO2eq	**A.6. Expected adaptation impact**	**1 121 615** (121 615 Direct beneficiary and 1 000 000 indirect beneficiaries) *4,6% of population*
A.7. Total financing (GCF + co-finance)	45,542,415 Euros	**A.9. Project size**	Medium (Up to USD 250 million)
A.8. Total GCF funding requested	30,138,772 Euros		
A.10. Financial instrument(s) requested for the GCF funding Euro 30 035 800	*Mark all that apply and provide total amounts. The sum of all total amounts should be consistent with A.8.* ☒ Grant Euro 24,248,772 ☐ Equity Enter number ☒ Loan Euro 5,890,000 ☐ Results-based payment Enter number ☐ Guarantee Enter number		
A.11. Implementation period	June 2022– May 2027 (5 years)	**A.12. Total lifespan**	**25 years** corresponding the lifetime of solar equipment.
A.13. Expected date of AE internal approval	*This is the date that the Accredited Entity obtained/will obtain its own approval to implement the project/ programme, if available.* *3/30/2022*	**A.14. ESS category**	**B**
A.15. Has this FP been submitted as a CN before?	Yes ☒ No ☐	**A.16. Has Readiness or PPF support been used to prepare this FP?**	Yes ☒ No ☐

A.17. Is this FP included in the entity work programme?	Yes ☒ No ☐	**A.18. Is this FP included in the country programme?**	Yes ☒ No ☐
A.19. Complementarity and coherence	*Does the project/programme complement other climate finance funding (e.g. GEF, AF, CIF, etc.)? If yes, please elaborate in section B.1.* Yes ☒ No ☐		
A.20. Executing Entity information	*If not the Accredited Entity, please indicate the full legal name of the Executing Entity(ies) and provide its country of registration and ownership type. Note that there can be more than one Executing Entity. Also indicate if an Executing Entity is the National Designated Authority. Refer to the definition of Executing Entity in the Accreditation Master Agreement.* The Executing Entity (EE) is the Republic of Niger, acting through the Ministry of Agriculture with respect to channeling of GCF proceeds. The EE will be in charge of components 1, 2, 3, 4, except for Output 3.3. The Banque Ouest Africaine de Développement (BOAD) is the Accredited Entity, as well as the Executing Entity for the agricultural loan facility provided by the GCF under Output 3.3. An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the scaling up of the AHA-AIC project.		

A.21. Executive summary (max. 750 words, approximately 1.5 pages)

Niger is a landlocked, Least Developed Country in West Africa with one of the highest rates of poverty in the world. The country's economy, food security and the livelihoods of its rural communities are extremely vulnerable to the impacts of climate change. Niger's climate is already hot and dry with major fluctuation in rainfall across years. Increasing temperatures and increasing rainfall variability are having severe impacts on agriculture, which is the main source of income and livelihoods for 87% of Niger's people. Mean annual rainfall has decreased in recent decades and dry spells have increased, while the onset and length of the rainfall season is variable. At the same time, rainfall intensity is increasing. Intense rainfall events in Niger have caused flooding that led to loss of life and major economic damages amounting to 15 240 615 Euros[1].

Food insecurity, poverty and malnutrition are increasing in Niger because of the negative impacts of climate change on the agricultural sector. In rural areas, 3 million people (12% of the population) were food insecure in 2018 and a further 29% of people were at risk. Most agriculture in Niger is rainfed, but given the changing climate and often erratic rainfall, the ongoing expansion of irrigated agriculture is a government priority. Surface water resources are limited and under pressure from climate change and various users, but Niger also has significant ground water resources that can be utilized sustainably for irrigation to boost agricultural production.

Niger has established Irrigated Agricultural Developments (*Aménagements Hydro-Agricoles* – AHA) which provide irrigated areas for farmer's groups with government support. These Irrigated Agriculture Developments (AHAs) are affected by floods and droughts. Flooding damages fields and fills the open irrigation canals with silt, which reduces canal capacity and thus prevents irrigation water from reaching some fields. Intense rainfall events also cause soil erosion. As a result of these problems, only 70 out of 87 AHAs were operational in 2014. Out of a total of 8,704 ha under irrigation only 6998 ha could be harvested, representing a loss of ~20% and 2 104 728 Euros during the agricultural season of 2015.

The proposed GCF project will address these climate change problems by: i) developing climate-resilient AHAs with solar-powered and water-efficient irrigation systems; ii) supporting the effective operation of AHAs and building the capacity of all stakeholders; and iii) promoting private sector financing for climate-smart agriculture. In this way, the project will enable rural communities and the agricultural sector to adapt to the adverse effects of climate change, as well as mitigating Green House Gas (GHG) emissions by using solar energy.

This project will be implemented in the regions of Tahoua, Agadez, Maradi, Diffa and Zinder, which are among the most vulnerable to climate change of Niger's seven regions. In total 1000 hectares of new AHAs will be developed and 749 hectares of existing AHAs will be rehabilitated to be resilient against the climate change impacts of increasing temperatures, droughts, and floods. The AHAs will be cultivated by beneficiaries (women, men, youth) who will be organized in farmers' mutual production groups which will constitute a farmer's cooperative on each AHA. Solar-

[1] PA-SRRC 2015

powered pumps will be installed at the AHAs, instead of the typically used pumps that are powered by diesel or electricity from the fossil-fueled national grid. In addition to irrigation, these pumps will also provide water for livestock and human consumption. The water-efficient irrigation technologies, such as drip irrigation, that will be installed will achieve significant water savings compared to the status quo. A total of 4.6 MW of solar power will be installed across the project sites.

A comprehensive set of interventions will ensure the effective operation of the AHAs, namely enhancing the regulatory environment, establishing strong management structures, and building the capacity of key stakeholders such as farmer's groups, cooperatives, water user associations and relevant government staff. The rural communities at each AHA will also be assisted to improve their access to markets and to undertake income generating activities such as processing of agricultural products. Farmer's groups, cooperatives and Irrigation Water Users Associations will receive training and tools to use climate-resilient farming practices and efficient irrigation methods. Agricultural production and climate-resilience will also be enhanced by improving agro-meteorological forecasting and environmental monitoring, and by providing agro-meteorological information to farmers and early warnings to rural communities.

Given the large adaptation needs in Niger's agricultural sector, it is essential to scale up these climate-smart ways of farming and irrigation. However, the agricultural sector in Niger faces challenges in accessing low-cost and long-term loan financing for climate-smart agriculture. To overcome these challenges, the proposed GCF project will create a favorable environment for such private financing by: i) building the capacity of the private financial sector to promote and scale innovative financing for climate smart agriculture; and ii) setting up an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility which fund will be provided by the GCF, which could be scaled up at a later stage, in the context of other projects, with the support of regional or international development financial institutions. This proposed Agricultural Loan Facility of 5.890 million Euros will act as a catalyst to crowd in further private and public financing for climate smart agriculture in Niger.

This GCF project will benefit an estimated number of 121,615 people directly and one million people indirectly. The project's direct beneficiaries will comprise: i) farming households at the Irrigated Agriculture Developments; ii) people who will benefit from income generating activities such as processing agricultural products; iii) people who will benefit from capacity building; and iv) people who will receive agricultural products from project sites to support their food security. The indirect beneficiaries of the project will include the entire population of the villages benefiting from this project. The estimated one million people who live in these villages will benefit from awareness-raising activities, dissemination of good practices through guides and radio programs and dissemination of agro-meteorological information. The project's impact in terms of food security will include making available at least 6.6 tons of cereal equivalent each year. In terms of mitigation potential, the project will reduce GHG emissions by 11,176.3 tCO_2e^- per year or 227,551 t CO_2e^- for 25 years, by developing solar technology instead of fossil-fueled generators and water pumps.

This project is consistent with Niger's National Determined Contribution (NDC), particularly in terms of promoting climate-smart agriculture and considering adaptation, mitigation, and food security, while strengthening development at the grassroots level. The project will also contribute to the achievement of the results associated with the national priorities of the Agriculture Forestry and Other Land Use (AFOLU) sector, of water resources and capacity building of the actors at all levels identified in the NDC. The related benefits of the AFOLU sector are, in fact, constituted by the results of implementation and scaling up of CSA activities, namely strengthening of assisted natural regeneration, recovery of degraded land, improvement of the cereal and forage balance and of food and nutritional security.

B. PROJECT/PROGRAMME INFORMATION

B.1. Climate context (max. 1000 words, approximately 2 pages)

Climate change problem: Describe the climate change problem the proposal is expected to address. Describe the mitigation needs (GHG emissions profile) and/or adaptation needs (climate hazards and associates risks based on impacts, exposure, and vulnerabilities) that the proposed interventions are expected to address. Also describe the most likely scenario (prevailing conditions or other alternative) that would remain or continue in the absence of the proposed interventions. Include baseline information. The methodologies used to derive such information, including the mitigation and adaptation needs, should be included in the feasibility study.

The major portion of the Niger Basin that is outside of the Sahelian zone is in the humid tropical zone of southern Niger, a region already facing high temperatures and levels of precipitation. While climate models differ, some projections suggest that Niger may experience an increase in both rainfall and temperature as well as a rise in the frequency and intensity of extreme weather events, such as floods and droughts. The extreme variability of the basin's climate, and the likely long-term evolution of the warming effect of increases in global greenhouse gases, means that one single climatic future for the basin is unlikely. Moreover, any shift to drier or wetter conditions is likely to be reversed at some point in the future.

INCREASE IN HISTORICAL AND PROJECTED TEMPERATURE

In Niger, the increase of temperature has become continuous since 1980. From 1976 to 2010, the maximum temperature increased by 1.7°C and the minimum temperature by 2.4°C[2] (figure below). In the project area as such as Tahoua, Agadez, Zinder and Maradi, there is a significant increase of the average annual temperature, respectively by +0.85°C, +1.18°C+ 0.79°C, +0.85°C and +1.07°C between 1980-2018. At Mainé Soroa (Diffa region), the daily minimum temperatures have warmed by 4 to 5°C from 1951 to 2014. From 1951 to 1989, daily minimum temperatures were generally below 5°C. From the 1990s, they rose to 9°C and reached 10°C during the decade 2001-2010 for the Mainé Soroa station (Barké et al, 2015).

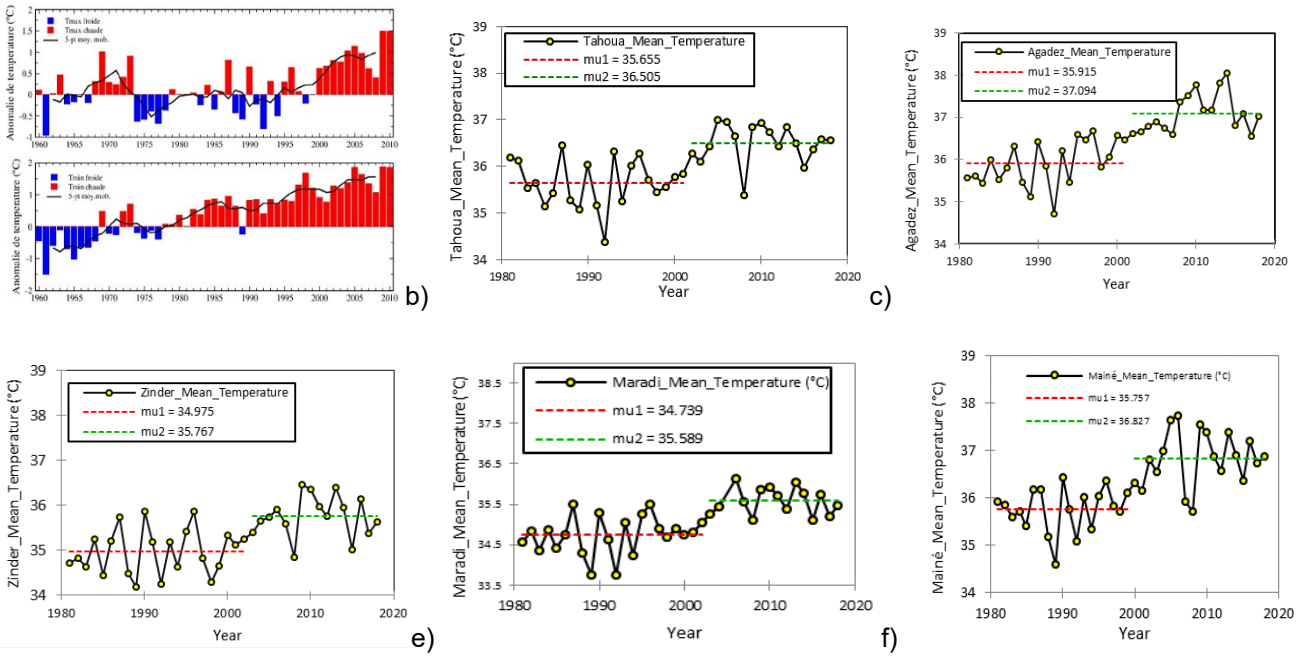


Figure 1: Panel of variability of maximum and minimum temperature anomalies in Niger (AGRHYMET, 2015) (a), variability of average temperature at Tahoua (b), Agadez (c), Zinder (d), Maradi (e) and Mainé Sorao in Diffa region (f) (Data from the National Centers for Environmental Information (NCEI).

Considering that the standard deviation of annual temperatures in this geographical area is low (approximately 0.5°C according to the United State Geological Survey Department, 2012), the increase of temperature in the range of 0.8°C - 1°C, across the project area, represent at least a deviation of 1.6 time from the average climatic norm of the temperature. This ambient temperature is expected to increase by a minimum of 1.5°C across the regions of Diffa, Agadez and Tahoua, and 1°C across the Zinder and Maradi regions by to 2050 compared to 1980-2018 according to the RCP (Figure 2)[3].

[2] The national framework for climate services implementation Plan in Niger. World Meteorological Organization and the Ministry of Transport, Directorate of National Meteorology. January 2016.

[3] Average temperature increases across Niger as a whole by 2050 are expected to be between 1.6 and 2.9°C.

Regional temperature projections for Niger and the project target areas are presented in Figures 3, 4 and 5.

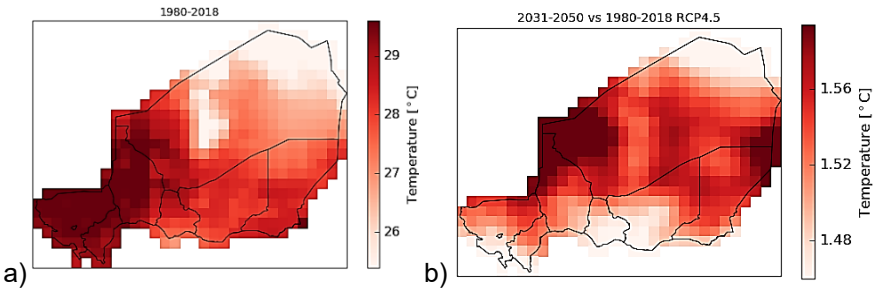


Figure 2: Map of temperature average over the reference period 1980-2018 with EWEMBI dataset. (a) and map of projected change in temperature for 2031-2050 compared to the reference period according to the emission scenario RCP4.5 (b) (Climate Analytics).

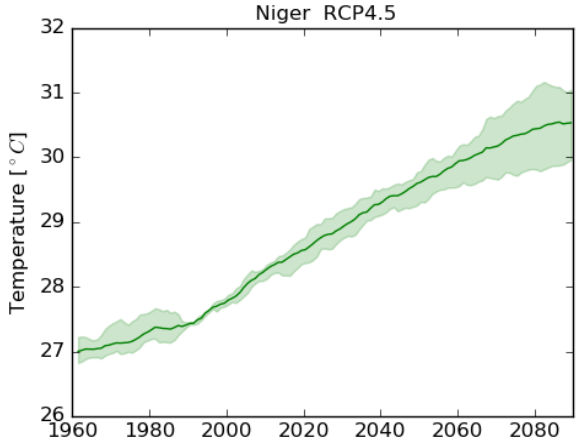


Figure 3: Regional climate model projections for temperature displayed as 20 year running mean for Niger. The line represents the ensemble mean while the shaded area represents the model spread. The projections are based on the emission scenario RCP4.5.

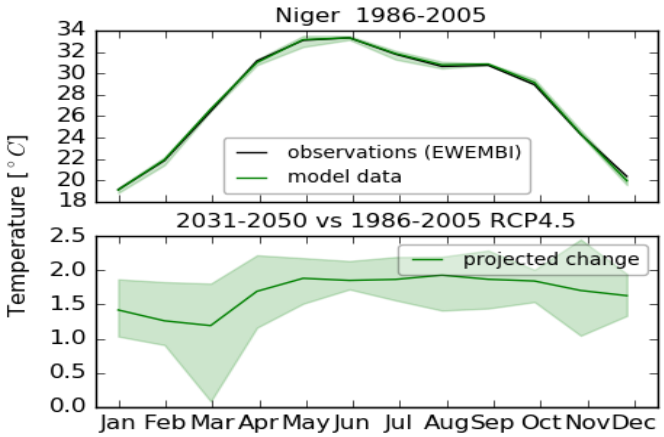


Figure 4 : Top: Annual cycle of temperature for the period 1986-2005 for Niger. Bottom: Changes in annual cycle projected for 2031-2050 compared to the reference period 1986-2005. EWEMBI data is shown in black, RCM simulations in green. The green line represents the ensemble mean while the shaded area represents the model spread. The projections are based on the RCP 4.5 emission scenario.

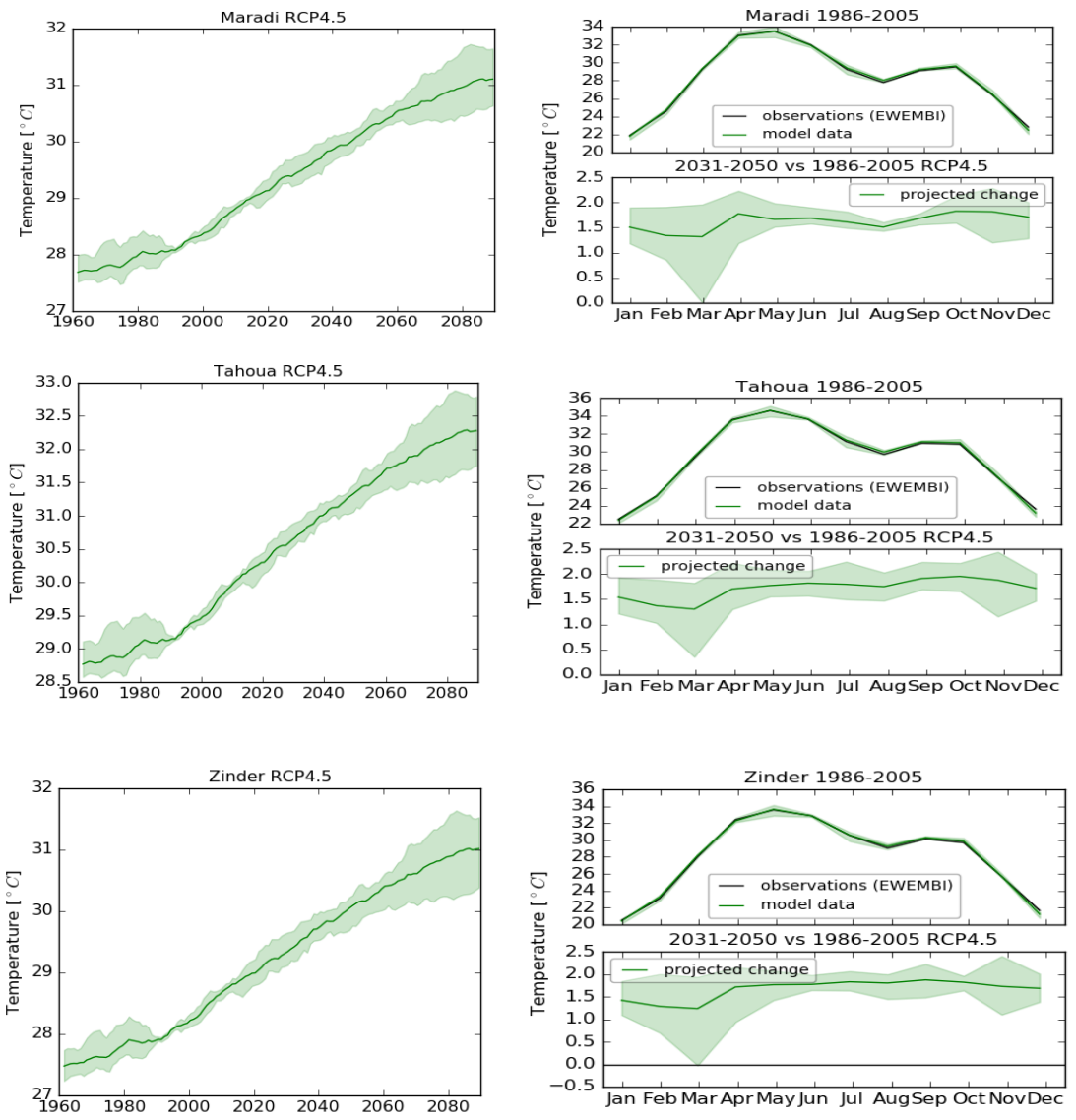


Figure 5: Regional Climates models- Zinder, Maradi and Tahoua. **Left figures** for each region: Regional climate model projections for temperature displayed as 20 year running mean. The line represents the ensemble mean while the shaded area represents the model spread. The projections are based on the emission scenario RCP4.5. **Right figures:** Top: Annual cycle of temperature for the period 1986-2005. Bottom: Changes in annual cycle projected for 2031-2050 compared to the reference period 1986-2005. EWEMBI data is shown in black, RCM simulations in green. The green line represents the ensemble mean while the shaded area represents the model spread. The projections are based on the emission scenario RCP 4.5.

Under the SSP2 4.5 scenario, mean temperatures across Niger are expected to increase by at least 1.3°C in the near term (2021–2040) relative to a baseline period of 1981 to 2010 (Figure 6)[4].

[4] Source: https://interactive-atlas.ipcc.ch

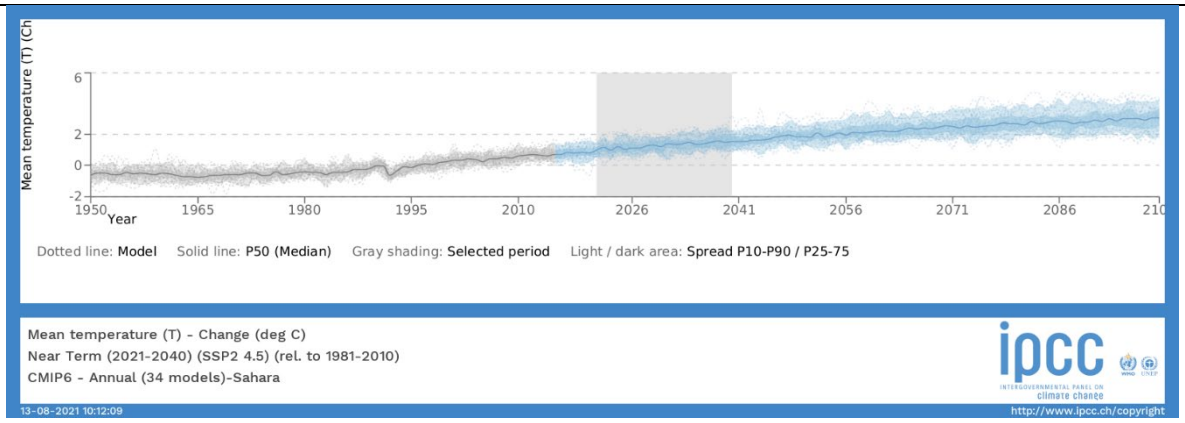


Figure 6. Projected mean temperature increases across Niger over the period 2021–2040 compared to a baseline period of 1981 to 2010 under the SSP2 4.5 scenario.

Projected extreme temperature trends for the near term (2021-2040), using the SSP2 4.5 scenario, over a baseline period of 1981 to 2010 are presented in the figure below[5].

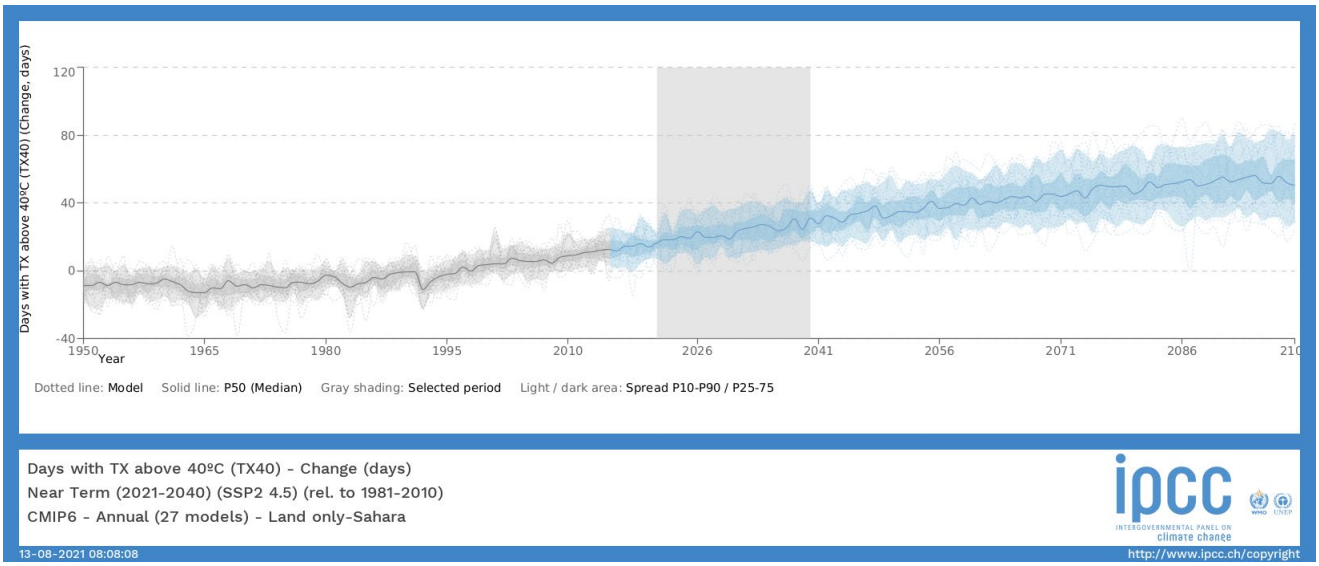


Figure 7. Since 1980, the number of days per year experiencing maximum temperatures of over 40°C have shown an increasing trend, reaching ~20 days by 2020. This trend is projected to continue with the number of days per year reaching at least 20 by 2040 and close to 40 by 2050.

This warming accelerates the evapotranspiration and impacts negatively on the availability of surface water and the recharge of the groundwater resources, particularly the alluvial groundwater. According to Niger's third national communication on climate change, one of the current impacts of warming on surface water resources is a general decline in the flow of Niger and Komadougou Rivers. In the case of groundwater apart from its volume, timing and quality and recharge, the characteristics of the aquifer system is also affected. As evaporation rates increase with temperature rises, the availability of water for groundwater recharge from surface water sources and that left behind from rainfall events will be reduced. The resulting reductions in groundwater recharge, in combination with that related to meteorological droughts, will also be compounded by increased abstraction rates as the dependence of communities on groundwater resources increases because of temperature rises, resulting in increased domestic and agricultural water needs, and surface water sources are depleted. Consequently, the reduction of required volume of water needed for crop growth and livestock, reduce crop harvests and pasture availability, amplifying the impact of droughts or dry spells (Third National Communication, 2016).

NEW RAINFALL VARIABILITY CARACTERIZED BY INTENSIVE RAINFALL AND DRY SPELLS

[5] Source: https://interactive-atlas.ipcc.ch

Rainfall in Niger declined rapidly between 1950 and the mid-1980s and partially recovered during the 1990s and 2000s. An analysis of rainfall changes over the period 1961-2010 shows a significant decrease in rainfall since 1970 and which has continued until beginning of the 1990s, with a long deficit period between 1980 and 1990. The corresponding rainfall deficit is on average around 20%, but may exceed 30% in the west and centre; a clear tendency for isohyets to slide south up to 150 km. In addition, there is a slight increase of rainfall trend that began in 1990 in the Saharan and while the Sahel-Sudan zone shows that the rainfall is relatively constant over the same. Furthermore, observations indicate a decreasing rainfall variability towards the South and an upward trend in temperatures at all stations, with however, a moderate increase on the Niamey and Tahoua stations. (RdN, 2016)

Between 2000 and 2009, the average rainfall in Niger's crop growing districts was about 8 percent lower than the 1920–69 mean. The recent rainfall increases are probably due to of the northern Atlantic Ocean (Hoerling and others, 2006); as the northern tropical Atlantic has increased in temperature over this period, this has drawn the summer rains further north, increasing rainfall in the Sahel. These changes can be visualized in three ways: as an expansion of the region receiving adequate rainfall for viable agricultural livelihoods, as maps of anticipated changes in rainfall, and as time series plots (Figure 8).

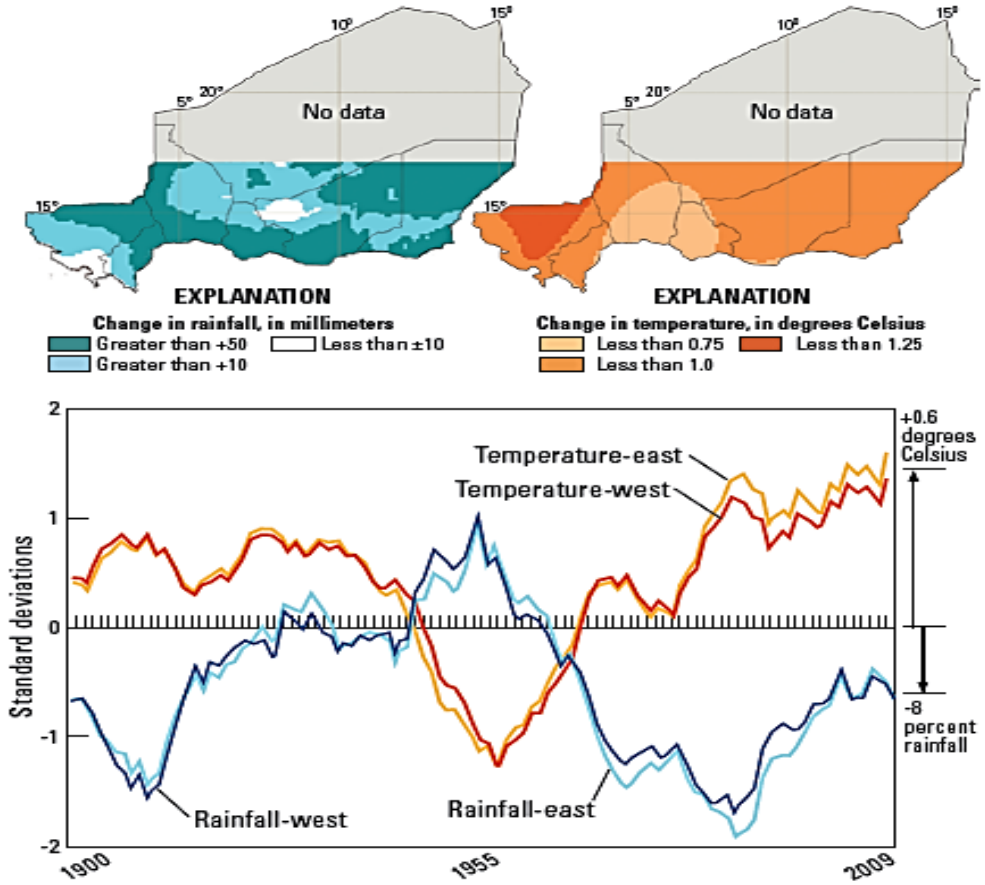


Figure 8. Observed and projected change in June–September rainfall and temperature for 1960–2039 (top), together with smoothed rainfall and air temperature time series for June–September for eastern and western Niger. Mean rainfall and temperature are based on the 1920–69 time period (USAID, 2012)

Under the SSP2 4.5 scenario, mean annual rainfall across Niger are expected to increase by at least 13.1% in the near term (2021–2040) relative to a baseline period of 1981 to 2010 (Figure 9)[6].

[6] Source: https://interactive-atlas.ipcc.ch

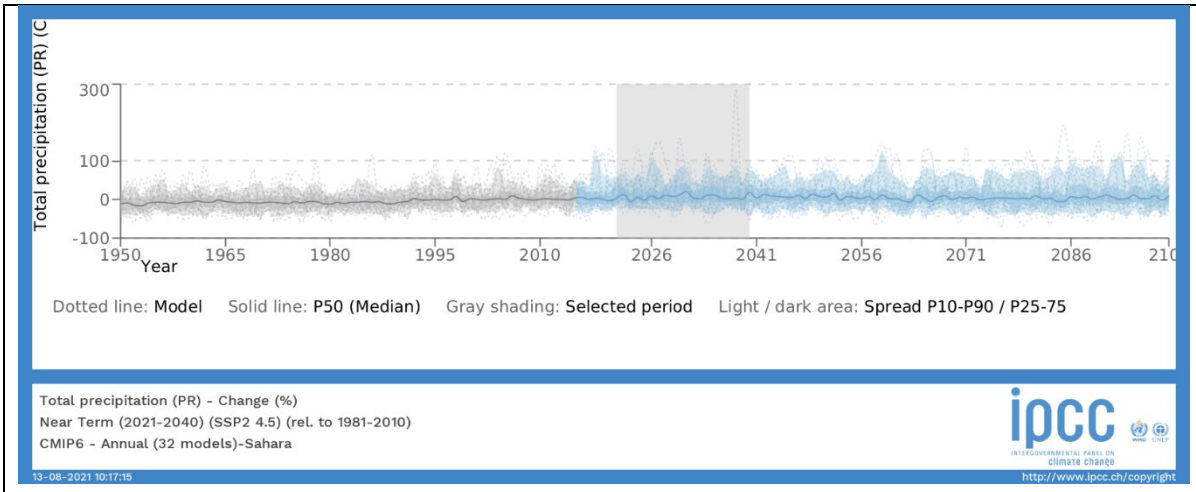


Figure 9. Projected mean annual rainfall increases across Niger over the period 2021–2040 compared to a baseline period of 1981 to 2010 under the SSP2 4.5 scenario.

On average, Niger's climate used to alternate between wet and dry periods every seven years, during the period 1960-87. Since the beginning of the 1990s, a new mode of rainfall variability characterized by a succession of wet and dry years appears to have started in Niger (figure 10-a). This evolution has continued in recent years under the effect of climate change. At the same time, there has been an overall decrease in average rainfall. The isohyets, lines on a map indicating mean annual rainfall for a given area, have migrated to the south in Niger as the country has become drier. The 600 mm isohyet which was north of Niamey in the years 1950-1967 is found completely in the south of Dosso after about two decades. The 800 mm isohyet completely disappeared from the Niger map around 1995, i.e., nowhere in Niger receives this amount of annual average rainfall anymore. While the overall average rainfall has decreased across Niger, intense rainfall events have increased over the period 1960–2010 and are predicted to continue increasing for the period 2020-2050 in the target regions (Figure 10–b, c, d, e, f and Figure 11). These changes confirm the increasing trend of rainfall extremes across the project area.

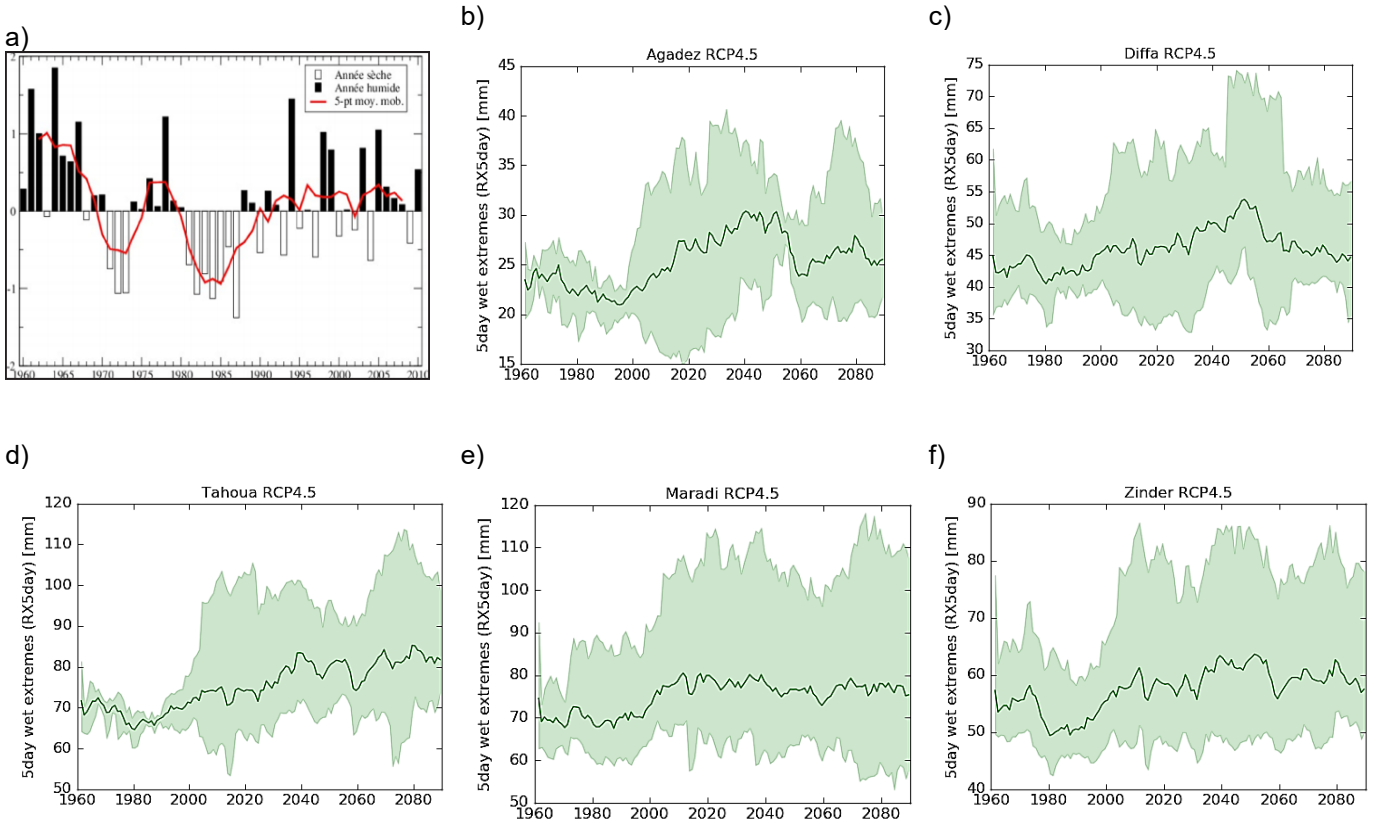


Figure 10: Inter-annual variability of rainfall between 1960-2010 in Niger (AGRHYMET, 2015) (a); projections for 5-day wet extremes (maximum consecutive 5-day rainfall - RX5day) with the line representing the regional model ensemble mean and the

shaded area represents the model spread for the emission scenario RCP4.5. for Agadez (b), Diffa(c), Tahoua (d), Maradi (e) and Zinder (f) (Source: Climate Analytics).

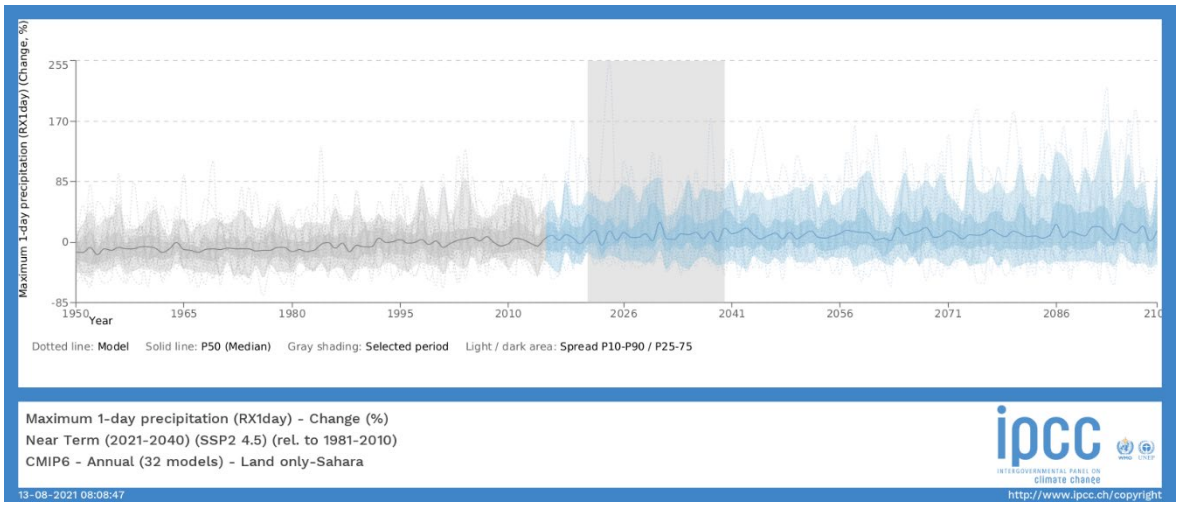
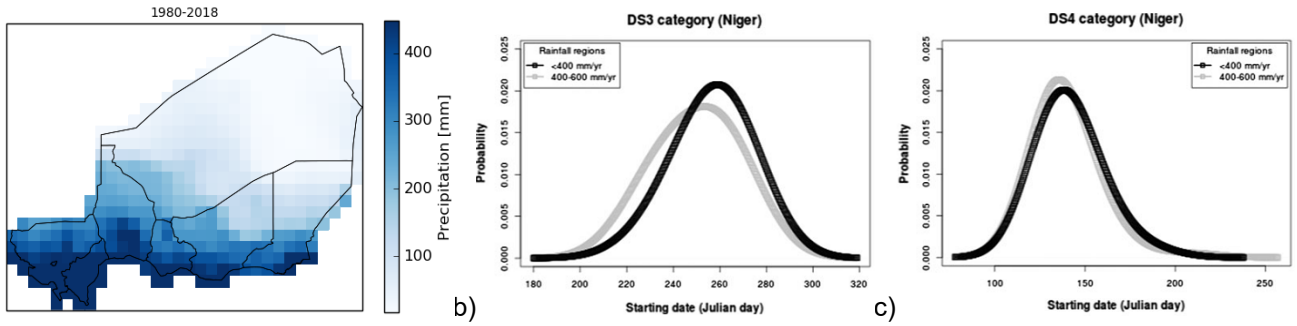


Figure 11. Projected 1-day precipitation extremes trends for the near term (2021-2040), using the SSP2 4.5 scenario, over a baseline period of 1981 to 2010[7].Since 1980, the number of days per year experiencing 1-day precipitation extremes have shown an increasing trend, reaching >0 by 2020. This trend is projected to continue with the number of days per year continuing to rise above 0 by 2050. Projected 1-day precipitation extremes trends for the near term (2021-2040), using the SSP2 4.5 scenario, over a baseline period of 1981 to 2010[8].

In addition to the heavy rainfall, long dry spells (Salack et al., 2014; Sarr et al., 2015) are also main characteristic of this new variability of rainfall. In agriculture, the dry spells (DS) extending from 8 to14 days (DS3) and more than 2 weeks (DS4) are detrimental to crop development. Based on the daily rainfall records of 12 stations over 1960–2000, the project area that used to receive a total rainfall less than 400 mm/year seems to be more exposed to occurrence of dry spell extending from 8 to 14 days than the area located at the western part of the country which is outside this project's targeted area and used to 400-600 mm/year. In case of DS4, the distribution of its probability at regional level seems to be almost the same for the area receiving less or more than 400 mm of rainfall (Figure 12). But the occurrence of DS4 per season has increased by 10 and 1.5, for Maradi and Zinder, during 2001–2004 compared to the period 1961–1970 (Barron et al., 2010).



a) b) c)

Figure 12: Map of total rainfall over the reference period 1980-2018 with EWEMBI dataset (a), Empirical probability distribution of two extreme dry spells occurrence dates as depicted from each rainfall region from the 1950–2010 daily rainfall time series. From 8 to14 days (DS3) and more than 2 weeks (DS4) (Salack, 2013).

The inherent high variability in temporal and spatial rainfall distribution, combined with high-intensity rainfall events, affect landscape biomass productivity and the water budgets of the Sahelian agro-eco systems. They induce an increase of surface runoff, as soil infiltration capacity is quickly exceeded and the landscape with predominantly sandy soils is prone to erosion crusts. In addition, water-food-energy nexus impacts include yield loss through farm flooding, waterlogging of lowland crops, power, and energy losses (Barron et al., 2010; Salack et al., 2018).

VARIABILITY OF THE ONSET AND LENGTH OF RAINY SEASON

In Niger, the period 1991-2010 is characterized by relatively delay of rainy season onset, especially at Maradi and Zinder.

[7] Source: https://interactive-atlas.ipcc.ch
[8] Source: https://interactive-atlas.ipcc.ch

For Tahoua and Maïné (Djiffa), early onsets of the season are observed but they are often associated with extreme dry spells and are considered as false onset situations. Broadly, the end of the growing season is relatively stable and shows no signs of significant change. Broadly, the lengths of seasons even if they tend to be extended for Tahoua, remain stable for Mainé, Zinder and Maradi (AGRHYMET, 2015).

In terms of climate change impacts on the agricultural season, under the emission scenario RCP4.5, the years with annual rainfall deficit compared to the normal annual rainfall over the period 1961-1990, will be predominant. The potential impacts of climate change related to this situation include a reduction in the length of the agricultural season combined with an increasing frequency of dry days during the agricultural season, resulting in changes to the growing, sowing and harvesting periods in Niger's crop calendar — see Section 1.4.1 of Annex 2. The onset of the rain season will be delayed with the majority of rainfall being concentrated in the late rain season, resulting in delayed planting, a shorter growing period and a late harvesting period relative to the current crop calendar[9].

Farmers in the project intervention area, in light of historical-observed and projected climate risk, are exposed to the increase of temperature, dry spell occurrence, heavy rainfall and disruption of the rainy season onset and are vulnerable to those impacts of climate change considering their actual adaptation techniques (rural exodus; mutual aid - goods and cropping materials or agricultural residues sales; displacement of populations for better land and pasture, the use of local short cycle varieties and farmer-managed natural regeneration of degraded land in Maradi and Zinder). The project intervention area is aligned with the most vulnerable area to climate change identified in the National Adaptation Programme of Action (NAPA), across the regions of Tahoua, Agadez, Maradi, Diffa and Zinder. These farmers, young people, and women are among the most vulnerable in those targeted area.

ADAPTATION NEEDS

Climate change, which can be translated in the project intervention area by the rising of temperatures, the increase of dry spells and heavy rainfalls and variable regional trend of the onset and length of the rainy season, is affecting soil, and agriculture, a relevant sector for ensuring the food security of the population.

In Niger, the various types of soils are subject to degradation due to the adverse effects related to the rising temperatures and the hybrid character of the rainy season. The most visible soil degradation are, among others: (i) the progressive reduction of the plant cover (accentuated by human pressure from livelihood activities); (ii) the formation of crusts at the soil surface following the drying up of the topsoil layers and their induration by the precipitation of iron oxides and hydroxides; (iii) the reduction of rainwater infiltration; (iv) the acceleration of erosion; (v) flooding; (vi) soil depletion and salinization and (vi) the alteration of the balance of soil ecosystems. Those climate hazards induce silting of shallow lands and the reduction of land surface suitable for rice. At medium term, rice farmers need to undertake soil and water conservation actions for maintaining of soil quality and being able to practice efficient irrigation.

Broadly, the human pressure on land results from the expansion of crop fields in Niger, driven by the rapid population growth and the increasing demand for food[10]. In Niger, the cultivated areas have increased by 12.6%, 18.1% and 24.5% respectively in 1975, 2000 and 2013. Particularly in Zinder and Maradi, the land already cultivated in 1975, is now a wall-to-wall homogeneous agricultural landscape where agriculture is still expanding eastward on the short grass Sahelian savannas. In order to combat land degradation due to extensive agriculture which uses unproducible extended areas more than the producible small area in the framework of the current project, since the 1980s, southern Niger smallholder farmers have experimented successfully with the farmer-managed natural regeneration technique[11] which is currently practiced on ~3 million hectares of lands in Maradi and Zinder regions. In the case of Agadez, the reduction of land degradation strategies was focused on the implementation of sustainable land management practices on land identified as suitable for restoration.

Strong greening trends were reported in Tahoua and some studies have even estimated at 100% the increase in vegetation cover from 1982 to 1999[12]. Indeed, marginal vegetation increases in valley bottoms and decreases higher in the landscape and according to some reports, this greening does not necessarily mean more trees planted in the landscape but is rather a consequence of the cropping systems intensification by farmers during the last two decades as

[9] Biasutti, M. 2019. Rainfall trends in the African Sahel: Characteristics, processes and causes. *WIREs Climate Change*. 2019;10:e591.
10 Reenberg et al. 2013. Land Saturation in SE Niger: Triangulating Qualitative and Quantitative Information for Critical Assessment of Land Use Trajectories. Land 2013, 2, 508-533.
11 A low-cost way of encouraging the natural and spontaneous growth of trees and shrubs that provide useful food, fuel, and fodder (Reij and others, 2009).
12 L. Olsson, L. Eklundh, and J.Ardö. A recent greening of the Sahel – trends, patterns and potential causes. Journal of Arid Environments, 63:556-566, 2005

a response to increasing population pressure. In other areas of this region, farmers have planted, protected and managed trees to increase woody cover as a response to the droughts of the 1970s and 1980s[13]. Based on those experiences, our project emphasizes the upscaling of sustainable intensification of the cropping systems in irrigation areas (*périmètre d'irrigation* in French) with the climate resilient practices that have been experimented with success for reducing human pressure on land (farmer-managed natural regeneration, sustainable soil and water management practices…).

Agriculture, the main activity of the Niger's rural population is essentially rain-fed and is therefore highly vulnerable to climate change impacts. The potential impacts of climate change linked to increasing temperatures, increasing dry spells and heavy rain events occurrence, and a spatiotemporal variability of rainy season onset and length are the following: (i) water shortage to meet crop water requirements during crop cycles; (ii) outbreaks of pests such as leaf miner caterpillars of fall armyworm, during dry spells at heading or flowering stage; and (iii) the decrease and/or total loss of crop production. In terms of pests, leaf miner caterpillar outbreaks are expected to become more frequent with the increasing length of dry spells under climate change conditions as their appearance is stimulated by several consecutive dry days. Fall armyworm outbreaks are also expected to increase in frequency as temperatures rise, resulting in faster insect development, shorter lifecycles and a greater number of pest generations[14]. Consequently, pest management is a growing adaptation need in Niger's agricultural areas.

Many studies are consistent with predicting yield reductions in the near future under the current changing climate. Millet/Sorghum will decrease by more than 10% in the case of a 2°C increase in temperature and insignificant variations in rainfall by 2050. An increase of 3°C will lead to a decrease in agricultural yields of around 15 to 25% (Sarr et al., 2007; AGRHYMET, 2009). For rice, the projections under 1.5°C of warming shows a drastically reduction of grain yield by 15% in Maradi region and by 5.5% to 15% in Zinder region. The map on the right hand-side (Figure 13c) shows the potential relative increase in yield if additional irrigation is applied on present-day harvested areas with climate change, assuming irrigation water is not limiting.

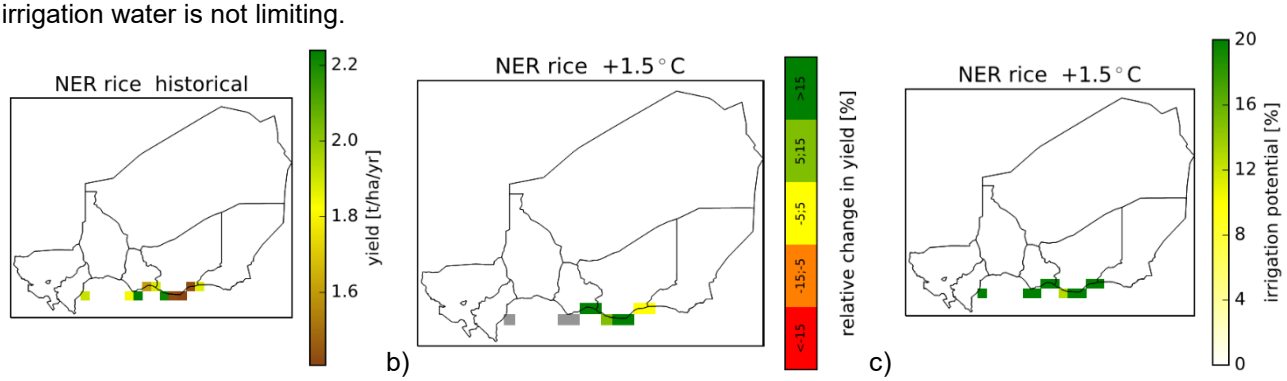


Figure 13: Simulated crop yield (t/ha/year) circa year 2000 (+1.5°C above preindustrial) (a); Projected change in yield (%) relative to 2000 based on multi-model ensemble median. Yellow areas show small level of impacts (range [- 5;5%]). Grid cells where the models do not agree in the sign of change are shown in grey (b); Relative increase in yield (%) if irrigation is applied on present day rainfed harvested areas, assuming no water limitation.

Achieving food security goals in West Africa, depends on the capacity of the agricultural sector to feed the rapidly growing population and to moderate the adverse impacts of climate change. But according to the NAPA, the agricultural production surplus, which covered 86% of food needs until the early 1970s, has become structurally in deficit since the end of the 1980s until the present day due to climate disruptions. Recently, Niger has imported more than 80% of its rice consumption. Severe food insecurity persists and is affecting an increasing number of households. From 2015 to 2018, the population under severe food insecurity more than doubled, from 1.1% in 2015 to 2.8%.

CLIMATE CHANGE AND FOOD INSECURITY

As mentioned above, the adverse effects of climate have extremely negative impacts on production and production factors. In addition to this is the high cost of energy. All this contributes to food insecurity and erodes farmers' incomes. For example, in 2015, following the overflowing of the seasonal rivers known as "koris", causing flooding of the AHAs with the silting up of irrigation canals and the drying up of cultivated plots, 1706 ha of rice were lost during the course of one season with a loss of income of 6633 tons of white rice, i.e., 2 104 728 Euros.

Indeed, the various survey reports on the vulnerability to household food insecurity in Niger confirm the worsening of the

13 UNEP (2012). Sahel Atlas of Changing Landscapes: Tracing trends and variations in vegetation cover and soil condition. United Nations Environment Programme, Nairobi.
14 H.J. Plessis, N. Berg,

problem from year to year. Over the same period, the food secure population decreased by 3.3% and the population at risk of food insecurity increased from 25.8% to 29.1%, while the population are suffered from severe food insecurity increased more than doubled, from 1.1% to 2.6%. (Figure 14).

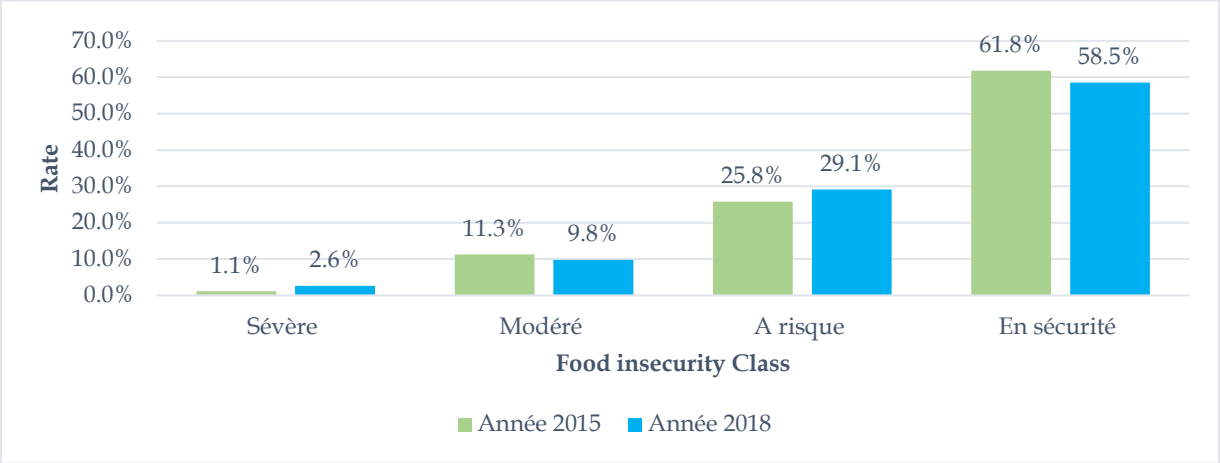


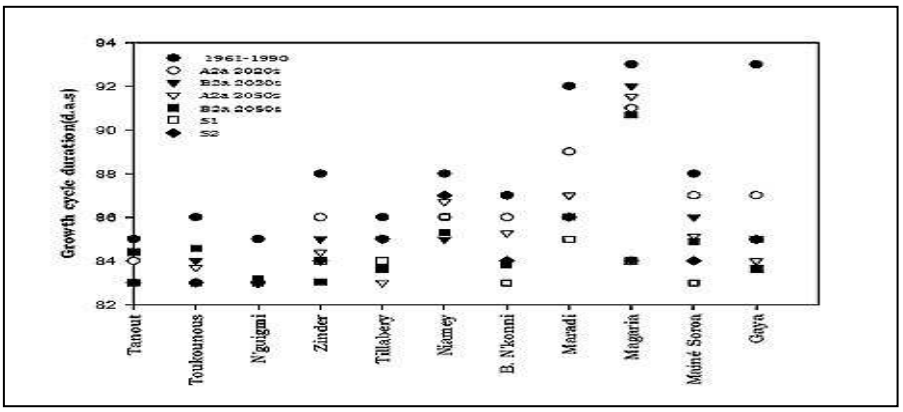
Figure 14: Illustration of food insecurity categories for the years 2015 and 2018.
Source: Data from the Report of the Joint Survey on Household Food Vulnerability and Insecurity in Niger 2018.

However, the various forecasts show that people's vulnerability to climate change will continue to increase in Niger, with the consequent growing food insecurity.

According to the NAPA, the potential impacts of climate change related to a situation of decreasing rainfall and increasing temperatures are, in particular, the following: (i) a reduction in the length of the agricultural season; (ii) an increase in the frequency of dry days during the agricultural season; (iii) insufficient water availability for crops needs; (iv) the appearance of pests; (v) the decrease and/or total loss of agricultural production.

To illustrate this situation, three studies were conducted, one with a plant growth model, the other two on a purely statistical basis, to assess the impacts of climate change on the development and production of millet in Niger.

The first study (Salack et al, 2008) used historical data covering the period 1961 - 1990 from 12 synoptic stations in the Sudano-Sahelian zone of Niger.



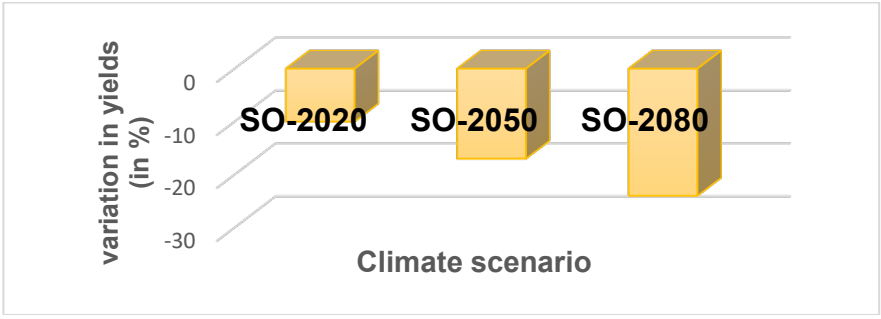
The results obtained show a reduction of the growth cycle by 2 to 3 days by 2020 and by 4 to 5 days by 2050. Figure 11 shows the variability at the local level for one millet of cycle from 82 to 92 days. The yield reduction was estimated at 4.6%.

Figure 15: Changes in millet growth cycle under different climate scenarios.
Source: Salack et al, 2008

The second study, based on purely statistical considerations, concludes that there will be a 13% drop in millet yields by 2025 as a result of a rise in temperature in July-August-September. It should be recalled that rainfall is well correlated with maximum temperatures of the same period, which could have negative impacts on rainfed millet cultivation.

The third study focuses on the statistical modelling of the climate-cereal yield relationship for Niger. According to this study, based on a logistic regression model, up to 42% of the variability of millet yield in Niger can be attributed to rainfall. The studies presented here confirm well the conclusions of the 4th IPCC report concerning a decrease in cereal crop yields because of rising temperatures in tropical regions.

According to Sarr et al (2007) and Agrhymet (2009), yields are expected to continue to decrease in the coming years in connection with the amplification of the climate change phenomenon. These studies have shown that yields of crops such as millet/sorghum will decline by more than 10% in the case of a 2°C increase in temperature and insignificant variations in rainfall by 2050. An increase of 3°C will lead to a decrease in agricultural yields of about 15 to 25%. Figure 16 illustrates the expected declines in millet and sorghum yields in Niger.



Legend:

S0_2020: Temperature rise: 1 ° C
S0_2050: Temperature rise of 1.5 ° C
S0_2080: Temperature rise of 3.0 ° C

Figure 16: Rate of change in millet/sorghum grain yields in Niger as a function of T° increase scenarios.
Source: CILSS, 2016 (adapted)

FAO simulations also show that cereal crop yields will generally decline in the tropics and subtropics, where this project is located, by 2050. These declines will be relatively large, ranging from 20 to 50 per cent across the Sahelian strip (FAO, 2008). This will have a negative impact on food security and the survival of the populations.

Since the projections show a relative increase in yield up to 12-20 % in the case of rice in Maradi and Zinder regions, if irrigation is applied on present day rainfed harvested areas (figure 5), to cope with growing severe food insecurity due to the adverse effects of climate change, Niger is promoting irrigated agriculture through small-scale irrigation and Irrigated Agriculture Developments, i.e., hydro-agricultural infrastructures (AHA).

However, the AHAs implemented so far are subject to climatic, technical, and financial constraints, which severely limit their optimal and sustainable productivity. According to the National Office of Hydro Agricultural Development (ONAHA), under a hybrid rainy season, the increasing occurrence of heavy rainfall events is exacerbating soil erosion and is inducing the breaches of protective dykes around the existing hydro-agricultural infrastructures and the flooding of irrigation areas (figure 9 and 10). During such events, strong runoff transports sand and sediments into the irrigation and drainage channels. Within a short time, the irrigation channel function is disturbed and closed by the sediments or sand (figure 11 and 12). During dry spells exacerbated by heat waves, the disruption of irrigation channels reduces the available water which can be used to meet the crop water requirements on irrigated areas (figure 13 and 14). The climate context, exacerbated by poor design, lack of maintenance, etc., thus rapidly weakens the hydro-agricultural infrastructure and contributes to the decrease or total loss of crop productivity (about one out of five of the AHAs are currently non-operational) (see Table 1 for the years 2011 to 2015).

Table 1: Number of non-operational hydro agricultural developments due to climatic effects.

Year	Number of AHAs developed	Number of operational AHAs	Number of non-operational AHAs lost due to climatic effects
2011	70	56	14
2012	70	63	7
2013	75	56	19
2014	77	60	17
2015	87	70	17

For example, in 2015, more than 1,996 ha of hydro-agricultural infrastructures land were exposed to long dry spells and floods.

Figure 17: Dike breaches due to heavy rainfall and flooding of the irrigation areas by water.

Figure 18: Flooding of irrigated areas.

Figure 19: Bottom filling of a drain preventing the circulation of water with sediments brought by the Koris.

Figure 20: Obstruction of a serving channel with sand transported by Koris water

Figure 21: Insufficient irrigation, silting and drying of plots.

Figure 22: Drying of plots and crops in vegetation.

On the Djirataoua AHA (Maradi region), the sudden interruption of rains during the rainy season caused the loss of 57.7% of the 389 ha sown in 2014. Only 164.5 ha could be harvested. This resulted in a loss of production in the Djirataoua II irrigation area of about 595 tonnes for the wintering season of 2014 alone. In addition to this loss of production, there is also the loss of investments related to development.

Table 2: Production losses related to climatic events in Djirataoua II in 2014.

Crops	Area sown (ha)	Area harvested (ha)	Losses in area (ha)	Yield (ton/ha)	Production losses (tonnes)
Sorghum	150	55	95	1,45	137,75
Corn	85	16	69	2,85	196,65
Pepper	25	22	3	7,57	22,71
Cassava	5	0	5	0	0
Millet	52	35	17	0,98	16,66
Cowpea	15	5	10	2,1	21
Tomato	14	6	8	17,15	137,2
Peanut	20	7,5	12,5	0,95	11,875
okra	23	18	5	10,125	50,625
Total	**389**	**164,5**	**224,5**		**594,47**

Source: ONAHA, 2015

Farmers' understanding of the causes of the decline in agricultural yields

While the Government estimates that harvests were good in the 2018 agricultural season, the household food security survey conducted in September and October 2018 showed that 45.4 percent of producers reported that the 2018 harvest was lower than the 2017 harvest on the same areas sown. Only 37.5% of farmers believed that the 2018 production was higher than that of 2017.

Among households that reported that their harvest level was lower than ???in 2017, 24.7% mentioned pest pressure (insects and diseases), 22.9% referred to low rainfall and 20.7% reported lack of inputs as the main causes. Apart from the cause relating to the lack of agricultural inputs, the other two causes (pest pressure and low rainfall) are mentioned by Niger's Third National Communication as being the consequences of climate change[15].

MITIGATION NEEDS

In 2014, following a heavy rainfall event at the AHA of Djirataoua, the irrigation channel was closed by the sediments and

[15] TCN Niger 2016, P. 101

sand, thus 57.7% of the 389 hectares of crop field dried up with a production loss of around 595 tons. In this context, on most AHAs, excessive water is drained with the help of thermal units powered by diesel which emits greenhouse gas. This occasional emission of greenhouse gas (GHG) is added to the cost of energy for irrigation of crops due to the dysfunction of irrigation channels. The electricity bill can cost an average of 140,21 Euros/ha/year, which is a real constraint despite the State subsidy. On AHAs using diesel generators the cost of fuel acquisition and its unavailability in all zones limit the normal operation of pumping stations and therefore regular irrigation. In either case, the energy problem is acute. However, the situation is more worrying at the level of AHAs using fossil fuel generators because of the high costs weighing heavily on the operating accounts of the operators, but also greenhouse gas emissions contributing to global warming, which is impacting Niger severely.

One of the NDC objectives is to assure food security, and combat poverty to: contribute to the reduction of world greenhouse gas (GHG) emissions (objective 2°C at the 2050 horizon), promote rational management of natural resources, a low-carbon and green-growth development strategy, and enhance the resilience of populations and agricultural, forest and pastoral ecosystems. The emission trends show that the Agriculture, forestry and other land uses (AFOLU) sector accounted for 89.88% of the total GHG emissions in 2000, and 93.83% in 2008 (See table below).

Table 3: Global GHG emissions, by sector in 1990, 2000 and 2008.

Year / Sector	1990		2000		2008	
	Value (Gg)	%	Value (Gg)	%	Value (Gg)	%
LULUCF	6,106.26	68.52	14,250.95	44.91	21,010	58.52
Agriculture and breeding	1,839.55	20.64	14,270.92	44.97	12,675	35.31
Energy	928.47	10.42	2,765.04	8.71	1,766	4.92
Industrial processes	9.56	0.11	18,05	0.06	34	0.09
Waste management	28.22	0.3	429,96	1.35	415	1.16
Total	8,912.06	100	31,734,92	100	35,900	100

Source: Niger, Greenhouse gas inventory, October 2014

Additionally, the figure below shows that agriculture-related conversion of soils, forest and grassland are the main sources of emissions from the forestry subsector (See figure below).

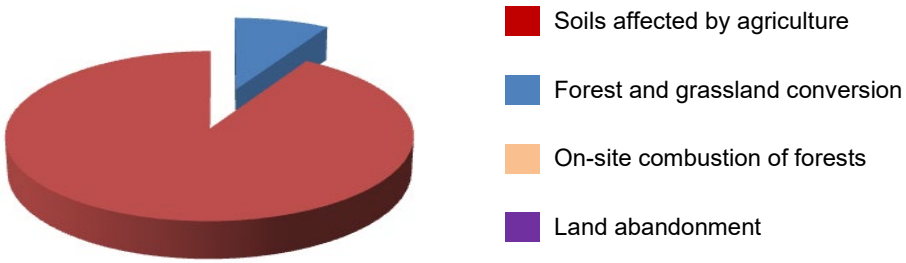


Figure 23: Emissions from the forest sub-sector
Source: Niger, Greenhouse gas inventory, TNC

Thus, the NDC considers that, for the mitigation of emissions at the level of this subsector, the conversion of forests will be mainly taken into account, given that the avoidance of emissions at this level will have a definite impact on the CO_2 emission from agricultural soils.

According to the National Determined Contribution (NDC, 2015) and the Third National Communication (TCN, 2016), the agriculture and livestock sector contribute 35.31% to GHG emissions at the national level, or 12,675 GgCO2Eq. The use of diesel generators for irrigation, the expansion of cultivated areas to the detriment of forest, poor cropping techniques practiced on the irrigation areas, etc. are indexed as main sources of GHG emissions.

In the absence of this project, the climate constraints facing Niger's AHAs cannot be addressed to improve food security. It is therefore for this purpose that the Ministry of Agriculture suggests , as recommended by the NDC, to start hydro-agricultural developments with techniques resilient to the adverse effects of climate change by promoting climate smart agriculture interventions (CSA) to achieve both adaptation and mitigation, by improving production and incomes with

innovative irrigation techniques (solar systems as a source of energy and water efficient irrigation networks including Californian and drip irrigation).The criteria for choosing intervention areas are therefore primarily related to their vulnerability to climate change and food insecurity in recipient households, the existence of potential for irrigable land and water resources (including groundwater potential)[16], easy land security in an acceptable time, complementarity to past and ongoing projects, distance separating the natural reserves (see the project intervention area selection on page 58 to 61 and annex 11 in the Feasibility Study Document). The regions and village's sites selected based on these criteria are presented in the table below (see details in Location of intervention sites on page 62 and annex 11 in the Feasibility Study Document).

Table 4: Regions and sites to be developed, selected by the project.

Regions	**DIFFA**	**MARADI**	**ZINDER**	**TAHOUA**	**AGADEZ**
Villages Sites	Digargo	Korahane	Angoual Malam Jataou	Tsaouna	Agogh
	Dassa	Douman Gada	Kantché	Karofane	Elmeki-Aoudéras
	Chéri	Gabi Tajaé	Gazoura	Vallée de Boussaragué	Téchillé
		Guidan Chérifi	Guirari		Tchintaborak
		Foura Guirké	Gwabron Majé		
		Magadi	Gayi		
			Riga Babban Shemé		

The project is consistent with Niger's National Determined Contribution (NDC), particularly on promoting climate-smart agriculture (CSA) and considering adaptation, mitigation, and food security, while strengthening development at the grassroots level. It meets CSA's triple objectives of: building resilience (adaptation), reducing GHG emissions from the sector (mitigation), improving agricultural productivity and incomes (production). Indeed, the development of hydro-agricultural developments with climate-resilient techniques and a solar water pumping system to replace thermal power generators, is in line with the complimentary actions of adaptation and mitigation advocated by the NDC. The project will also contribute to the achievement of the results associated with the national priorities of the AFOLU sector, of water resources and capacity building of the actors at all levels identified in the NDC, the related benefits of the AFOLU sector being, in fact, constituted by the results of implementation and scaling up of CSA activities (strengthening of assisted natural regeneration (RNA), recovery of degraded land; improvement of the cereal and forage balance and of food and nutritional security, etc..

Related projects/interventions: Also describe any recent or ongoing projects/interventions that are related to the proposal from other domestic or international sources of funding, such as the Global Environment Facility, Adaptation Fund, Climate Investment Funds, etc., and how they will be complemented by this project/programme (e.g. scaling up, replication, etc.). Please identify current gaps and barriers regarding recent or ongoing projects and elaborate further how this project/programme complements or addresses these.

Currently, three major agriculture programs/projects are underway in Niger to strengthen the resilience of farming populations to climate change for ensuring food security. These are: (1) the Community Action Project for Climate Resilience (PACRC), funded by the World Bank, which aims to improve the resilience of populations and production systems to climate change to increase national food security. Unlike the proposed project which covers most of Niger, the PACRC is focused in specific areas and only 60% of its budget is being invested in sustainable forest management and improving grazing area productivity. In addition to the mainstreaming of climate change into health, water and road infrastructure sectors, the PACRC also aims to improve social protection and safety nets with: (i) the protection and rehabilitation of socio-economic community facilities prone to climate risks; (ii) the operational cash transfer system for the most vulnerable households; (iii) the remunerated seasonal labor intensive activities for the poor households and 'food stamps' or 'vouchers' distribution to chronically poor households[17]; (2) the Mobilization and Valorization of Water Resources Project (PROMOVARE), funded by the African Development Bank (AfDB), has a research and development character which is under implementation in the northern parts of the Tillabéry, Dosso, Tahoua and Agadez regions. Thus, the proposed GCF project area differs in its geographical coverage (Tillabery and Dosso are not cover by the current project). Even in Tahoua and Agadez, the intervention sites of PROMOVARE are different from the proposed GCF project sites. PROMOVARE seeks to enhance the population's capacity to adapt to climate change through actions such as the mobilization of water resources for irrigation and the popularization of resilient seeds and improved irrigation techniques. For the mobilization of water resources, PROMOVARE is also supporting the development of small-scale irrigation. The

[16] The areas must have access to an available water table of less than 100 m or to a deep artesian water table of less than 400 m with at least 20 m above the ground.

[17] Niger- Community Action Project for Climate Resilience Project on http://documents.worldbank.org/curated/en/125631468291377061/Niger-Community-Action-Project-for-Climate-Resilience-Project

planned reforestation activities within the framework of the project will contribute to increasing carbon sequestration capacity, albeit locally and carbon emissions from irrigation activities will be minimized by adopting eco-friendly farming methods. PROMOVARE differs from the proposed GCF project by the investments into the research and livestock resilience such as : (i) pastoral facilities, i.e. Pastoral areas for 5000 Tropical Livestock Units, inoculation centers, pastoral wells, watering corridors; (ii) water resources monitoring (with piezometers, water-level recorders, water resources modelling of the irrigation sites); and (iii) support for applied research (studies of the silting and sloughing of dams and reservoirs, setting of standardized resilience norms for the harnessing and irrigation network, research on crop storage, conservation conditions and distribution of improved seeds)[18]; (3) the Project to Strengthen Agriculture's Resilience to Climate Change Through Modern Irrigation Techniques (PRRA-CC) funded by the Adaptation Fund and the West African Development Bank (BOAD). This project, which is currently being launched, will be carried out in the Agadez, Dosso, Tahoua, Tillabéry and Niamey regions. The project aims to contribute to sustainable food security by building resilience to climate change using large scale irrigation in Niger, through the promotion of innovative irrigation techniques. In addition, the GCF has already funded two projects in Niger implemented by IFAD that include assistance to smallholder farmers in Niger, namely: i) SAP012 Inclusive Green Financing for Climate Resilient and Low Emission Smallholder Agriculture, which focuses on *Innovative Financing Facility to foster the best adaptation practices and use of renewable energy along agricultural value chains;* and ii) The Africa Integrated Climate Risk Management Programme: Building the resilience of smallholder farmers to c*limate change impacts in 7 Sahelian Countries of the Great Green Wall (GGW*). The current project complements these other projects, wanting to remove the key hindrances in developing irrigation in Niger[19], as : (i) removal of initial investment high cost; (ii) investment with a clearly defined economic model for sustaining the project whether by public institutions or private national banks and microfinance institutions, including operation and maintenance costs ; (iii) clearly identified surface and ground water sources for irrigation needs ; (iv) securing irrigation areas lands with titles, giving so a mean of assurance to farmers groups and cooperatives to access loan for irrigation and water pumping energy, irrigation areas protection from flooding ; (v) organizing farmers in groups and cooperatives, to enable them accessing financial resources to invest in irrigation systems; (vi) developing knowledge and technical skills for climate resilient, mitigation, yield and production improvement techniques, maintenance of such systems, using any source of funding, once the interest rates are affordable and the length of the loan has been adjusted (vii) giving capacities to farmers groups and cooperatives to produce food during three campaigns each year, regardless of the climate adverse effects, in particular, droughts, irregular rains, rains that can lead to flooding, etc.

Potential for maladaptation

Project approach

The climate smart agriculture approach that has been selected by the project includes measures that are “likely no-regret” as they are expected to perform equally well and benefit target communities under a range of future climate scenarios. Furthermore, the project’s proposed climate smart agriculture interventions have been designed, and will be implemented, based on the best available climate data and science concerning the most relevant climatic factors (see above).

The project’s climate smart agriculture measures target the most vulnerable smallholder farmers in rural Niger. So, it is not anticipated that the measures will result in the unsustainable expansion of agriculture in the target areas once the benefits thereof — increased crop yields and income potential — are realized. As a result, there will not be any further unregulated clearing of land to increase the size of farms, which would result in the degradation of ecosystems and the overexploitation of natural resources such as water and soil. The proposed project will promote the sustainable intensification of agriculture with commercialization, ensuring that land cultivation is carefully controlled and that benefit sharing amongst vulnerable smallholder farmers is maintained by preventing the monopolization of agriculture by powerful groups. In addition, it is unlikely that the beneficiary smallholder farmers would expand the size of, or establish additional, AHAs as yields and income increase, degrading the surrounding lands. Conversely, as increased yields will be experienced in previously unmaintained or abandoned AHAs because of project measures, the need to establish new AHAs and increase the area of farmed land to meet their subsistence and income needs will be reduced. The establishment of new, or increasing the area of existing, AHAs will also be mitigated by the need for the related land titles to be approved by the ONAHA Land Management Unit and would also require support from other local stakeholders. Consequently, the risk of maladaptation due to increased pressure on land and natural resources from the success of the project’s climate smart agriculture interventions is low. The potential for the project to have unintended negative consequences on water resources is discussed below.

Pressure on water resources as a result of the project

[18] African Development Bank, 2012. Water Resources Mobilization and Development Project (PROMOVARE): Project Appraisal report

[19] Based on the lessons learned from the IFC / World Bank projects on « Private Sector Investment to Build Climate Resilience in Niger’s Agricultural Sector: Introducing Improved Irrigation Systems and Climate Resilient Seeds » in 2013, https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledge-documents/ifc_ppcr_niger_irrigation_seeds_public_full_english_9dec2013_0.pdf.

With the decrease of the rainfall, the increase of the food insecurity, there is a need to increase the irrigation areas in Niger to achieve food security; water is needed to develop small-scale irrigation and hydro-agricultural infrastructures. In the framework of the current project, ground water will be needed. Therefore, it is especially important to be sure that despite the adverse effect of climate change, the availability of ground water and its sustainable use will be secured. Indeed, two water basins are concerned by the project: Iullemeden Aquifer System (Niger Basin) and the Chad Basin Aquifer System. **The 1,001 ha AHA which will be developed are not expected to significantly impact the ground water resources.** The Methodology used to assess the pressure of AHA-AIC water withdrawals on available groundwater resources is "Tracking Indicator 6.4.2. of United Nations Food and Agriculture Organization Version: February 4, 2019 updated in August 2020 - GEMI - Integrated Monitoring of the Sustainable Development Goal (SDG) 6 Water stress level freshwater withdrawals as a proportion of available freshwater resources" (see analysis in Annex 28 In: AHA-AIC Water estimation and water balance analysis). Considering the evapotranspiration, the availability of water, the climatic conditions and trends, the water needs of the crops, the current recharging capacity of groundwater and the projects underway or planned, the ecological water needs in the project area, the climate-smart agriculture technologies are sized so as not to put pressure on water resources. The cumulative impacts of the AHA-AIC project with the other projects being implemented in the aquifers are considered in the analysis. **All the projects already developed and projected in the targeted area and the AHA-AIC project are without stress on the groundwater resources that will be used.** The level of pressure of AHA-AIC project is considered as no stress on water resources, according to the indicators recommended by the United Nations for the Sustainable Development Goals indicator 6.4.2. Staying within the limits recommended by the International Water Management Institute (IWMI), the AHA-AIC project replication and scaling up is largely possible considering water resources. *See Annex 28: Analysis of the Pressure of Irrigation Water Withdrawals from the Hydro-agricultural Development Project with Climate Smart Agriculture Practices on Groundwater Resources in Niger.*

Land acquisition, securing, and distribution for landowners and other beneficiaries in the framework of AHA-AIC project

In the framework of this project, the identified land at the sites identified for the development of AHAs belong to peasants whose property is recognized under customary law. The landowners who will transfer these lands are also beneficiaries of the project. They agree to make a voluntary surrender of their land, in accordance with national regulation. The regulation requires that land retained for the AHA's development will be registered with the support of ONAHA with definition of property rights on the land titles that will be established. Under this regulation, landowners who have surrendered their land will receive 33% of the land developed in return. Each active member of their family will even be able to benefit from 16% of land, if he proves that he will be able to effectively exploit the landscaped plot. Thus, a landowner could regain about 97% of the land bequeathed if he comes with 4 active members of his family. If the landowner does not have enough active members to effectively occupy the entire land, the title will bear the necessary references to cede the unoccupied portion, without any other form of coercion to other needy farmers.

The ONAHA Land Management Unit provides land tenure for new and old AHAs, having land titles established to avoid land conflicts and manage them in the event of such conflicts. The process of land title establishment is highly participatory from the village level to the top of the national land administration with the effective contribution of local, communal, departmental, regional, and national land commissions. Each meeting of the owners, the heads of villages, townships, ONAHA and the commissions raised is sanctioned by a meeting minutes which consensual and participatory decisions will be recorded at the level of the land title that will be established.

Table 5: Indicative chronogram of land acquisition and registration activities on the project sites.

ACTIVITIES	1st month				2nd month				3rd month				4th month			
1. Information by official mail from the various competent ministries																
2. Inventory of existing and available documents, first interviews with local authorities to begin to complete the available information.																
3. Information and awareness-raising for the various authorities																
4. Information and awareness-raising for the populations concerned																
5. Delimitation of irrigated areas in the field																
6. Land advertising and boundary marking																
7. Census of farmers and codification of plots of land																
8. Explanation, signature, and registration of contracts on the land title																

In four months, the process of securing a land title can be completed and several applications can be submitted at the same time, depending on the availability of funding.

The figure below presents the rates applicable to land acquisition from landowners and land distribution for all the project beneficiaries.

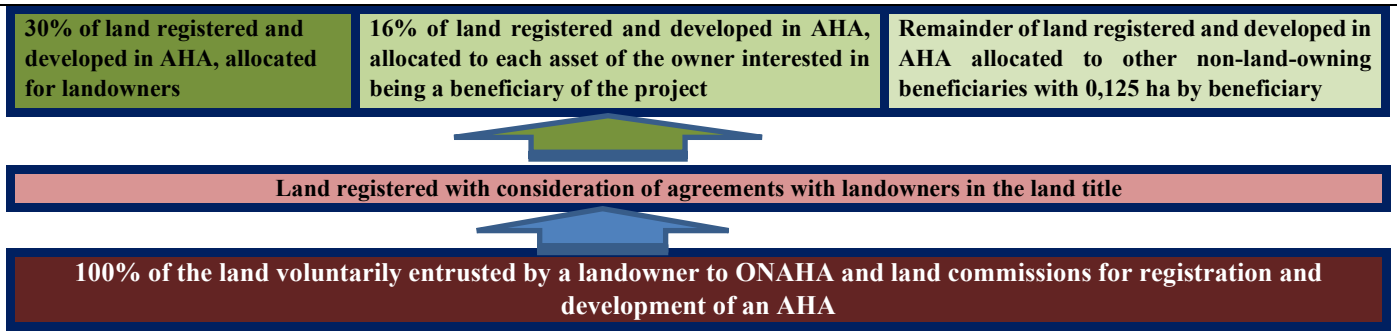


Figure 24: Rates applicable to land acquisition from landowners and land distribution for all the project beneficiaries.

Dispositions are in place for AHA's land Governance, land voluntarily entrusted by a landowner, land acquisition for AHAs development, land secure, registration, distribution, land tenure security activities in the irrigation areas, land management, land tenure conflict management on AHAs, litigation and dispute resolution, the favorable conditions to be adopted with the AHA-AIC project approach in communes that are currently excluded from it because of "land problems", the land documents archiving, the land securing audit, monitoring-evaluation, etc. *See annex 29 of Funding proposal: Land securing methodology for AHA-AIC development and its replication.*

B.2. Theory of change (max. 1000 words, approximately 2 pages plus diagram)

Describe the theory of change and provide information on how it serves to shift the development pathway towards a low-emission and/or climate resilient direction. Provide the diagram of the theory of change (approximately 1 page).

Problem statement and proposed solution

Niger is the poorest of the Least Developed Country constituency (LDC) in the world[20] and faces extraordinary challenges in ensuring infrastructure and development aligns with climate-resilient, low-emission development pathways. Agriculture is the main source of income and livelihood provision for 87% of the population, yet it is severely impacted by the adverse effects of climate change, including irregular rainfall, short rainy seasons, droughts, flooding and lack of water availability for cropping beyond the rainy season. Notably, the increasing intensity and frequency of floods and droughts under climate change conditions are impacting government-supported Irrigated Agricultural Developments (AHAs), reducing their functionality and potential to increase agricultural production. Flooding damages fields, increases erosion and causes siltation of irrigation canals, primarily causing crop losses and reducing the efficiency of irrigation systems, reducing productivity further. As a result, food insecurity, poverty and malnutrition are increasing and have led to 29.1% of the population being classified as "at risk" and 12.4% as "food insecure".

To remedy this, the preferred solution is the deployment and rehabilitation of AHAs that are climate resilient, which is crucial to help communities adapt to climate change, as well as decrease the amount of GHG emissions currently produced through business-as-usual methodologies of water management for agricultural purposes. Consequently, the proposed project aims to enable the development of a replicable model of climate-resilient, low-emission agriculture financing with solar energy, innovative irrigation techniques and enhanced protection against floods. Introducing these measures to the region will increase agricultural productivity and income as crop production will yield more and communities will be able to turn a profit.

The project zone is one the most vulnerable regions and communities in Niger's Tahoua, Agadez, Maradi, Diffa and Zinder regions. It calls for a total of 1,000 ha of new AHAs to be developed and 749 ha of old AHAs to be rehabilitated across the regions, ensuring that they are resilient to climate change-related temperature increases, and more intense and frequent flood and drought events. This will be complemented by the installation of solar-powered pumps at AHAs, replacing those reliant on diesel and the national grid, thereby reducing GHG emissions. Adaptation co-benefits of the mitigation component include increased water supplies for human and livestock consumption, as well as reduced amounts of money spent by farmers on fuel and electricity, thereby improving their adaptive capacity. The cross-cutting project aims to increase the climate resilience of 121,615 direct beneficiaries and 1,000,000 indirect beneficiaries, while also helping communities shift to low-emission sustainable development pathways with 11,176.3 tCO2eq avoided.

The proposed approach has a strong transformative potential as it will combine GHG emission reduction, climate-resilient agricultural techniques, cost-effective production methods, public and private funding of the AHAs and the inclusion of youth, women, and vulnerable people in all the activities. Niger agriculture is vulnerable to the impacts of climate change

[20] UN Human Development Index (UDI)

such as droughts and floods. Using inefficient cropping and water-use techniques (including the use of diesel generators for irrigation) has limited productivity, resulting in deforestation to expand cultivated areas, and are some of the main contributors to the agriculture and livestock sector's GHG emissions. Ultimately, the project will transform Niger's agriculture sector from the current model to a one that is climate smart agriculture (using CSA and water-saving techniques), cost-effective, productive and mitigates GHG emissions through the use of clean energy systems. This will climate proof the livelihoods and incomes of vulnerable farmers and livelihoods — including women and youth. The project's transformative potential will allow for it to be replicated and scaled up across Niger, the West African Region and beyond.

Goal statement

If climate-resilient irrigated agricultural systems and strengthened capacity for their management result in increased productivity and food security, then resilience to climate change (rainfall variability, drought and floods) of Niger's most vulnerable communities will be enhanced because irrigation systems are improved, sustainably maintained and well managed by local producers who have access to funding and markets, improved knowledge on and capacity for climate smart agriculture, and support from the private sector. GCF grant financing will therefore facilitate the uptake of the technology with hopes of normalizing climate-smart agricultural technology and creating a paradigm shift toward low emission and climate-resilient development.

Project outcomes and associated results

The proposed project's goal will be achieved through the realization of three outcomes and their underlying results.

Outcome 1: Improved water use in, energy efficiency of reduced GHG emissions from and increased resilience to flooding of irrigated agricultural systems under climate change conditions. Outcome 1 will be realized through *Component 1* (sustainable development and rehabilitation of perimeters vulnerable to the adverse effects of climate change), which is made up of: *Result 1.1* – Perimeters are developed and rehabilitated with techniques that are resilient to the adverse effects of climate change; and *Result 1.2* – The perimeters are developed with water-saving techniques and clean energy systems.

Outcome 2: Increased agricultural productivity and food security under climate change conditions. Outcome 2 will be realized through *Component 2* (increased agricultural productivity and food security under climate change conditions), which is made up of: *Result 2.1* – Producers organized for sustainable optimal development of perimeters; *Result 2.2* – Technical itineraries adapted to the major climatic risks of the irrigated perimeters are adopted for crop production; *Result 2.3* – Integrated outsourced water and energy management system set up and operational for optimal development of the perimeters; and *Result 2.4* – Funding and market access mechanisms for products from irrigated perimeters are strengthened.

Outcome 3: Strengthened capacity (technical organizational and financial) for climate smart agriculture. Outcome 3 will be realized through *Component 3* (developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices), which is made up of: *Result 3.1* – Knowledge, practices and regulations for irrigated agriculture resilient to the adverse effects of climate change are strengthened; *Result 3.2* – The technical and organizational capacities of farmers' groups are strengthened for the implementation of climate-resilient actions; *Result 3.3* – An incentive environment favorable to the promotion of a private and sustainable financing mechanism for climate-smart agriculture is created for the scaling up of the AHA-AIC project; *Result 3.4* - Control, supervision, and M&E framework to quality assure climate-resilient, low emission project implementation; and *Result 3.5* – Lessons learned are shared among stakeholders and disseminated for an overall strengthening of the agriculture sector in the context of climate change.

Barriers and risks to the realization of project outcomes and approaches to overcoming them

Barrier 1: Limited technical capacity and knowledge of government staff and local stakeholders (farmers, cooperatives and other agricultural actors) to implement and manage sustainable climate-resilient agricultural technologies and practices. Barrier 1 will be addressed through strengthening the technical capacity of local producers and actors to implement climate-resilient agricultural technologies and practices, including those which conserve soil and water resources — *Activities 3.1.2 and 3.2.1*. This will contribute to the strengthening of: i) knowledge practices and regulations for irrigated agriculture that are resilient to the adverse effects of climate change (*Result 3.1*); and ii) the technical and organizational capacities of farmers' groups for the implementation of climate-resilient actions (*Result 3.2*). These results contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*), which ultimately results in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Barrier 2: Poorly maintained and damaged (from floods) existing AHAs are reducing the climate resilience of agriculture production systems resulting in reduced agricultural productivity and contributing to food insecurity. Barrier 2 will be

addressed through the rehabilitation of existing AHAs — *Activity 1.1.2*, designing and implementing maintenance mechanisms for hydraulic infrastructure and electrical equipment at AHAs — *Activities 2.3.1 and 2.3.2*, and facilitating the promotion and scaling of innovative financing and on-lending mechanisms for climate smart agriculture, including ensuring that finance is available for the maintenance of AHAs — *Activities 3.3.1 and 3.3.2*. These activities will contribute to the: i) development and rehabilitation of perimeters with the techniques that are resilient to the adverse effects of climate change (*Result 1.1*); ii) setting up and operationalization of an integrated and outsourced water and energy management system for the optimal development of perimeters (*Result 2.3*); and iii) creation of an incentive environment favorable to the promotion of a private and sustainable financing mechanism for climate-smart agriculture for the scaling up of the AHA-AIC project (*Result 3.3*). These results will contribute to: i) sustainable development and rehabilitation of perimeters vulnerable to the adverse effects of climate change (*Component 1*), and subsequently to improved water use in, energy efficiency of and reduced GHG emissions from irrigated agricultural systems under climate change conditions — *Outcome 1*; ii) to support for sustainable development of developed and rehabilitated perimeters (*Component 2*), and consequently to increased agricultural productivity and food security under climate change conditions — *Outcome 2*; and iii) developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*), which ultimately results in strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger — *Outcome 3*.

Barrier 3: Lack of organizational capacity within farmers' groups and cooperatives to coordinate the collaborative implementation of climate-resilient agricultural technologies and practices. Barrier 3 will be addressed through capacity-building programs which will focus on strengthening organizational capacities to stimulate the coordinated implementation of climate-resilient agricultural technologies and practices, as well as improve producer groups' access to agro-meteorological information — *Activities 3.2.2 and 3.2.3*. These activities will contribute to the strengthening of the technical and organizational capacities of farmers' groups for the implementation of climate-resilient actions (*Result 3.2*), which will, in turn, contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*). This will result in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Barrier 4: Limited availability of funding options, coupled with high interest rates charged by banks on lending products, needed to introduce, implement and maintain climate-resilient agricultural technologies and practices in Niger — such as solar water pumping systems and water-efficient irrigation networks, such as Californian or drip irrigation. Barrier 4 will be addressed through facilitating the promotion and scaling of innovative financing and on-lending mechanisms with attractive interest rates for climate smart agriculture — *Activities 3.3.1 and 3.3.2*. These activities will contribute to the creation of an incentive environment favorable to the promotion of a private and sustainable financing mechanism for climate-smart agriculture for the scaling up of the AHA-AIC project (*Result 3.3*). This result will contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*), which ultimately results in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Barrier 5: Weak or non-existent regulatory frameworks to foster strengthening the climate-resilience of agriculture, and introducing climate-smart agricultural technologies. Barrier 5 will be addressed through: i) the establishment of an Irrigation Water Users Associations (AUEis) which will sign operating contracts with farmers' groups and cooperatives for support in deploying climate-smart technologies — *Activities 2.1.3 and 2.1.4*; and ii) facilitating improved contracts and agreements between GoN, ONAHA, cooperatives and AUEis to ensure that climate change mitigation and adaptation are prioritized and mainstreamed into Niger's agricultural sector — *Activity 3.1.4*. These activities will contribute to the: i) organizing of producers for the sustainable optimal development of the perimeters (*Result 2.1*); and ii) the strengthening of knowledge practices and regulations for irrigated agriculture that are resilient to the adverse effects of climate change (*Result 3.1*). Result 2.1 contributes to support for sustainable development of developed and rehabilitated perimeters (*Component 2*), and consequently, increased agricultural productivity and food security under climate change conditions (*Outcome 2*). Result 3.1 contributes to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*), which ultimately results in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Risk 1: Farmers' groups and cooperatives do not support the uptake of climate-resilient agricultural technologies and practices, continuing with unsustainable current practices leading to reduced productivity under climate change conditions and preventing reductions in GHG emissions in the agriculture sector. Risk 1 will be addressed through fostering the buy-in of farmers' groups and cooperatives will be fostered via: i) supporting their establishment and functioning — *Activity 2.1.3*; ii) establishing operating contracts with cooperatives and AUEis — *Activity 2.1.4*; iii) supporting the development and implementation of business plans for farmers' groups and cooperatives — *Activity 2.4.1*; iv) strengthening the organizational capacities of operators — *Activity 3.2.2*; and v) supporting farmers' groups access to agro-meteorological information — *Activity 3.2.3*. These activities will contribute to the: i) organizing of producers for the sustainable optimal development of the perimeters (*Result 2.1*); ii) strengthening of funding and market access mechanisms for products from

irrigated perimeters (*Result 2.4*); and iii) strengthening of the technical and organizational capacities of farmers' groups for the implementation of climate-resilient actions (*Result 3.2*). Results 2.1 and 2.4 will contribute to support for sustainable development of developed and rehabilitated perimeters (*Component 2*), and consequently, increased agricultural productivity and food security under climate change conditions (*Outcome 2*). Result 3.2 will contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*), which ultimately results in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Risk 2: Conflicts over land ownership and titles amongst beneficiary households, which may compromise loan repayments on credit for climate-resilient, low emission agriculture. Risk 2 will be addressed by decreasing the risk for the FIs, as the land on which the technology will be deployed will be registered with a land title which will help ensure the banks that loans will be paid back and reduce interest rates on agricultural credit — *Activities 2.1.1 and 2.1.2*. These activities will contribute to the organizing of producers for the sustainable optimal development of the perimeters (*Result 2.1*), which in turn will contribute to support for sustainable development of developed and rehabilitated perimeters (*Component 2*). This will lead to the realization of increased agricultural productivity and food security under climate change conditions (*Outcome 2*).

Risk 3: Private sector stakeholders (other than financial institutions) do not support a transition to climate-resilient, low emission agricultural technologies and practices because of a lack of interest or non-demonstration of impacts/potential. Risk 3 will be addressed through stimulating the support of the private sector for climate-resilient technologies and practices through a demonstration of their impact and building their capacity to provide innovative financing opportunities for climate smart agriculture — *Activity 3.3.1*. This will contribute to the creation of an incentive environment favourable to the promotion of a private and sustainable financing mechanism for climate-smart agriculture for the scaling up of the AHA-AIC project (*Result 3.3*), which will contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*). This will ultimately result in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Risk 4: Financial Institutions (FIs) do not commit to supporting sustainable financing mechanisms for the scaling up and replication of climate-resilient, low emission agricultural technologies and practices because of a risk of defaulting on loan repayments if the technologies and practices are not successful. Risk 4 will be addressed as follows: once the potential impacts of the climate-resilient practices and technologies have been demonstrated and there is increased demand, there will be a stimulation of private sector funding for which the Agricultural Loan Facility will enable FIs to provide low-interest loans in the future and help create a favorable environment for private and sustainable financing mechanisms for climate-smart agriculture and the scaling up of the AHA-AIC projects across Niger — Activities 2.4.1, 2.4.2, 2.4.3 and 3.3.1, 3.3.2. Activities 2.4.1, 2.4.2 and 2.4.3 will contribute to the strengthening of funding and market access mechanisms for products from irrigated perimeters (*Result 2.4*), while Activities 3.3.1 and 3.3.2 will contribute to the creation of an incentive environment favorable to the promotion of a private and sustainable financing mechanism for climate-smart agriculture for the scaling up of the AHA-AIC project (*Result 3.3*). Result 2.4 will contribute to support for sustainable development of developed and rehabilitated perimeters (*Component 2*) which will lead to the realization of increased agricultural productivity and food security under climate change conditions (*Outcome 2*). Result 3.3 will contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*) and consequently, strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

Risk 5: Agricultural plots (AHAs and their quarters) are damaged by climate change-induced floods, resulting in erosion and restricting agricultural productivity and food security gains — i.e., reduced functionality of the AHAs. Risk 5 will be addressed through the development of irrigated perimeters, which will involve protecting sites from water erosion through building anti-erosion structures, flood perimeter protection strengthening, anti-erosive control by planting trees around plots and sites as well as the development of hydro-agricultural perimeters with climate-resilient techniques — *Activities 1.1.1 and 1.1.2*. These activities will contribute to the development and rehabilitation of perimeters with techniques that are resilient to the adverse effects of climate change (*Result 1.1*). This will contribute to sustainable development and rehabilitation of perimeters vulnerable to the adverse effects of climate change (*Component 1*), and subsequently to improved water use in, energy efficiency of and reduced GHG emissions from irrigated agricultural systems under climate change conditions (*Outcome 1*).

Risk 6: Water resources required for improvements to agricultural productivity and food security are insufficient or are overexploited under conditions of climate change resulting disrupted supplies. Risk 6 will be addressed through the deployment of innovative irrigation techniques such as solar and water-efficient irrigation systems as well as through strengthening the regulation of water use (to prevent overexploitation). Innovative irrigation techniques will include drip and California irrigation systems to improve the crop yield to water use ratio, ensuring that water use at the AHAs is sustainable. It is expected that, through the project's water-saving interventions, 18.6 million m^3 of water per year will be saved — *Activities 1.1.1 and 1.2.1*. These activities will contribute to the development and rehabilitation of perimeters with the techniques that are resilient to the adverse effects of climate change (*Result 1.1*), and development of perimeters with

water-saving techniques and clean energy systems (*Result 1.2*). Results 1.1 and 1.2 will, together, contribute to sustainable development and rehabilitation of perimeters vulnerable to the adverse effects of climate change (*Component 1*). This will subsequently lead to improved water use in, energy efficiency of and reduced GHG emissions from irrigated agricultural systems under climate change conditions (*Outcome 1*). Water use regulation within the project target areas will be enhanced through: i) ONAHA overseeing billing related to water use by beneficiaries, allowing them to monitor and mitigate the overextraction of groundwater — *Activity 1.2.2*; ii) the establishment of Irrigation Water Users Associations (AUEis) which will sign operating contracts with farmers' groups and cooperatives for support in deploying climate-smart technologies, which reduce water usage — *Activities 2.1.3 and 2.1.4*; iii) facilitating improved contracts and agreements between GoN, ONAHA, cooperatives and AUEis to ensure that climate change mitigation and adaptation are prioritized and mainstreamed into Niger's agricultural sector (including sustainable water use) — *Activity 3.1.4*; and iv) strengthening the organizational capacities of operators for water use allocation — *Activity 3.2.2*. These activities will contribute to: i) prioritizing the saving of water at perimeters (*Result 1.2*); ii) organizing of producers for the sustainable optimal development of the perimeters (*Result 2.1*); iii) strengthening of knowledge practices and regulations for irrigated agriculture that are resilient to the adverse effects of climate change (*Result 3.1*); and iv) strengthening of the technical and organizational capacities of farmers' groups for the implementation of climate-resilient actions (*Result 3.2*) — to prevent the overextraction of groundwater which will be more feasible once cheaper solar-powered pumps are available. Result 1.2 will contribute to improved water use in agricultural systems under climate change conditions (*Outcome 1*). Result 2.1 contributes to support for sustainable development of developed and rehabilitated perimeters (*Component 2*), and consequently, increased agricultural productivity and food security under climate change conditions (*Outcome 2*). Results 3.1 and 3.2 contribute to developing stakeholders' technical and organizational capabilities to promote climate-resilient agricultural practices (*Component 3*), which ultimately results in the realization of strengthened capacity (technical, organizational and financial) for climate smart agriculture in Niger (*Outcome 3*).

The addressing of the five risks and six barriers through the proposed project (activity–result–outcome, as described above) will ultimately result in the achievement of the *project's goal* of strengthening the climate resilience of Niger's most vulnerable populations, and mitigated GHG emissions because of reduced exposure to erratic rainfall, droughts and floods, as well as decreased reliance of fossil fuels in the country's agriculture sector.

Assumptions

Key assumptions that apply to the proposed project's outcomes and their underlying activities are listed below.

- Local communities, existing institutions and organizations actively take up and implement the climate-smart agricultural techniques introduced by the project.
- Local communities commit to a shift away from fossil fuel-generated energy to clean energy.
- Women and youth from the project's target communities actively participate in project activities that strengthen food security.
- Current private sector stakeholders have buy-in for the transition towards a climate-smart low-emissions approach in Niger's agriculture sector.
- Local actors and producers in Niger's agriculture sector buy into and participate in climate smart agriculture capacity building activities implemented by the project.

Private financial sector stakeholders commit to the promotion of innovative financing mechanisms for climate smart agriculture in Niger.

The project's theory of change is presented in the below diagram.

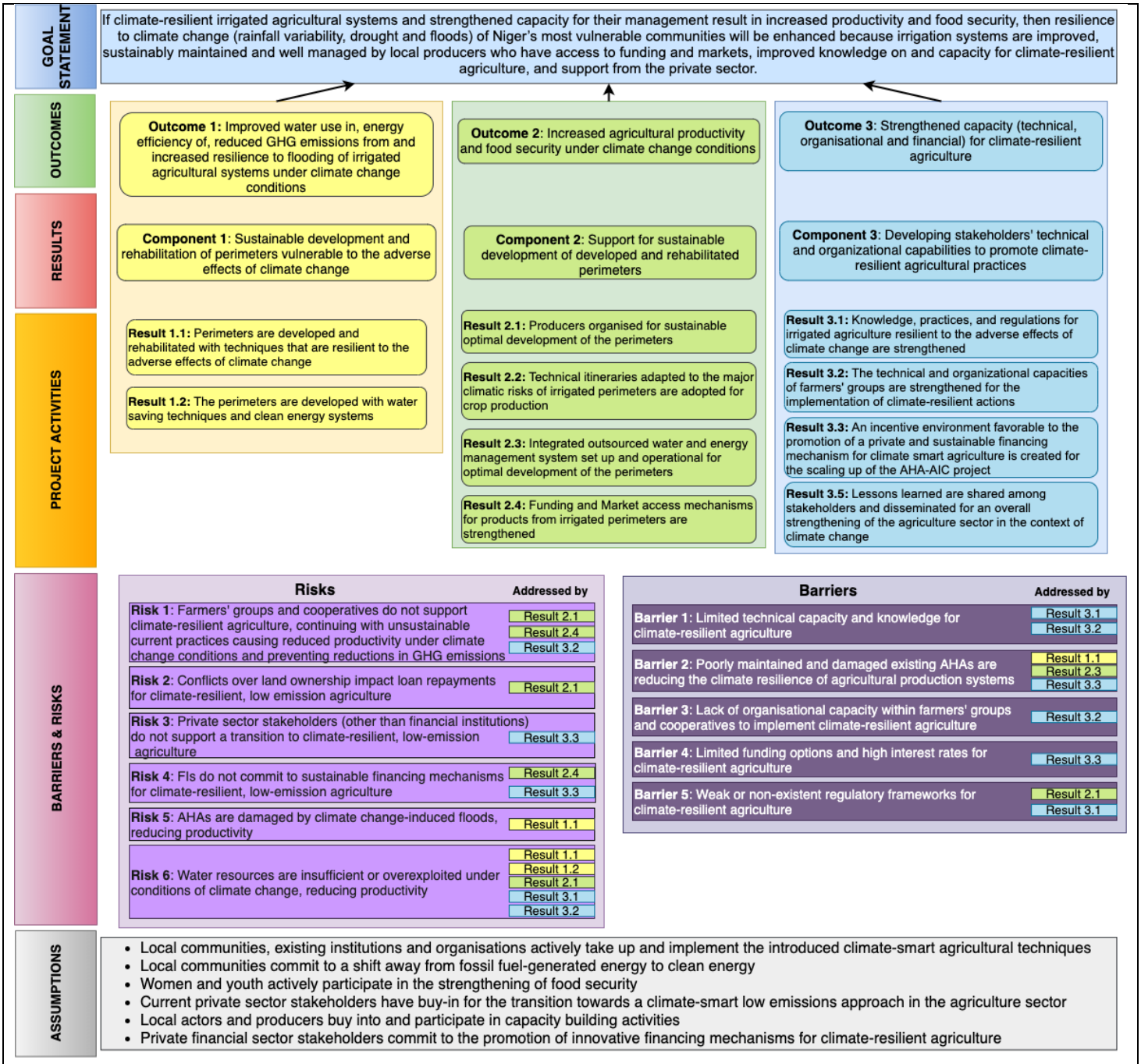


Figure 25: Project's theory of change diagram (project activities and results of the same color are linked)[21].

[21] Result 3.4 has been omitted from the diagram as it pertains to project M&E and supervision (Control, supervision, and M&E framework to quality assure climate-resilient, low emission project implementation) and, therefore, does not contribute to the ToC.

B.3. Project/programme description (max. 2000 words, approximately 4 pages)

Define the project/programme. Describe the proposed set of components, outputs and activities that lead to the expected Fund-level impact and outcome results. Components should reflect the project/programme level outcomes.

This should be consistent with the financing by component in section C.2, the results and performance indicators provided in section E.5, and the implementation timetable in annex 5.

The overall objective of the project is to contribute to the increase of national agricultural production by strengthening the resilience of populations to the adverse effects of climate change. The specific objectives of the project are to: (i) intensify agricultural production in a sustainable manner by improving crop yields through hydro-agricultural developments designed with innovative irrigation and solar pumping systems; (ii) protect productive capital against threats from the effects of climate change such as silting and flooding; and (iii) ensure the sustainability of operations, infrastructure and their funding through the strengthening of technical, organizational and financial capacities of operators, technical services and private financing institutions. The project is structured around three components: (i) Sustainable development and rehabilitation of perimeters vulnerable to the adverse effects of climate change; (ii) Developed and rehabilitated irrigation areas development support; (iii) Stakeholders' technical, organizational and financial capacities development for the climate-resilient agricultural practices promotion (see details of components, outputs, activities and sub activities in the feasibility study).

Component 1: Sustainable development and rehabilitation of irrigation areas vulnerable to the adverse effects of climate change and reducing GHG emissions

This component aims to develop new irrigation areas and to strengthen existing irrigation areas that are affected by the adverse effects of climate change such as flooding, droughts, irregular rainfall, short rainy season, water shortage for cropping beyond the rainy season. Moreover, the AHAs are developed in Niger with inadequate irrigation networks which lose water and use diesel generators and the fossil fuel-powered public electricity network to pump irrigation water, thereby emitting GHG. To shift these perverse effects of climate change, the activities will be developed to achieve two Outputs. This component aims to develop 23 irrigated areas totaling 1001 ha with solar pumping and water-saving irrigation system and to rehabilitate two formers AHA sites totaling 759 ha. Two Outputs are planed: Irrigation areas are developed with techniques resilient to the adverse effects of climate change (Output 1.1), and the Irrigation areas are developed with total water control and a clean energy system (Output 1.2).

Table 7. Eligibility criteria for relevant outputs and activities under Component 1.

Activities for which beneficiaries will be selected	**Eligibility Criteria**	**Potential selection processes**
Output 1.1: Irrigation areas are developed with techniques resilient to the adverse effects of climate change *Direct beneficiaries: 121,615*		
Activity 1.1.1: Development of irrigation areas with climate-resilient techniques Activity 1.1.2: Rehabilitation of 749 hectares of the old AHAs	• Farmers / Producers organized or willing to be organized as cooperatives or agricultural groups to follow the ONAHA's hydro-agricultural areas management rules. • Poorest and most climate- vulnerable smallholder landowners in the project's target areas. • Commit to implementing climate-resilient, low-emission agriculture introduced by the project, and be willing for the adherence for this to be monitored periodically. • Commit to not using any degradative practices or expanding their cropping areas to outside of the land that they own. • Member of a cooperative and/or an irrigation water user's association (AUEi).	• Irrigation areas and local producers will be selected through participatory selection meetings between ONAHA, cooperatives, AUEis and other relevant committees.

Output 1.1: Irrigation areas are developed with techniques that are resilient to the adverse effects of climate change for Euros 15,123,742 of which Euros 7,149,179 will be funded by GCF**.** It should be noted that until now the irrigation areas of Irrigated Agriculture Developments (AHAs) have been developed with rudimentary non-resilient techniques that compromise agricultural production under the threat of the adverse effects of climate change. Production losses are enormous, caused by either flooding, pockets of increasingly recurrent droughts, silting or destruction by koris. In addition to this, producers have little capacity to carry out developments and conduct the agricultural campaign in this new context of climate change, where the effects are diversified and will increase. To combat these adverse effects of climate change, the proposed project will consider two activities: i) Development of irrigation areas with climate-resilient techniques (Activity 1.1.1) and, ii) Rehabilitation of 749 hectares of the old AHAs (Activity 1.1.2). This will develop and rehabilitate the irrigation areas with climate-resilient

techniques, and among others, protecting sites and farming plots in irrigation areas against water erosion by building anti-erosion structures, and strengthening erosion control by planting trees around plots and sites. Activities 1.1.1 and 1.1.2 are explained in further detail below.

Activity 1.1.1

This activity will include the climate-resilient development of 1,000 hectares of irrigation areas operated by cooperatives and farmers' groups. The irrigation areas will be subdivided into Irrigated Agricultural Developments (AHAs), each of which will be cultivated by a farmer's cooperative. AHAs will be between 10 and 71.7 ha in size. Each AHA will firstly be subdivided into 5 ha hydraulic quarters, which will then, in turn, be subdivided into 40 0.125 ha plots (Figure 26). The size of each site/hydraulic quarter to be developed within the irrigation areas, serves as a basic parameter for determining the amount of work to be carried out and volume/number of inputs required for the development of the site, as well as how water resources will be managed to fulfil the site's irrigation needs. Once the 5 ha hydraulic plots have been demarcated (200), the 0.125-hectare plots will be constructed. Hydraulic quarters and plots will then be climate proofed by: i) constructing anti-erosion structures, and planting trees around the sites and plots, developing Assisted Natural Regeneration (ANR) Farmer Managed Natural Regeneration (FMNR) to prevent and arrest erosion, respectively; and ii) strengthening the plots perimeter flood protection measures to mitigate the impacts of flooding.

Activity 1.1.2

749 ha of old AHAs at the Djirataou 1 and Galmi sites will be rehabilitated through this activity. The functionality of these AHAs has been severely reduced as a result damaged caused by flooding and erosion. This has result in increasing production losses and costs required to rebuild and maintain them. Therefore, the rehabilitation measures to be implemented under Activity 1.1.2 will strengthen the resilience of the AHAs to the impacts of climate change (increased frequency and intensity of floods, erosion and drought). Rehabilitation measures will include: i) establishing processing koris; ii) constructing anti-erosion structures; iii) rehabilitation of 43 and construction of 11 new boreholes; iv) rehabilitating old and installing new (solar powered) pumps; v) replacing 65 km of irrigation canals with buried PVC piping; v) rehabilitating 18 km of drains by re-profiling and curing them; and vi) rehabilitating 61 km of access roads to the AHAs.

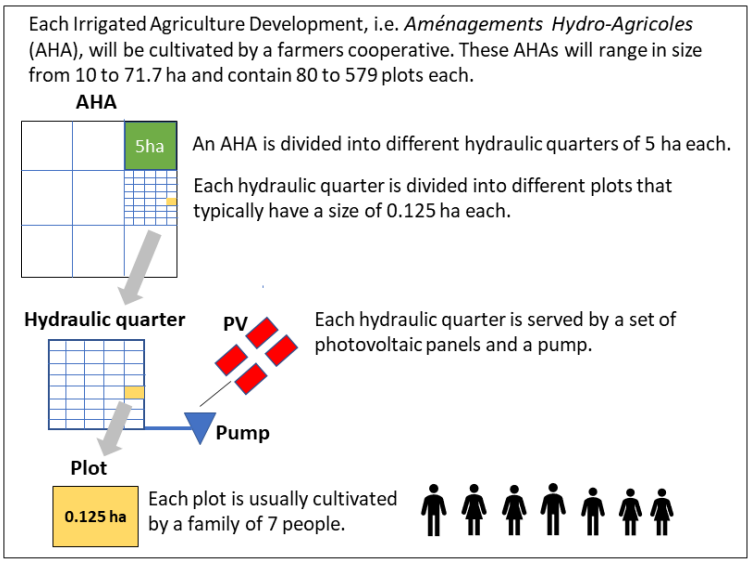


Figure 26. Division of Irrigated Agriculture Developments (AHAs) into hydraulic quarters and individual farming plots.

Output 1.2. The irrigation areas are developed with water-saving techniques and a clean energy system for Euros 15,123,742 of of which Euros 13,802,653 will be provided by GCF**.** As Niger is a Sahelian country, the flow of surface water is relatively low in areas far from Niger River. These waters are in fact subject to high evaporation and are widely used for both human consumption and livestock farming. Conflicts of use are frequent, especially between farmers and stockbreeders, limiting the supply of water necessary for the development of crops. This project intends to use relatively abundant groundwater in the project areas but at different depths through drilling and storage water and to develop total control of this irrigation water with drip and California irrigation systems. These systems have irrigation yields of 90% and 85%, respectively, and are expected to result in water savings of between 35 and 50% at the sites. This will be done through Activity 1.2.1: Drilling of boreholes equipped with solar pumps and installation of drip and California irrigation systems. The steps to implementing Activity 1.2.1 is described below.

- Drill and establish 688 boreholes and water storage basins.
- Install to piezometers per 5 ha hydraulic quarter.
- Install drip irrigation units across 5% of the 5 ha hydraulic quarters.
- Install California irrigation network units across 95% of the 5 ha hydraulic quarters.
- Construct five 10 m^3 water storage reservoirs per 5 ha hydraulic quarter.
- Construct the major irrigation canals for the drip and California systems.

Activity 1.2.2 includes installing and equipping boreholes with clean energy systems. The clean energy systems will be solar powered and replace the diesel generators usually used on hydro-agricultural developments. Kits composed of pumps, solar panels, inverter, regulator, and connection accessories for pumping will be installed at the scale necessary to ensure the irrigation of 5 ha units. Depending on the depth of the drilling, three common types of solar photovoltaic pumping systems have been identified: i) submersible solar pumps; ii) solar pumps with a motor on the surface; and iii) systems with both the motor and pump installed on the surface. The appropriate type of installation to be carried out is determined by the characteristics of each site (see Installation Sizing). 803 solar power pumping system installations will be undertaken by the project (728 for the new AHAs and 75 for the rehabilitated AHAs). An additional 37 solar power pumping systems will be installed to provide drinking water to livestock across the project sites.

Within the AHAs, the farmers groups are organized in cooperatives to pay the cooperative costs of collective equipment such as water and electricity bills. ONAHA will be: i) the owner of the asset under this output (e.g., solar pumps, solar panels etc.); (ii) the responsible for O&M for the asset; and (iii) the Directory of Infrastructure, Materials and the Workrooms is going to assess the impact of the mitigation on GHG reduction. The irrigation water users will collect water and energy bills and pay ONAHA. There are no backup generators powered by non-renewable energy resources planned in the framework of this project.

Figure 27: Diesel generator for irrigation water pumping on the AHAs.

Figure 28: Clean Water Drainage Solar Energy Generator to be Installed in the Project context.

Component 2: Support of the sustainable increase in agricultural productivity and income of farmers' groups and cooperatives in irrigated areas on developed and rehabilitated perimeters

This component aims to ensure the rational use of the newly developed and rehabilitated areas to support the sustainable increase in and maintenance of agricultural productivity and income of farmers' groups and cooperatives in irrigated areas under conditions of climate change. It contains actions that will make it possible to develop the physical investments planned under Component 1 "development of perimeters with techniques resilient to the adverse effects of climate change". It will also be consolidated by the activities of Component 3, "Strengthening technical capacities for the promotion of climate smart agriculture". The Outputs with which the component 2 will be realized are: Output 2.1. Producers organized for optimal development of irrigated areas. Output 2.2: Technical itineraries adapted to the major climatic risks of irrigated areas are adopted for crop production. Output 2.3: Integrated and outsourced water and energy management system set up and operational for optimal development of irrigation areas. Output 2.4: Funding and market access mechanisms for products from irrigated areas are strengthened.

Table 8. Eligibility criteria for relevant outputs and activities under Component 2.

Activities for which beneficiaries will be selected	**Eligibility Criteria**	**Potential selection processes**
Output 2.1. Producers organized for optimal development of irrigated areas *Direct beneficiaries: 121,615*		
Activity 2.1.1: Conducting the land registration process at selected sites Activity 2.1.2: Distribute hydraulic quarters and allocate plots to beneficiaries Activity 2.1.3: Support for the establishment of farmers' organizations and their functioning Activity 2.1.4: Establishment of operating contracts with cooperatives and AUEi	• Farmers / Producers organized or willing to be organized as cooperatives or agricultural groups to follow the ONAHA's hydro-agricultural areas management rules. • Poorest and most climate- vulnerable smallholder landowners in the project's target areas. • Formal acceptance to participate in household surveys undertaken by project monitoring teams. • Commitment to promoting and supporting climate-resilient agricultural practices introduced by the project. • Commit to implementing climate-resilient, low-emission agriculture introduced by the project, and be willing for the adherence for this to be monitored periodically. • Commit to not using any degradative practices or expanding their cropping areas to outside of the land that they own.	• Local producers will be selected through participatory selection meetings between ONAHA, cooperatives, AUEis and other relevant committees.
Output 2.2: Technical itineraries adapted to the major climatic risks of irrigated areas are adopted for crop production *Direct beneficiaries: 109,105*		
Activity 2.2.2. Support to vulnerable groups for the acquisition of small operating equipment	• Poorest and most climate- vulnerable smallholder landowners in the project's target areas. • Formal acceptance to participate in household surveys undertaken by project monitoring teams. • Commit to implementing climate-resilient, low-emission agriculture introduced by the project, and be willing for the adherence for this to be monitored periodically. • Commit to not using any degradative practices or expanding their cropping areas to outside of the land that they own. • Member of a cooperative and/or an irrigation water user's association (AUEi).	• Local producers will be selected through participatory selection meetings between ONAHA, cooperatives, AUEis and other relevant committees.
Output 2.4: Funding and market access mechanisms for products from irrigation areas are strengthened *Direct beneficiaries: 109,105*		
Activity 2.4.1. Support for the implementation of business plans drawn up at the level of groups and cooperatives Activity 2.4.2. Support for the development of income-generating activities (IGAs) based on the conservation and processing of agricultural products Activity 2.4.3. Support for *warrantage* and group sales initiatives	• Poorest and most climate- vulnerable smallholder landowners in the project's target areas. • Commit to implementing climate-resilient, low-emission agriculture introduced by the project, and be willing for the adherence for this to be monitored periodically. • Commit to not using any degradative practices or expanding their cropping areas to outside of the land that they own. • Member of a cooperative and/or an irrigation water user's association (AUEi). • Cooperatives, groups and committees need to be formally established and recognized as role players within the agricultural sector of target areas (farmers groups and cooperatives, AUEis, , the Executing Entity which is the Ministry of Agriculture acting through ONAHA).	• Local producers will be selected through participatory selection meetings between ONAHA, cooperatives, AUEis and other relevant committees. • Local groups and cooperatives will be selected through consultations with , the Executing Entity which is the Ministry of Agriculture acting through ONAHA and other bodies involved in the provisions of agricultural support and extension services.

The activities under this component will be carried out by ONAHA. These activities will be implemented on each site and benefit all of the direct beneficiaries. The expected results of this component are as follows:

Output 2.1. Producers organized for optimal development of irrigated areas for Euro 205,074**.** Producer organization is as important in the development of the irrigation areas as physical investment. To achieve this result, the following activities are planned: (i) Conducting the land registration process selected sites (Activity 2.1.1); (ii) hydraulic quarters and allocate plots to beneficiaries (Activity 2.1.2) (the detail of land registration and distribution methodology and process is described in Annex 29: Land securing methodology for AHA-AIC development and its replication); (iii) support for the establishment of

farmers' organizations and their functioning (Activity 2.1.3) ; and (iv) Establishment of operating contracts with cooperatives and AUEi (Activity 2.1.4).

Output 2.2: Technical itineraries adapted to the major climatic risks of irrigated areas are adopted for crop production for Euro 1,081,848**.** On each site, the crops have been selected according to: the food preferences of the local population; the economic viability of the crop and suitability of the crop to the local environment. Rice has been retained on 3% of the targeted cropped surface affected by the project and are focused on area prone to flooding. Moreover, the water-intensive character of rice will be mitigated using drought tolerant varieties and the application of water saving techniques in rice cultivation (System of Rice Intensification[22]). Annex 21 provides the details of the crop selected for project sites. The efficiency of the crop management system is a key factor in improving crop productivity.

To achieve this Output, the following activities are planned: (i) Activity 2.2.1. Support in planning activities at site level; This will include the availability of agrometeorological information; (ii) Activity 2.2.2. Support to vulnerable groups for the acquisition of small operating equipment; (iii) Activity 2.2.3**.** Strengthening agronomic monitoring and agricultural input acquisition mechanisms; and (iv) Activity 2.2.4. Promotion of composting and the use of organic fertilizers on irrigated perimeters.

Output 2.3: Integrated outsourced water and energy management system set up and operational for optimal development of irrigation areas for Euros 1,493,863 of which Euros 1,113,536 from GCF**.** The maintenance of the network is a prerequisite for the normal circulation of water and the optimal development of the irrigation areas. A distinction is made between two types of care or maintenance. These are preventive maintenance and curative maintenance. Preventive maintenance takes place before the campaign and, as its name suggests, consists of maintaining the irrigation systems in good condition and this is done every year. Curative maintenance takes place during the season and especially in case of emergency. The project to reduce GHG emissions from irrigation activities on AHAs uses solar energy. To ensure the sustainability of the investments, the project will develop a programme of close and permanent maintenance and management of the physical investments made on the sites. The water and energy management system will be outsourced by the EE (ONAHA) as follow: shall: (a) Assign, in addition to the perimeter manager that the association shares with the cooperative, technical skills on a permanent or intermittent basis for local technical support; (b) Design and ensure the funding of a capacity development plan for the AUEI in terms of water management, infrastructure and equipment maintenance, associative life and social engineering, and administrative and financial management; (c) Support the cooperative in collecting the water fee and ensuring its proper use; (d) Support the association in developing an annual maintenance plan for the facilities (irrigation networks, energy, drainage systems, roads, dams, weirs, pumping stations, special structures, etc.); (e) Ensure that the association provides sufficient resources for the renewal of pumping equipment and periodic maintenance of energy infrastructure; (f) Ensure the overhaul of pumping stations at the end of each campaign; (g) Maintain the installations and repair the electromechanical and solar equipment at the request of the association and for a fee; (h) Supervise any company with which the association may contract for the maintenance of the infrastructures; (i) Undertake, according to the needs and availability of funding, all rehabilitation work and physical and institutional modernization of the hydro-agricultural development and representative entities of users; (j) Ensure the monitoring and evaluation of the performance of the AUEI in water management, maintenance and associative management, accounting and report to the Ministry of supervision. The Irrigation Water Users Association (called AUEi in french) will participate in the energy and water management as follow: (a) The preparation of an annual water and energy management plan and maintenance of infrastructure and equipment and the corresponding budget; (b) The instructions of the technical staff regarding the organization of the water tour and the maintenance of the facilities; (c) The equitable management of water on the perimeter with respect to all users; (d) Order and discipline regarding water management and maintenance; (e) Free access of ONAHA to the infrastructure and equipment of the hydro-agricultural development and to all the documentation of the association; (f) The hiring of salaried staff essential to the achievement of the objectives of the operating contract (manager, watermen, etc.); (g) The funding of all expenses generated by maintenance work carried out by ONAHA or other service providers under the supervision of ONAHA. Through this result, the project seeks to eliminate conflicts of water use, access to irrigation energy sources, abandonment of irrigation areas due to poor management of the equipment and works carried out. The activities planned under this result are: (i) Activity 2.3.1: Design and implementation of a mechanism for the maintenance of hydraulic infrastructures; (ii) Activity 2.3.2: Design and implementation of a maintenance mechanism for electrical equipment; (iii) Activity 2.3.3: Implementation of a programme for close monitoring of the efficiency of the hydraulic and electrical structures. The farmers cooperatives will be in charge of the mechanism for the maintenance, but under the ONAHA's control.

Output 2.4: Funding and market access mechanisms for products from irrigation areas are strengthened for Euros 508,156. The project will improve market access mechanisms at the intervention sites to enable farmers' organizations to make their production more profitable and thus strengthen their resilience to the effects of climate change. This will involve providing

[22] Haougui et al., 2019. On-farm testing of the System of Rice Intensification (SRI) in lowlands ecology in Niger. Journal of Research in Biology (2019) 9(4): 2693-2700

support through the following activities: (i) Activity 2.4.1. Support for the implementation of business plans drawn up at the level of groups and cooperatives; (ii) Activity 2.4.2. Support for the development of income-generating activities (IGAs) based on the conservation and processing of agricultural products; and (iii) Activity 2.4.3. Support for *warrantage*[23] and group sales initiatives. This will support construction of agricultural products storage warehouse, and organizing the producers' groups with the Microfinance Institutions for warrantage.

Component 3: Stakeholders' technical, organizational, and financial capacities development for the climate-resilient agricultural practices promotion

This component aims to build the capacity of technical services and producers on techniques that are resilient to the adverse effects of climate change to facilitate project implementation, ownership, and sustainability. The component will put in place a financial incentive mechanism in the form of line of credit from GCF to facilitate the private funding of the climate smart agriculture and consequently the scaling up of the AHA-AIC project. Five results are expected from the implementation of this component. This component has the following Outputs: Output 3.1: The local government officials' Knowledge and technical skills of climate smart agriculture are strengthened ; Output 3.2: The technical and organizational capacities of farmers' groups and cooperatives are strengthened for the implementation of climate change-resilient actions; Output 3.3: An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the replication of the AHA-AIC project; Output 3.4: Control, supervision, and M&E of project activities; Output 3.5: Lessons learned are shared among stakeholders and disseminated for an overall strengthening of the agriculture sector facing climate change pervert effects.

Table 9. Eligibility criteria for relevant outputs and activities under Component 3.

<table>
<tr><th>Activities for which beneficiaries will be selected</th><th>Eligibility Criteria</th><th>Potential selection processes</th><th>Potential supported activities</th></tr>
<tr><td colspan="4"><u>Output 3.1: Knowledge, practices, and regulations for irrigated agriculture resilient to the adverse effects of climate change are strengthened</u>

121,615 direct beneficiaries</td></tr>
<tr><td>Activity 3.1.1: Strengthening of knowledge on rainfall trends and temperature variability in the project area.</td><td rowspan="2">• Poorest and most climate-vulnerable smallholder landowners in the project's target areas.
• Actors within the target areas involved in the provision of agricultural support or extension services (farmers groups and cooperatives, AUEi, ONAHA, MoA).
• Formal acceptance to participate in household surveys undertaken by project monitoring teams.
• Commitment to attending at least 80% of all information-sharing and training sessions.
• Member of a cooperative and/or an irrigation water user's association (AUEi).
• Own land within targeted AHAs. Women farmers will be exempt from this criterion.</td><td rowspan="2">• Local producers will be selected through participatory selection meetings between ONAHA, cooperatives, AUEis and other relevant committees.
• Local actors will be selected through consultations with ONAHA and other bodies involved in the provisions of agricultural support and extension services.</td><td>• Training on planning crop calendars related to changes in rainfall trends.
• Providing information which is understandable to local producers of current and expected rainfall trends and temperature variability.
• Informing producers how changing rainfall trends and temperature variability are expected to impact growing seasons, planting and harvesting times, and productivity of relevant crop varieties.</td></tr>
<tr><td>Activity 3.1.2: Strengthening the technical capacities of local actors and producers for the promotion of agriculture resilient to the adverse effects of climate change.</td><td>• Train local actors and producers on the selection and implementation of climate smart agriculture techniques appropriate for local conditions and climate change scenarios — including rainfall trends and temperature variability in the project area.
• Train local actors to provide advice, support and extension services to local producers on climate smart agriculture practices.</td></tr>
</table>

[23] *Warrantage* is an inventory credit system (normally called the warehouse receipt system, or WRS, in English). It entails granting credit with grain as collateral in secure warehouses where a third independent party holds the collateral on behalf of both the creditor and the debtor.

Activity 3.1.3. Training of stakeholders in the use of tools for monitoring changes in natural resources in the framework of the implementation of environmental and social management plan.			• Train local stakeholders to monitor groundwater abstraction rates and identify signs of over abstraction or unsustainable reductions. • Train local stakeholders to monitor erosion rates and soil quality.
Output 3.2. The technical and organizational capacities of farmers' groups and cooperatives are strengthened for the implementation of climate-resilient actions			
Activity 3.2.1. Training of producers in climate-smart farming practices that can sustainably preserve soil and water resources.	• 25 farmers per perimeter area (farmers need to own land within the targeted perimeter areas), including adequate representation of women. • Farmers need to be of the poorest and most vulnerable to climate change in the target areas. • Farmers need to be members of either relevant groups, cooperatives or committees (such as perimeter management committees, the seed committee, the water and irrigation equipment management committee, WUAs, etc.). • Cooperatives, groups and committees need to be formally established and recognized as role players within the target areas. • All relevant groups, committees and cooperatives need to be represented at the trainings (at least 625 in total). • Commitment to attending at least 80% of all information-sharing and training sessions.	• Local producers will be selected through participatory selection meetings between ONAHA, cooperatives, groups and other relevant committees, ensuring that all are adequately represented and that farmers from all perimeter area are covered by the activity.	Training on: • selection of crop varieties relevant to the local climatic changes; • management of irrigation water, • management of soil fertility; • management and operation of irrigation areas; and • implementation of climate-resilient cultivation techniques.
Activity 3.2.2: Strengthening the organizational capacities of operators.	• Cooperatives, groups and committees need to be formally established and recognized as role players within the agricultural sector of target areas (farmers groups and cooperatives, AUEis, ONAHA, MoA). • Represent farmers who are the poorest and most vulnerable to climate change in the target areas. • Commitment to promoting and supporting climate-resilient agricultural practices introduced by the project. • Commitment to the provision of ongoing organizational and management guidance and support to their members.	• Operators will be selected via a process of registering for the training via ONAHA who will confirm their formal establishment and recognition as a local role player.	Provision of support and training to increase productivity and income-generating capacity under climate-change conditions for: • organization of farmers; • crop planning; • water use allocation, • crop recovery; • accounting/management; and • marketing.
Output 3.3. An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the scaling up of the AHA-AIC project			
Activity 3.3.1: Building the capacity of the private financial sector, farmers groups, associations and cooperatives to promote and scale	• Farmers need to be members of either relevant groups, cooperatives or committees (such as perimeter	The AE will select on the basis of the criteria retained in 3.3.2.the Financial Institutions which can participate in this assessment. The	Examples of activities that could be supported by the studyinclude: • assessment the financial viability of the Agricultural

innovative financing for climate smart agriculture	management committees, the seed committee, the water and irrigation equipment management committee, etc.) • Owner of or holder of title deeds for land where climate-resilient, low-emission agriculture will be implemented. • Commit to implementing climate-resilient, low-emission agriculture introduced by the project, and be willing for the adherence for this to be monitored periodically. • Commit to not using any degradative practices or expanding their cropping areas to outside of the land that they own. • Formal acceptance to participate in household surveys undertaken by project monitoring teams.	study will extend to pattern of agricultural cooperatives, irrigation water users associations, and agricultural groups.	Loan Facility, including consideration of likely default rates ; and • proposition of a design for the Facility that can maximize potential both to crowd in private finance and to help vulnerable farming communities adapt to climate change. •
Activity 3.3.2: Set up an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agriculture loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the "Agriculture Loan Facility") (Criteria related to provision of financial support to rural smallholder farmers for climate smart agriculture through an incentivized on-lending mechanism)	• Farmers need to be of the poorest and most vulnerable to climate change in the target areas. • Farmers need to be members of either relevant groups, cooperatives or committees (such as perimeter management committees, the seed committee, the water and irrigation equipment management committee, etc.). • Owner of or holder of title deeds for land where climate-resilient, low-emission agriculture will be implemented. • Commit to implementing climate-resilient, low-emission agriculture introduced by the project, and be willing for the adherence for this to be monitored periodically. • Commit to not using any degradative practices or expanding their cropping areas to outside of the land that they own. • Formal acceptance to participate in household surveys undertaken by project monitoring teams.	• Applicants for financial support will need to apply through relevant cooperatives and groups where they hold members, who will provide any initial screening of applications to ensure that they meet the criteria after which selected applications will be sent to the financial institutions for approval.	Examples of activities that could be supported by the finance include: • introducing climate-resilient agricultural techniques on the irrigation areas; • installing solar power systems for the pumping of water and irrigating of crops; • installing water-efficient irrigation systems (such as drip or Californian; • accessing and implementing an integrated system of outsourced water and energy management; • adapting technical itineraries to the major climatic risks of the irrigation areas for sustainable agricultural production; • accessing agricultural inputs (such as tools, fertilisers and seed) required for the implementation of climate smart agriculture; and • upgrading AHAs to a level that is climate-resilient. •

*Eligibility criteria for the selection of MFIs is presented in the description of Activity 3.3.2 below.

Output 3.1: The local government officials' Knowledge and technical skills of climate smart agriculture are strengthened for Euros 242,851 of which Euros 160,071 from GCF**.** The local government officials' Knowledge, practices' skills in agriculture resilient to the adverse effects of climate change skills is critical to meet the challenge of adapting agriculture to climate change and to strengthen the resilience of rural populations in Niger. Thus the strengthening and development of the local government officials knowledge in climate-smart agriculture with resilient techniques with benefits in terms of adaptation, mitigation and increased productivity is essential. The activities planned for local government officials to support farmers field actions are: Activity 3.1.1: Strengthening of knowledge on rainfall trends and temperature variability of the local government officials in the project regions ; Activity 3.1.2: Strengthening the technical capacities of the local government

officials for the promotion of agriculture resilient to the adverse effects of climate change; Activity 3.1.3. Training of the local government officials in the use of tools for monitoring changes in natural resources in the framework of the implementation of environmental and social management plan; Activity 3.1.4: Updating contracts and agreements between the State, ONAHA, cooperatives and irrigation water user's associations (AUEi) to incorporate climate change adaptation and mitigation provisions.

Output 3.2. The technical and organizational capacities of farmers' groups and cooperatives are strengthened for the implementation of climate-resilient actions for Euros 907,181 of which Euros 362,520 from GCF**.**

The success of crop intensification in an irrigated system is based on the control of varietal performance, rigorous management of irrigation water and soil fertility, efficient management of irrigation areas and mastery of different cultivation techniques. On each perimeter 25 farmers representing their farmers' groups and cooperatives, will be trained. At least 625 farmers' groups and cooperative representatives will be involved in this activity. The representatives of the association will insure the dissemination of the learned practices. The training will be in two languages (French language and local language). Members of the perimeter management committees, the seed committee, the water and irrigation equipment management committee, and fertilizers will all be trained. Gender parity will be targeted within the framework of these trainings. In addition to these trainings, manuals/guides of good practices to be adopted in the areas of water management, plant control and monitoring, water drainage energy management, crop planning, etc. will be prepared and made available to producer groups. Images illustrating good practices will be provided to enable people who are not literate to understand the message conveyed. Most people belonging the vulnerable groups are not literate. The success of the project will depend on the farmers' groups and cooperatives. During the fieldwork, it was noted that some producers are in groups and others are individuals. Only farmers organized into groups and cooperatives will be prioritized in the choice of beneficiaries. Difficulties in the functioning of the groups were noted due to the lack of management capacity of the groups. The project will therefore provide support to the various groups to strengthen their management capacity in the project areas. Modules on farmers' organization, crop planning, allocation of water use in turn, cost recovery, accounting/management, marketing will be provided to the various farmers groups and cooperatives based on the project sites.

Access to real-time weather and climate information enables better planning of agricultural activities, enhances agricultural productivity and production. It considerably reduces the risk of loss of agricultural investments due to delayed and/or irregular rainfall. Enormous losses are recorded on AHAs due to unusual climatic events. Despite the major efforts devoted to the production of agro-meteorological information, this information is not always accessible to producers. For this reason, the project will strengthen producers' access to appropriate agro-meteorological information. To eliminate information asymmetry, mobile phone services are becoming an important means of providing farmers' groups and cooperatives with weather forecasts and market data. The dissemination of meteorological information through mobile phones will also be reinforced by radio broadcasts in local languages on rural radio stations. The implementation of this activity calls for collaboration between the meteorological services, the National Office of Solar Energy (ONERSOL), now the National Solar Energy Centre (CNES), AGRHYMET (Centre Régional d'Agriculture, d'Hydrologie et de Metéorologie) and the Development Directorate. The project will also set up an early warning system to warn grassroots communities, using a computer system, of disasters (floods, intense droughts, locust invasions, etc.). The activities planned under this Output are: Activity 3.2.1. Training of producers in climate-smart farming practices that can sustainably preserve soil and water resources; Activity 3.2.2: Strengthening the organizational capacities of operators for local government officials; Activity 3.2.3: Support for access to agro-meteorological information adapted by producer groups.

Output 3.3. An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the scaling up of the AHA-AIC project for Euros 6,378,709 from GCF whose Euro 6,137,800 is reserve for the "Agricultural Loan Facility**"**

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This output will help to create a favorable environment and promote private sector financing for climate-smart agriculture. The need for sustainable management of AHAs in the context of climate change is particularly important in Niger. Unfortunately, this need is not addressed due to a lack of technical, financial, and other means. Although many people indicate that they would like to adopt smart agriculture techniques resilient to climate change, the proposed GCF project (i.e. the "AHA-AIC Project") will only be able to meet a relatively small part of the total need for climate-resilient agricultural techniques across Niger through the project's grant funding. It is therefore essential to mobilize additional and sustainable financing to scale up the interventions that will be implemented by the grant component of this project. For this reason, the proposed GCF project will also include an Agricultural Loan Facility and associated interventions to catalyze sustainable financing from the private sector for climate smart agriculture in Niger.

The challenge will be to adopt at the national level the climate smart agriculture approach that will be implemented by this project in specific areas, if food insecurity is to be tackled in a sustainable manner.

In Niger's current economic context, characterized by high population growth and the prospect of progressive and rapid urbanization, the demand for agricultural and agri-food products will consequently have to increase significantly. Thus, many analyzes agree that this market will continue to grow until 2050. Over the period 2018-2020, the average growth rate of agriculture in the UEMOA zone (Benin, Burkina-Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo) was 7.1%. Consequently, the quantitative and qualitative improvement of the supply of agri-food products and its adaptation to demand in a context of climate change is an important challenge. However, in Niger, there is considerable agricultural potential, including an abundant availability of irrigable land (270,000 Ha), the availability of an abundant reserve of renewable water resources (32 billion m^3 of surface water and 2500 billion m3 of groundwater), the existence of a excellent solar energy potential for efficient mobilization of irrigation water using a clean energy source, and the increase in yields per hectare obtained in particular thanks to the agricultural model set up by the present AHA-AIC project, the willingness of farmer communities organize themselves, manifested through their representative organizations, agricultural cooperatives and the existence of a long national experience in agricultural development and financing provided by a public institution such as ONAHA, and an agricultural bank such as BAGRI.

This is clearly an opportunity for the sustainable financing of Nigerien agriculture through its private financial sector by the development of credits, which are nevertheless less expensive and less prohibitive to the profitability of the farm. Current financial institutions can therefore meet these needs if the issue of financing their own agricultural activities at incentive rates is resolved. In this sense, it is necessary to scale up the impact of the grant-financed project activities and to ensure their long-term sustainability by catalyzing a paradigm shift in private sector agricultural financing, so that the private sector can complement and replace the current public financing provided by the State of Niger, the BOAD and the GCF in the form of grants and soft loans.

This component of the proposed GCF project will create an enabling environment to prepare stakeholders for the promotion of climate-resilient agricultural finance adapted to the needs of the sector through direct support in the form of an agricultural Agriculture loan facility mechanism to subsidize interest rates and stimulate innovation in terms of dedicated financial products and services. The activities planned under this Output are: Activity 3.3.1: Building the capacity of the private financial sector, farmers groups, associations and cooperatives to promote and scale innovative financing for climate smart agriculture ; Activity 3.3.2: Set up an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the " Agricultural Loan Facility"). The GCF will provide funding to BOAD under a trust arrangement. This will allow BOAD to put in place an Agricultural Loan Facility, in accordance with the terms and conditions to be agreed with the GCF.

Activity 3.3.1: Building the capacity of the private financial sector, farmers groups, associations and cooperatives to promote and scale innovative financing for climate smart agriculture

This activity will be conducted to facilitate the setting up of an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the "Agricultural Loan Facility").

With the sub Activity 3.3.1.3, (Technical Assistance to build operational and institutional capacities of Financial Institutions involved in the agriculture loan facility execution) and prior to the disbursement of funds for Output 3.3 of the Funded Activity, the accredited entity shall finalize and submit to the Fund an additional report, in a form and substance satisfactory to the GCF Secretariat containing an in-depth market and design study that :

- assesses the financial viability of the Agricultural Loan Facility, including consideration of likely default rates ; and
- proposes a design for the Facility that can maximize potential both to crowd in private finance and to help vulnerable farming communities adapt to climate change.

If the market study confirms the potential for the loan facility, then prior to the disbursement of funds for Output 3.3 of the Funded Activity, the AE should provide, in form and substance satisfactory to the Secretariat, a detailed technical assistance programme targeting both lenders and borrowers to ensure successful implementation of the loan component.

The sub Activity 3.3.1.1 will complete the sub activity 3.3.1.3. through a training workshop for the establishment of an incentive environment for more massive climate-smart agriculture funding proposed for the benefit of Niger's private Financial sector,

farmers groups, Irrigation Water Users Associations and Cooperatives. The Sub Activity 3.3.1.2 will be an Assistance to cooperatives for the formalities of opening bank accounts with financial institutions in order to promote smart agriculture through private financing. This will facilitate their financial relation with the Financial Institutions for for the loans that will be granted to them.

Activity 3.3.2: Set up an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the "Agricultural Loan Facility")

The constraints of the current private financial mechanism are inadequate to finance sustainable and profitable agriculture.

The factors that hinder the development of appropriate and accessible on-farm financial services are many and well identified. They are mainly linked in terms of supply to the availability and accessibility of limited agricultural credit products (lack of sources of financing with adapted characteristics, including medium and long-term credit, flexible payment deferrals and schedules, insufficient financial penetration, reluctance of financial institutions to grant agricultural credit). These can be grouped into nine main constraints to agricultural financing in Niger, as presented in Table 10 below:

Table 10: Main constraints to agricultural financing

Constraints	Explanations
C1: High credit rate	With the exception of a few rare initiatives (projects and programmes), credit rates in Niger are between 11% and +20%, i.e. in double digits.
C2: Short credit period: less than or equal to 1 year	The minimum operating cycle for agricultural activities to generate income to support credit charges is on average one year.
C3: Insufficient credit to meet demand	The volume of credit granted to farmers often does not correspond to the demand expressed.
C4: Non-financing of all agricultural activities	The choice of channels/links to be funded remains conditioned by the duration of the (short-term) credit and the level of organization of the players in the channels/links.
C5: Insufficient refinancing lines	There is therefore a lack of appropriate resources at the level of financial institutions for the financing of farms.
C6: Difficulties in debt collection	This is due to the distortion of the modalities of setting up credit (rate, duration etc...) proposed by some programmes which are far below those of formal financial structures.
C7: Lack of a mechanism for monitoring-evaluation, capitalization and extension of services offered to farms or agribusinesses	Most financial institutions have dysfunctions in the information and management system due to a lack of equipment and qualified staff. This makes it difficult for them to design, maintain and update databases on their farmers.
C8: Insufficient credit security mechanism	Agricultural activities are subject to multiple risks: (i) climatic hazards, epizootic disease, pest invasion; (ii) technical and operational risks on the quality and quantity of production; (iii) stock holding and disposal; (iv) price variability; (v) variability in production costs; and (vi) the ability of entrepreneurs to manage their businesses.
C9: Insufficient appropriate warranty system	Apart from a limited system of agricultural credit insurance, there are no financial risk mitigation instruments such as guarantee funds and agricultural credit insurance in Niger (or those that do exist are not operational like FISAN).

Niger's financial system currently does not provide an innovative and sufficient offer that responds effectively to the needs of the national agricultural sector. The financing available does not allow access to mid and long-term credit to finance equipment or structured finance to meet the sector's supply or value chain needs. However, agriculture contributes more than 35% of GDP and employs almost 85% of Niger's working population. The Agriculture Bank of Niger (BAGRI) was created to meet the demand for agricultural financing, but it has limited resources and is struggling to develop its credit portfolio in favor of farmers. As of 31 January 2020, BAGRI's total outstanding loans amounted to 81 million USD, of which 13 million USD were in favor of agriculture, i.e. 17% of the total portfolio, while the estimated costs of the Agricultural Value Chain Development of the Strategic Programme for the period 2016-2020 was more than 268 million USD. From 2021 to 2025, the estimated annual financial requirements for priority resilience, water management and sustainable land management programs are $520 million (Confers Presidential Political Agenda 2020). The Government of Niger has limited financing resources and cannot cover these needs.

It is therefore crucial to crowd in private capital by establishing an attractive on-lending mechanism to support climate-resilient, and clean energy-based agricultural value chains through local financial institutions in the form of an agricultural loan facility put in place by BOAD. This could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions including BOAD (the "Agricultural Loan Facility"). ***For this objective, the GCF is requested to provide the funding for an Agricultural Loan Facility of 5,890,000 Euros.***

BOAD, as the AE, will be responsible for managing and monitoring the proper use of the line of credit. The establishment of the proposed mechanism in Niger's financial sector will make it possible to correct the imperfections of the current system and provide affordable finance for climate-smart agriculture. For an ideal offer, the financing mechanism tool should be established in a manner that is not burdened by complex procedures (Table 11).

Table 11: funding mechanism or arrangement not to be burdened with complex procedures

• **available at**	**The funding mechanism or arrangement should not be burdened with complex procedures**
• sufficient	the volume and scope of the credit should not only enable the largest number of beneficiaries to be reached, but also enable each beneficiary to carry out his or her project
• of proximity	the farmer must be able to get his financing from his locality
• at a reasonable cost	the financing must have terms and conditions, in particular the interest rate bearable by the farmers' activities;
• punctual	the implementation of the credit must be timely and respect the periodicity of the activity for which the promoter is applying for financing
• sustainable	the funding mechanism or tool must be sustainable not only from an institutional point of view, but also from a financial point of view (sustainability of the funds and of the mechanism)
• Doubled to a system of advice and support	for the implementation of the credit: some poor results of the activities financed by the credit are due to the lack of training (technical and management) and follow-up advice during implementation
• Be accompanied by a monitoring system for recoveries	some delinquencies are often due to poor monitoring by loan officers, the relationship should be continuous until the loan is unwound (at least).
For an application to be acceptable and fundable	
• clearly explained	presented by a person or entity that can be trusted
• profitable	The AHA model of the AHA-IAC Niger project demonstrates that the applicant will earn money
• underpinned by the capacities/competences of the applicant	knowledge, know-how, interpersonal skills, mastery of one's activity, etc. ;
• useful for the development of the value chain in which the applicant operates and/or for food security in Niger	more and more, financial institutions are financing value chains, the place of the credit applicant in the value chain is important in order to know if he allows his link and the whole chain to develop
• profitable for the financial institution that finances it	The funding must enable the FI to win and not lose, it must allow it to diversify its interventions while safeguarding its profitability, etc.

Considering the constraints mentioned in the Table 10, and the requirements in the Table 11 to put in place a funding mechanism or arrangement without complex procedures, the Banks and micro finance institutions which will benefit the agricultural loan facility put in place by the BOAD will be selected based on the criteria listed in table below.

Items	**Selection criteria for Banks and Micro finance institutions which will benefit from the agricultural loan facility**
Governance, compliance with Fiduciary standards and project management rules	- Legally registered as a financial institution under the national law; - Apply Policies and procedures to fight against fraud; - Apply Ethic guidelines; - Apply AML/CFT policies; Solid financial standing; - Dedicated to green financing or Agri unit or proof of commitment to scale up in green financing/agriculture lending; - Sound governance and management; - Credit underwriting standards; - Experience in managing loans ; - Well-established accounting and financial reporting systems.
Risk management	- Minimum credit rating (national or international); - Minimum capital size; - Minimum capital adequacy ratio; - Maximum classified loan ratio.
Environmental, social and climate safeguards	- adherence to BOAD and GCF environmental, social and climate safeguards; - interventions need to be linked to projected climate change related impacts on the agriculture sector;
Gender	- demonstrate willingness to mainstream gender and youth issues;
Others	- Compliance with the West African States Central Bank's regulatory requirements; - any others deemed appropriate by BOAD.

The granting of this agricultural loan facility will allow agricultural groups, cooperative and unions, to access affordable finance for the development and use of AHA based on a climate-smart agriculture approach.
The implementation of the subsidized on-lending mechanism in favor of Niger's financial sector will enable banks and microfinance institutions to access affordable financial resources to finance the beneficiaries on the AHAs to be rehabilitated, by granting microcredits to the beneficiaries (agricultural cooperatives and groups, Associations of irrigation water users, women, and youth groups, etc.) to scale financing for AHA, in particular:

- climate-resilient techniques on the irrigation areas;
- total water control by a Californian or drip system and a clean energy system;
- the integrated system of outsourced water and energy management;
- technical itineraries adapted to the major climatic risks of the irrigation areas for sustainable agricultural production.

Output 3.4: Control, supervision and monitoring and evaluation of project activities for Euros 1,223,989 of which Euros 121,959 from GCF.

This Output will be achieved with the Activity 3.4.1: Control and supervision of works, and the Activity 3.4.2: Monitoring of the Project. These are services which include in particular: (i) quality control of the works and equipment and the quantities implemented in accordance with technical specifications; (ii) assistance to the project owner and the contracting authority for the acceptance of the works. This activity will be carried out by an engineering consultancy firm which will be recruited for this purpose. It may be the consultancy firm that carried out the studies.

As for the supervision of the works, it is ensured by the General Directorate of Rural Engineering (DGGR) and its branches with the support of other structures of the Ministry of Agriculture or any other Ministry concerned by the project. To this end, the project will provide the General Directorate of Rural Engineering with adequate means through the Project Management Unit. The CNEDD in its capacity as DNA will monitor the climatic aspects of the project. Field missions will therefore be organized in this sense. The role of the CNEDD is detailed under the Implementation arrangement (page 28). The National Environmental Assessment Office (BNEE) will be involved in monitoring the environmental aspects of the project, in particular the implementation of the Environmental and Social Management Plans (ESMP) and the Plan for the Management of Pests and Pesticides in collaboration with the Directorate General of Plant Protection.

According to Niger's NDC, the monitoring-evaluation and capitalization mechanism will be based, among others, on: the definition of corrective measures for climatic, environmental, economic and social safeguards, the monitoring of risks and the evolution of vulnerability to climate change at the national level as well as the capitalization of experiences and lessons learned. To this end, a monitoring and evaluation (M&E) system of the project activities will be set up to assess progress through the results achieved in relation to the set objectives. This will enable the identification of strengths and weaknesses to make timely and informed decisions. Monitoring will focus on the implementation of project activities and will be based on measuring progress at each critical stage of the process. The project will introduce a sex-disaggregated data collection and reporting system for each project component, through gender mainstreaming in climate-smart agriculture. The M&E system will, in effect, be designed to measure the rate of implementation against planned objectives and targets as reflected in the Annual Work Programmes and Budget (AWB). It will monitor: (i) the rate of implementation of project activities; (ii) the evolution of project financial data; (iii) the regular and systematic recording and reporting of progress against planned project objectives through the establishment of a database; (iv) the assessment of the impact of project activities on the target group and the environment; (v) the monitoring of the project' gender action plan which will be undertaken by an consultant in gender mainstreaming, recruited for supporting the executive entity.

The M&E system will support decision making for the adoption of resilience actions or activities for future projects. The M&E system will facilitate learning, replication and upgrading of project results and lessons learned. The ex-post evaluation will be conducted by BOAD one year after the closure of the project. It will be financed by BOAD. This assessment is different from the final assessment conducted before the closure of the project. The ex-post evaluation is an activity that is carried out by BOAD with the support of consultants on all projects in which the Bank participates in financing. This involves evaluating the impact of the project in terms of improving the living conditions of the populations, ensuring the continuation of activities and especially the lessons learned from the projects. The Directory of Development and Economic Analysis "Directeur de la Mise en valeur et des Analyses Economiques" of ONAHA will collect adaption data. The Directory of Infrastructure of Materials and the Workrooms will collect the GHG reduction data (irrigation and energy). The GCF National Designated Authority (CNEDD) will supervise the adaptation and mitigation data collection by ONAHA. The results will be sent to the Project management unit (PMU) which will put it in the annual report submitted to the Accredited Entity (BOAD).

Output 3.5: Lessons learned are shared among stakeholders and disseminated for an overall strengthening of the agriculture sector in the context of climate change for Euros 692,576 of which Euros 575,495 from GCF**.**

The Output will be achieved through Activities 3.5.1: Capitalization of results and compilation of lessons learned from the project; Activity 3.5.2. Development of technical and manual sheets for the operator; Activity 3.5.3: Knowledge sharing and dissemination of good practices for a climate resilient agricultural sector in Niger.

The project's monitoring-evaluation system will contribute significantly to managing the performance of the technologies and the traceability of the operations that led to the achievement of the results and to making decisions useful for action. In this perspective the technical, management (administrative, regulation, organization, etc.) results (outputs, effects and impacts) will be capitalized and archived electronically and physically to strengthen the documentation of lessons learned. The compiled lessons learned will be processed and will be the subject of the preparation of user manuals adapted to the various actors intervening in the agricultural sector, particularly the sub-sector of hydro-agricultural developments. To allow a better assimilation and implementation of the lessons learned by farmers' groups and cooperatives , the manuals will be translated into picture guides and into the official local language of Niger (ii) the results on the private sector financing mechanism enhanced for climate smart agriculture funding will be evaluated and capitalized to improve and allow the sustainable funding for scaling up of the AHA-AIC project by the local banks and micro finance institutions for the benefit of small, medium and micro (MSMEs) engaged in AHA operations.

Documents and documentaries on lessons learned and best practices tested under the project on actions to build resilience to the adverse effects of climate change, increase productivity and production and mitigate GHG emissions in the agriculture sector will be produced. To this end, the project will develop several fact sheets on the technologies and practices implemented. These will include, among others: (i) a fact sheet on the drip irrigation system; (ii) a fact sheet on the Californian system; (iii) a fact sheet on the solar water drainage system and the maintenance of solar equipment; (iv) a fact sheet on the sustainable management of hydro-agricultural development soils and the use of agricultural inputs; and (v) a fact sheet on the optimal profitability of irrigation project activities using modern techniques. These sheets will be designed at the end of the third year of the project and disseminated from the fourth year of the project.

The project will support the dissemination of successful results in national policies, plans, programs and projects related to the agricultural sector and irrigation sub-sector. The project will be one of the first to be implemented under the ONAHA Plan contract. It will be necessary to reflect on the project's weaknesses to propose new solutions that will be disseminated with the project's strengths. As the use of solar energy on AHAs is not yet commonplace, the lessons learnt will make it possible to replicate and scale up the project for equipping AHAs with solar energy to the Government and donors. This activity aims also to share knowledge and disseminate good practices for a climate resilient agricultural sector in Niger in with Representatives of: the 25 Cooperatives and agriculture groups (Men, women, youth) ; local decentralized Authorities, local agriculture and environment offices ; Private Banks and Microfinance Institutions executives of Niger; Niger's international technical and financial partners ; National Authority of the Green Climate Fund ; Commissioner to the 3N (les Nigériens Nourissent les Nigériens) Initiative ; Project management Unit and Executing agency ; Ministries in charge of agriculture, plan, and finance; Directorate in charge of Microfinance Institutions, National Debt, agriculture investment, Rural Engineering ; National Office of Environmental Assessments.

Referring to the feasibility study, describe why this set of interventions was selected instead of alternative solutions and how the project/programme can help unlock the needed support in a sustainable manner.

There are two main alternatives for the project, namely: i) using the current irrigation strategy for the development of AHA without considering the climate change-related problems; and ii) private small-scale irrigation.

- *Using the current irrigation strategy for the development of AHA without considering climate change related problems*

Despite the previous resources mobilized by the Niger government and the various donors, this intervention strategy initiated in the mid-1960s has not allowed the development of sustainable AHA considering the climate issues. Moreover, they were often connected to the electricity network or depended on the fossil fuel energy-based engines that increased the operational costs of those AHA and thus limited their ability to play their role in food security and resilience to climate change. The improvement in the implementation and functioning of these AHAs by the introduction of clean energy such as solar energy combined with the use of sustainable cropping practices will reduce the operational cost and ensure the sustainability of the AHA promoted by this project. In this regard, the proposed project is an improved strategy of AHA development, appropriate for increasing irrigated areas and allowing smallholders organized in agriculture groups and cooperatives to sustainably derive significant socio-economic benefits[24].

- *Private small-scale irrigation*

The analysis of the different irrigation project approaches also highlighted private small-scale irrigation. The development of this irrigation strategy has been supported through the World Bank's PIP project. This irrigation approach was not retained in

[24] Centre d'Etudes et d'Information sur la Petite Irrigation, 2011. Projets et programmes de développement de l'irrigation au Niger (1960-2010) : Eléments pour un bilan.

the framework of the current project because its potential impact in terms of increasing income from irrigated production is lower than that provided by the AHA (1524,06 Euros to 2286,09 Euros compared to 9144,37 Euros to 15240,62 Euros)[25]. Even if the interest around the small-scale private irrigation approach is increasing because of its simple design, its low cost and significant socio-economic benefits for producers, its impact in term of the total number of people, overall socio-economic benefits, and potential for GHG mitigation is lower than those potentially generated by AHA approach.

Also identify trade-offs of the selected interventions, if applicable.
For Enhanced Direct Access (EDA) proposals and projects/programmes with financial intermediation (loans or on-granting), describe the selection criteria of the sub-project and types.

B.4. Implementation arrangements (max. 1500 words, approximately 3 pages plus diagrams)

Provide a description of the project/programme implementation structure, outlining legal, contractual, institutional and financial arrangements from and between the GCF, the Accredited Entity (AE) and/or the Executing Entity(ies) (EE) or any third parties (if applicable) and beneficiaries. Provide information on governance arrangements (supervisory boards, consultative groups among others) set to oversee and guide project implementation. Provide a composition of the decision-making body and oversight function, particularly for Enhanced Direct Access (EDA) proposals. Provide information on the financial flows and implementation arrangements (legal and contractual) between the AE and the EE, between the EE or any third party and beneficiaries. For EEs that will administer GCF funds, indicate if a Capacity Assessment has been carried out. Where applicable, summarize the results of the assessment. Describe the experience and track record of the AE and EEs with respect to the activities (sector and country/region) that they are expected to undertake in the proposed project/programme.

Technical project management approach
The project will be managed according to an adaptive approach and intervention principles(see Appendix 6) promoting (i) the use of a para-state service, ONAHA, with the technical capabilities for rapid and real-time intervention to accelerate the development of hydro-agricultural developments resilient to climatic hazards; (ii) improving food and nutrition security by strengthening the resilience dimensions of AHA to the harmful effects of climate change; (iii) learning and disseminating lessons learned (capitalization/knowledge sharing) for a scaling-up at the level of AHA in degradation due to climate effects and replication of proven technologies and techniques for fighting climate change at the level of new AHA to develop.

Project organization and management

The Executing Entity the Republic of Niger, acting through (i) ONAHA with respect to implementation of components 1 and 2, and (ii) the relevant Ministries of the Government of the Host Country with respect to the flow of GCF Proceeds, project coordination, management, and execution.

The various Organizations that will intervene directly in the project are: (i) the Accredited Entity (BOAD); (ii) the National Designated Authority (NDA) of the GCF, the National Commission for Environment and Sustainable Development (CNEDD); (iii) the National Contracting authority for financing, the Ministry of Planning; (iv) the National Project Owner (the Ministry in charge of irrigated agriculture); (v) the Contractor/Project Management Unit-PMU (The Directorate General of Rural Engineering, DGGR); (v) the implementing entity of project in charge to carrying out the work planned (the National Office of Hydro Agricultural Developments, ONAHA); vi) the Ministry of Finance, responsible for the flow of funds and tax refund for the Government of Niger.

Accredited Entity

BOAD is acting for the benefit of WAEMU Member States, local communities and public and private corporations of the WAEMU region. The BOAD also collaborates with non-WAEMU Member States, should their agencies and corporations contribute to the development or integration of the Union's economies. The financing tools used by the BOAD may consist of short, medium and long-term lending, cash advances for feasibility studies, equity investments, financing arrangements and/or bond loan guarantees. The BOAD supports the private sector both through the establishment of direct loans to corporates and equity participations in their capital but also provides on-lending to commercial banks and decentralised financial systems for the financing of Small and medium-sized enterprises ("SME"). This financial support may also be combined with financial advisory services or technical assistance.

These services are deployed within eight different sectors:
1. Agriculture and rural development;

[25] Projets et programmes de développement de l'irrigation au Niger (1960-2010) : Eléments pour un bilan. Centre d'Etudes et d'Information sur la Petite Irrigation, 2011.

2. Industries;
3. Infrastructure including energy, water, transportation, land-use and sanitation, telecommunications;
4. Environment;
5. Finance and insurance;
6. Hospitality and tourism;
7. Social projects including health and education;
8. Food security and other services such as real estate operations and leasing, corporate services.

In its new Strategic Plan for 2021-2025 ("DJOLIBA"), the BOAD intends to become "the Reference Bank, for a lasting impact on the integration and transformation of West Africa". This plan comprises three operational axes:

1. Strengthening regional integration;
2. Contributing to the creation of value and productive jobs in support of States and the private sector, and;
3. Strengthening resilience to climate change.

The West African Development Bank (BOAD) is the accredited entity (AE) for the overall implementation of the project. Financial resources from the GCF will be managed according to the general provisions of the AMA between the GCF and BOAD. BOAD as part of its AE role will among others carry out the following:

- BOAD will be responsible for the overall oversight of the framework implementation and will report to GCF as per the terms to be agreed under the Accreditation Master Agreement (AMA);
- BOAD will report to GCF as per the terms to be agreed under the AMA and the Funded Activity Agreement (FAA).
- BOAD will ensure that the project is implemented in line with its environmental and social safeguards (environmental impact classification, i.e., only up to category B);
- BOAD, as the accredited entity, oversees the supervision, monitoring-evaluation of the project, disbursement of funds, and reports to the GCF on project management;
- BOAD will supervise all the disbursements process and internal controls involved on GCF's resources in accordance with its procedures and the terms agreed under the Accreditation Master Agreement (AMA).

It is accredited for the implementation of climate change projects under the three financing mechanisms, namely the Green Climate Fund (GCF), the Adaptation Fund (AF) and the Fund for Global Environment (GEF). BOAD was accredited in 2017 as an Accredited Entity (direct access) of the GCF. It plays a central role in the identification, formulation and monitoring-evaluation of climate change projects at regional level, particularly in the UEMOA countries (Benin, Burkina-Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo). BOAD is involved in the identification, formulation, evaluation of project documents, disbursement of funds, monitoring and evaluation of development and adaptation projects to climate change. In the specific case of climate change mitigation and/or adaptation projects, the Bank has a dedicated Environment and Climate Finance Directorate (DEFIC).

National Designated Authority

The National Commission for Environment and Sustainable Development (CNEDD) is the national designated authority of Niger to the GCF. The national designated authority for the Green Climate Fund (CNEDD of Niger) will have the role of : (i) monitor the alignment of the actions proposed by the project with the national priorities defined in particular in the nationally determined contribution (NDC) and in the National Action Plan for Adaptation to Climate Change (NAPA); (ii) mobilize stakeholders around the project (iii) supervise the preparation of the funding proposal; (iv) ensure that the GCF investment criteria and the gender aspect are taken into account; (v) facilitate the administrative procedures for obtaining the necessary authorizations at the national level; (vi) provide the letter of no-objection for the project; (vi) supervise the implementation of the project. The CNEDD will ensure the strategic supervision of all climate change adaptation and/or mitigation programmes in Niger. As such, it will ensure the monitoring and evaluation of the project in relation to the indicators concerning climate change issues. An agreement will be signed between the CNEDD and the PMU for the execution of this activity.

National Contracting authority for financing: Ministry of Planning

The Government of Niger is represented by the Ministry of Planning as the finance contracting authority. In this framework, the Ministry of Planning will sign: (i) the GCF Grant management Agreement with the BOAD which is the Accredited Entity; and (ii) the loan Agreement with the BOAD as co-financier of the project. On behalf of the Republic of Niger, the Ministry of Planning is responsible for engaging the State by submitting a request for funding to BOAD. The Ministry is in charge of programming the funding allocated to the project by the GCF, BOAD and the Nigerien State in the government's investment budget. The Ministry of Planning will have to ensure that the Funds are managed at national level according to the requirements of the GCF and the BOAD. To this end, its financial control can be exercised a priori by checking the nature of the expenses and by co-signing requests for withdrawal of funds (FDD), cheques and other transfer documents with the Coordinator of the Project Management Unit. The Ministry can also exercise its control by choosing to audit the accounts after the fact. The Ministry of Planning is responsible for reporting to the Government on the efficient use of the funding obtained.

National Project Owner: Ministry of Agriculture
The Government of Niger is represented by the Ministry of Agriculture as 'National Project Owner'. The Ministry of Agriculture will, among other things, ensure the consistency and conformity of the project with the orientations of Niger's agricultural policy as well as the implementation of the project in accordance with the provisions of the Multi-year Plan Contract and the management agreement between the Government of Niger and ONAHA. **Consequently, the Ministry of Agriculture, on behalf of the Government: (i) will set up the Project Steering Committee; (ii) will set up the Project Management Unit at the level of the Directorate General of Rural Engineering within the Ministry of Agriculture.**

National Project Steering Committee (NPSC)
The general supervision of the project will be provided by a Steering Committee set up by the Minister of Agriculture's Order. The NPC meets twice a year in regular sessions. It is responsible for: (i) providing general guidance for the implementation of the project; (ii) approve the project's administrative, financial, accounting and operations manual; (iii) to approve the project's Annual Work Program et Budget (AWPB); (iv) to approve technical and financial performance reports; (v) to approve the Procedures Manual, Progress Reports and Project Audits.

The NPSC is composed of : (i) the General Secretary of the MAG/EL, Chairman; (ii) the Directorate of Studies and Programming, Rapporteur; (iii) the Executive Secretariat of the CNEDD, Rapporteur; (iii) the General Director of Rural Engineering; (iv) the General Director of Agriculture; (v) the representative of the High Commission for the 3 N Initiative; (vi) the representative of the Ministry in charge of the Plan; (vii) the representative of the Ministry in charge of the Environment; (viii) the representative of the Ministry in charge of Finance; (ix) a representative of the Governorate of Agadez, Tahoua, Maradi, Zinder and Diffa (5 representatives in total); (x) a representative of the Regional Council of Agadez, Tahoua, Maradi, Zinder and Diffa (5 representatives in total); (xi) the representative of the Permanent Secretariat of the Rural Code. The presence of women in the NPSC is highly desirable.

At the invitation of the President of the NPC, the General Director of ONAHA, the Program Managers of the Ministry of Agriculture and Livestock as well as the Coordinator of the Project Management Unit, the Heads of the Ministry's various programmes in agriculture can attend NPC meetings if needed. The National Project Steering Committee (NPSC) may be assisted by individuals or resource institutions with specific knowledge of the items on the agenda.

Project Execution and Implementation

The National Office for Hydro-Agricultural Development (ONAHA) will be responsible for the implementation of the activities of the Project **except the agricultural loan facility** which will be executed by BOAD. **ONAHA will sign a specific contract by direct agreement with the Ministry of Agriculture, which represents the Government of Niger.** Specifically, ONAHA will be responsible for: (i) carrying out site development work; (ii) carrying out the rehabilitation of the sites; (iii) the completion of the site development work; (iv) the implementation of stakeholders' capacity-building activities and capitalizing lessons learned, in collaboration with the PMU monitoring and evaluation; (v) collaboration with the PMU for control, reception and certification, in time for the work carried out by ONAHA; (vi) the preparation, signing and follow-up of the Farming Contract on the development of irrigation areas and the exploitation of irrigation areas with cooperatives; (vii) the preparation, signing and follow-up of the Operating Contract on water management, irrigation infrastructure and equipment with the AUEi; (viii) the preparation, signing and follow-up of the plot occupancy contract with the operators; (ix) the data collection on adaptation to climate change and the mitigation on GHG reduction. To facilitate the execution of the project, ONAHA will create a Project Execution Unit which will assist it in the execution of its responsibilities. For the purposes of the Project, the Unit will be referred to as the Project Execution Unit (PEU). The Director General of ONAHA is the Coordinator of the PEU, the Director of Development and Economic Analysis "Directeur de la Mise en valeur et des Analyses Economiques" of ONAHA is the Technical Coordinator of development and capacity building actions[26] and the collector of AHAs adaptation to climate change indicators. The Director of Infrastructure of Materials and the Workrooms is the Technical Coordinator of site development actions[27], the Director of Accounting and Finance is the Administrative and Financial Manager of the PEU. The designated PEU members are fully accountable to ONAHA which carries the overall responsibility for the implementation of the project. A consultant expert in gender mainstreaming will be recruited for supporting the monitoring the gender action plan of the project.

The Project Management Unit (PMU)
Under the article 1.4.2.1 of the Pluriannual Plan Contract (CPP) between ONAHA and the State of Niger, the General Directorate of Rural Engineering (DGGR), under the Ministry of Agriculture, acts as contractor for the development works entrusted to ONAHA within the framework of the implementation of the CPP. As such, it will set up the Project Management Unit. It ensures the recruitment of the Project staff through a call for applications. The DGGR, in its capacity as project manager,

[26] These actions cover the 5 years of the project and will be maintained after the project closure
[27] These actions cover the first 3 years of the project.

ensures the certification of works carried out by ONAHA to facilitate payments to the PMU. The firm in charge of the control of the works will provide support to the DGGR through the PMU for the certification of the works.

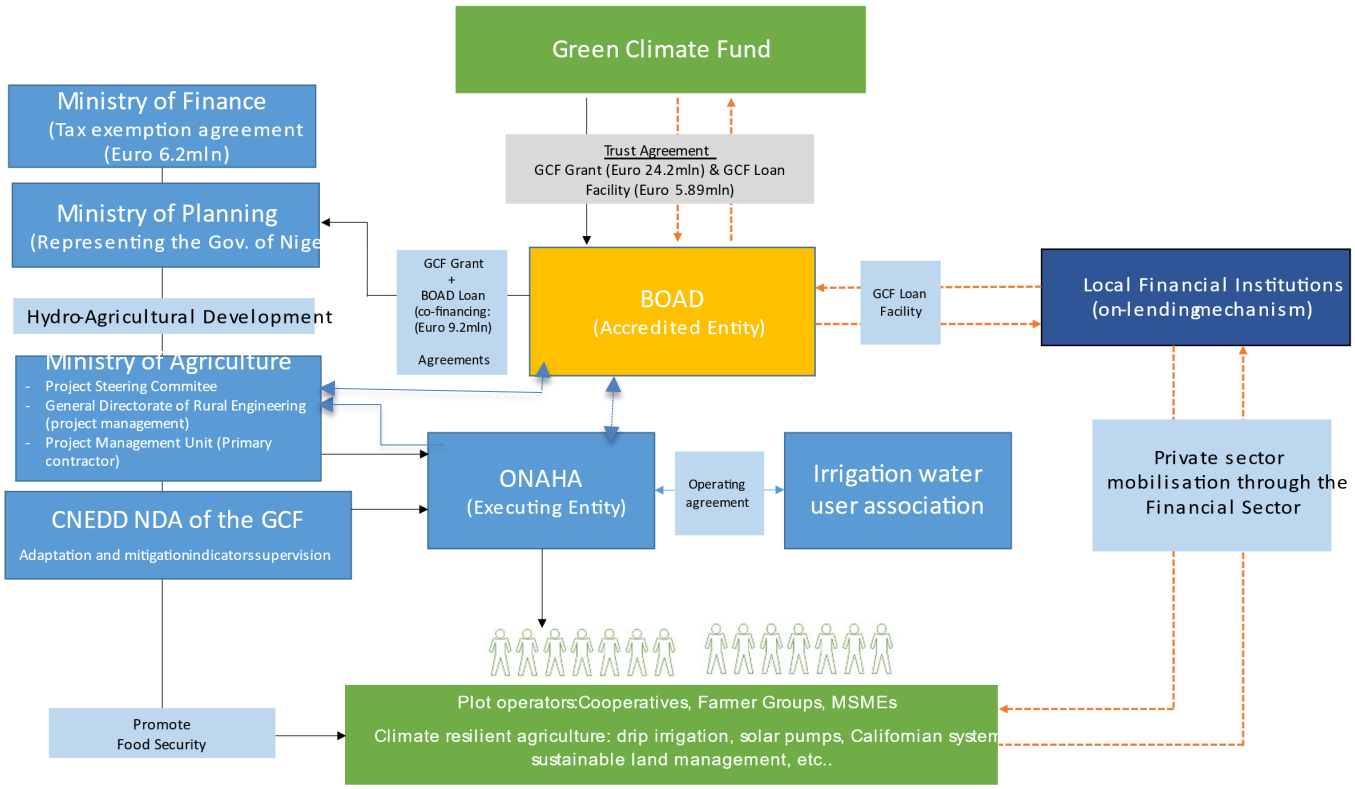
The Project Management Unit (PMU) is under the supervision of the General Directorate of Rural Engineering. The PMU has administrative and financial management autonomy. The PMU will sign a specific contract of direct agreement with ONAHA for the execution of the project works. The procedures for making funds available are those presented in point 8.4 of the feasibility study. The PMU ensures the quality of project implementation. Its main tasks are (i) coordination, animation, monitoring and control of all project activities; (ii) preparation, submission to the NPC, and application of the administrative, financial, accounting, and operational procedures manual of the project. The operational manual will be approved prior to any disbursement of GCF's resources; (iii) preparation of the annual work plan and budget (AWPB) of the project, taking into account the AWPB submitted by ONAHA; (iv) submission of the AWPB to the NPSC for approval; (v) awarding of project contracts; (vi) monitoring and management of the relationship between the project, the BOAD and the Green Climate Fund ; (vii) monitoring the preparation and signature of the various agreements between ONAHA and the project partners; (viii) requests for funds in accordance with the needs, the texts in force and negotiated with BOAD and the Green Climate Fund and the timetable established by the PMU and ONAHA; (ix) disbursement of funds; (x) keeping the project accounts; (xi) administrative and financial management of the project ; (xii) internal management control; (xiii) control and support to the DGGR for the timely receipt and certification of the work carried out by ONAHA; (xiv) preparation of financial statements and project implementation reports; (xv) monitoring and evaluation of the project.

The PMU staff is expected to include: (i) a National Coordinator (Rural Engineering Engineer -Bac + 5 with 15 years of experience including 10 in project management); (ii) an administrative and financial manager, a specialist in contracting (-Bac + 5 in project management with 15 years of experience including 10 in project management); (iii) a follow-up/assessment manager (agronomist engineer or rural engineer, specialist in statistical and/or socio-economic work -Bac + 5 with 15 years of experience including 10 in follow-up and evaluation of AHA projects); (iv) an Accountant (-Bac + 2 in accounting with 10 years of experience in project accounting -); (v) an administrative assistant (-Bac + 2 in Administrative Management or Human Resources Management with 5 years of experience); (vi) two drivers (BEPC level with a Category B license and 10 years of long-travel driving experience; (vii) a planton/courier (Bac level with 5 years of experience); (viii) a security guard (CEPD level with 5 years of experience).

The National Coordinator and the Monitoring and Evaluation Officer will be made available by the Ministry of Agriculture. The rest of the PMU staff will be recruited on a call for applications.

The Project Coordination and Management Chart is presented below.

Figure 29: Project management and contractual relationships



LEGAL AGREEMENTS

As the Accredited Entity of the project, BOAD will sign a Trust Agreement with GCF, under which, BOAD will use GCF proceeds to provide:

i) a grant to the Republic of Niger under component 1 and 2, and component 3 (at the exception of sub-activity 3.3.2 which is the Agricultural Loan Facility). A grant agreement will be signed between BOAD and the Niger republic's Ministry of the Plan.

ii) An Agricultural Loan Facility for the implementation of activity 3.3.2 under *Output 3.3: Setting up of an attractive climate resilient agricultural financing mechanism in favor of Nigerien financial institutions in the form of an agricultural loan facility with the funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international financial institutions (the "Agricultural Loan Facility").* BOAD will on-lend GCF proceed to selected financial institutions which will lend to end beneficiaries for climate smart agriculture activities. BOAD will be the executing entity for the agricultural loan facility; hence responsible to sign the loan agreement with the selected local financial institutions.

iii) the grant agreement between BOAD and the Niger's Government through the Ministry of the Plan, will include legal arrangements which oblige the institutions receiving GCF funding to manage the project in the strict compliance with BOAD procedures and GCF requirements.

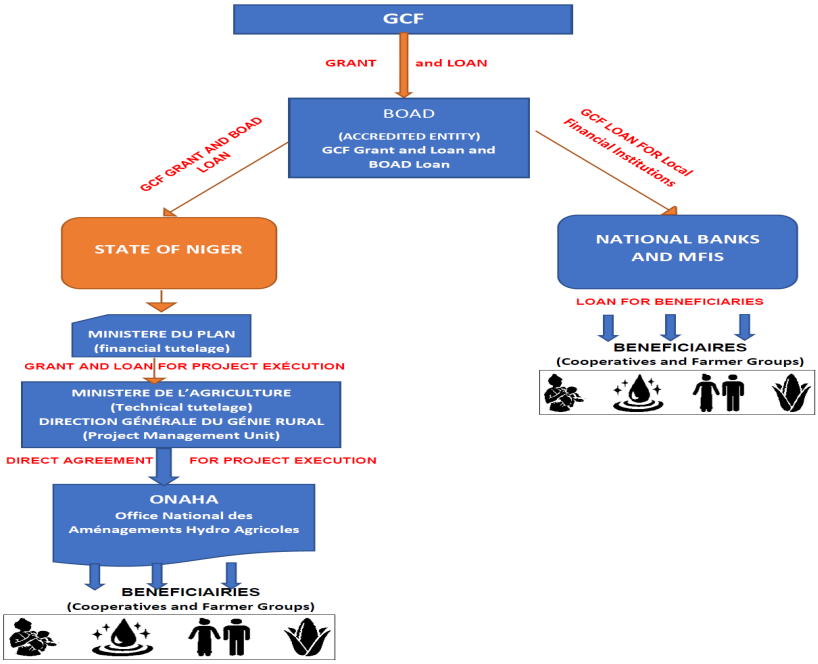
BOAD Co-financing

As Co-financier, BOAD will approve a loan for the co-financing of the project. As Co-financier, BOAD will approve a loan for the co-financing of the project.". The loan will be approved prior to the disbursement of GCF's resources. BOAD will sign a loan agreement with the Republic of Niger for its own co-financing.

Subsidiary agreements

In its two roles as Accredited Entity and Co-financier, the BOAD will sign the following a subsidiary agreement with the Government of Niger ("the GCF Grant Agreement") with respect to the management of GCF grant funding in accordance with the FAA.

Project funds flow chart



B.5. Justification for GCF funding request (max. 1000 words, approximately 2 pages)

Explain why the project/programme requires GCF funding, i.e. Why is the project/programme not currently being financed by public and/or private sector? Which market failure is being addressed with GCF funding? Are there any other domestic or international sources of financing?

The Republic of Niger seeks total financing of EUR 30,138,772 from GCF: EUR 24,248,772 as grant and EUR 5,890,000 in the form of line of credit to on-lend through local financial institutions for climate smart agriculture financing. Access to this grant and the credit line are critically needed and will play a significant role in increasing farm productivity for agriculture groups, cooperatives and MSMEs in Niger.

GCF's grant funding (for the Government of Niger) is justified for three main reasons:

i) **Niger is ranked the poorest country in the world according to the UN Human Development Index (UDI).** As a Least Developed Country located at the heart of the Sahel and one of the poorest countries in the world with limited fiscal capacity. Indeed, UNDP's 2019 HDI report ranks Niger 189th in the world[28], making it the poorest country on the globe. Niger's extreme poverty level remains very high at 41.4% in 2019, affecting more than 9.5 million people[29]. The Harmonized Survey on Household Living Conditions (EHCVM) in West African Economic and Monetary Union indicates that Niger is the country with the largest number of poor people. The survey was based on the international threshold of moderate monetary poverty, a tool that refers to anyone who spends less than $3.2 a day as poor. It shows that 75.5% of Niger's population fall into this category. Thus, the average annual amount spent by a Nigerien is set at 463 USD and is therefore below the threshold of 520 USD.

ii) **The most affected sector by climate change is agriculture**, which is the main source of income and livelihoods for more than 87% of the population in Niger. As a result, food insecurity, poverty and malnutrition are increasing. Nearly 29.1% of the population (nearly 6.5 million people) is classified as "at risk" and 12.4% are food insecure (about 3 million people). Neither the local communities nor the government of Niger have the means to invest significantly in climate change adaptation interventions. In this project, a total of 1000 hectares of new AHAs will be developed and 749 hectares of old

[28] This is the United Nations Development Programme's (UNDP) report on the Human Development Index (HDI) published on 9 December 2019.

[29] According to UNDP's Human Development Report 2019, the extreme poverty rate and the number of extremely poor people were measured using the poverty line of US$1.90 per day in purchasing power parity in 2011. Source: Calculations using the World Bank's PovcalNet databases, growth projections by the African Development Bank's Statistics Department, and population growth by the United Nations Population Division.

AHAs will be rehabilitated across the regions of Tahoua, Agadez, Maradi, Diffa and Zinder, which are among the most vulnerable areas to climate change in Niger. Furthermore, the project beneficiaries are farmers' groups and cooperatives who are the most vulnerable to climate change and are in food insecurity situation in the areas targeted by the project.

iii) **The COVID-19 worsened macroeconomic prospects and the impact of climate change on food security.** According to the African Development Bank, in the context of COVID-19, real GDP growth will decline from 7% in 2018 to -0.7% in 2020. The government budget balance, which was -2.2% GDP in 2018 and -3.1% in 2019, is expected worsen to -5% of GDP in 2020 and the current account balance from -9.4% in 2018 to -15.9% in 2020[30]. The budget deficit, estimated at 3.2% of GDP in 2019, widened in 2020 to 5.8%. This is increasingly moving Niger away from the performance standard set at 3% by the West African Economic and Monetary Union[31] (UEMOA). As early as June 2019, the sustainability of public debt indicated a moderate risk, with a public debt/GDP ratio estimated at 54%. This risk will be increased in 2021 with the effects of COVID 19[32]. According to the World Bank's report on "economics and poverty in Niger", published on 28 October 2020, Niger's economy could fall into recession in 2020 if the many downside risks to economic activity materialize." Unfortunately, climate change, gender inequalities and violent conflict in Niger continue to fuel and entrench inequality[33].

The effects of economic conditions on Niger's fiscal balance have been compounded by COVID-19 and make additional sovereign debt even more difficult to assume.[34] The budget allocated to agriculture by the government remains well below the financing needs to adapt the agriculture sector to the adverse effects of climate change. The economic downturn, fiscal pressures, and tightening financial conditions are giving rise to large financing gaps in Niger's public finances and balance of payments in 2020 and beyond. According to the International Monetary Fund (IMF), the country has a limited capacity to borrow additional loan financing, considering the overall fiscal balance including grants which is projected at -5% in 2020. This situation justifies the financing required for this project. The following table presents Niger's current financial indicators and projections, according to the African Development Bank outlook.

			Without COVID–19		With COVID-19 (baseline)		With COVID-19 (worst-case)	
	2018	2019 (e)	2020 (p)	2021 (p)	2020 (p)	2021 (p)	2020 (p)	2021 (p)
Real GDP growth (percent)	7.0	5.9	6.0	5.7	1.1	5.8	–0.7	4.4
Inflation (percent)	2.8	–2.5	2.6	2.0	3.0	2.1	3.6	2.5
Budget balance (percent GDP +/–)	–2.2	–3.1	–2.1	–1.5	–4.6	–4.5	–5.0	–4.9
Current account balance (percent GDP +/–)	–9.4	–13.2	–11.8	–9.7	–14.4	–13.9	–15.9	–14.4

Note: The baseline scenario assumes that the pandemic subsides in July, and the worst-case scenario, that it continues through December.
Source: African Development Bank statistics.

<u>Justification for Agricultural Loan Facility to mobilize private sector financing for climate smart agriculture through the local financial sector</u>

While agriculture contributes more than 35% of GDP and employs almost 85% of Niger's working population, the proportion of the banking sector lending to agriculture is extremely limited (less than 1% of total lending). The factors that hinder the development of appropriate and accessible on-farm financial services are: (i) high credit interest rates with short-term maturities of less than or equal to 1 year; (ii) insufficient supply of credit to meet demand ; (iii) non-financing of all agricultural sectors/activities due to the high risk perception and difficulties in debt collection, (vi) lack of guarantee mechanisms, and vi) the lack of capacity of Banks and Microfinance Institutions (MFIs) on financing agriculture groups and cooperatives for climate smart agriculture .

Interest rates in the banking and microfinance institutions sector that can reach 20% and this for a short-term loan. This explains the incredibly low penetration of agricultural credit. Thus, it is necessary for the sustainable financing of Nigerien agriculture to

[30] African Development Bank. Economic Outlook for Africa 2020, in the context of COVID-19.
[31] Issoufou Mahamadou. President of the Republic of Niger. October 8, 2020
[32] Economic outlook in Niger. African Development Bank, 2019.
[33] Human Development Report 2019. Beyond incomes, averages, and the present: inequalities in human development in the 21st century. December 9, 2019.
[34] According to the World Bank, to better cope with the Covid-19 crisis, Niger should primarily direct and strengthen its actions in favor of sensitive sectors such as food security. The cost of the COVID 19 Response Plan, estimated by the Government and its partners in May 2020, is $1.5 billion, or 18.4% of GDP.

promote private sector financing through the local financial sector by the development of financial instruments, which can limit the interest rates to at most 15% in the worst case and make the loan more affordable for agriculture groups and cooperatives and improves the profitability of the farms while increasing the resilience to climate change. To boost private financing, GCF's loan financing is designed provide access to affordable and long-term loans to agriculture groups and cooperatives.

Thus, the choice of a grant and concessional loan is because the beneficiaries of the project are mainly poor groups vulnerable to climate change and food insecurity. The contribution of GCF grant funding will help to reduce the weight of the loan from BOAD, and before reducing the fiscal burden of the Republic of Niger which is already aggravated by the COVID-19 crisis. Without GCF's grant and concessional loan, the beneficiaries of the project who are mainly poor groups at the bottom of the pyramid, will not be able to finance adaptation measures to reduce their vulnerability to climate change and improve food security.

Justification of using grants and loans for the same output and details in terms of what types of expenses to be financed by GCF grants and BOAD loans

GCF is financing the project with grant funding except Output 3.3 (the on-lending facility to local financial institutions). BOAD loan co-financing will be used to finance each component of the project except Output 3.3. It is one project with different activities; the non-revenue generating activities are not totally separated from the activities with revenue-generating potential. Therefore, in a holistic blended finance approach, both the proceed from GCF grant and BOAD loan will be used by the Government of Niger for the same outputs in order to support the overall bankability of the project while reducing the debt burden of Niger, the poorest country in the World. A detailed budget has been provided with the expenses funded by GCF grants and BOAD loans, respectively. (Annex 4 Budget Excel has been provided to the Finance team).

B.6. Exit strategy and sustainability (max. 500 words, approximately 1 page)

Explain how the project/programme sustainability (financial, institutional, social, gender equality, environmental) will be ensured in the long run after project closure, including how the project's results and benefits will be sustained. Include information pertaining to the longer-term ownership, project/programme exit strategy, operations and maintenance of investments (e.g. key infrastructure, assets, contractual arrangements). In case of private sector, please describe the GCF's financial exit strategy through IPOs, trade sales, etc.

The project seeks to sustainably strengthen the resilience of vulnerable populations to the adverse effects of climate change. The sustainability of the project is based on: (i) the strong political will of the government to achieve 1000 ha of AHA and to rehabilitate 500 ha each year through a pluriannual plan contract signed with the National Office of Hydro Agricultural Developments (ONAHA); (ii) aligning the project with the objectives of the nationally determined contribution (NDC) and the initiative "Nigeriens Feed Nigeriens (I3N); (iii) the development of local policies to resilience to the adverse effects of climate change; (iv) training all the stakeholders involved (public institutions, local elected officials, beneficiaries, private sector, etc.) for the adoption and implementation of techniques and technologies that consume less water and energy, and are resilient to adverse effects of climate change; (v) reduction of operating costs at the farmer level; (vi) the improvement of agricultural yields, productivity and production with the corollary of better food for beneficiaries and sufficient income to ensure sustainable financing of farms, maintenance and renewal of equipment; (vii) capitalization and dissemination of lessons learned.

At the economic and financial level, the implementation of the promoted techniques and technologies will allow producers to improve agricultural yields by at least 30% and to increase from 1 to 2 agricultural campaigns or from 2 to 3 agricultural campaigns per year, depending on the case. The additional campaign carried out because of water savings and the availability of energy will enable farmers' groups and cooperatives to make the profits to cover the costs of maintaining and replacing the infrastructure, at the end of their lifespan. The project through its component 2 aims to develop water management mechanisms and agricultural inputs, mechanisms for the maintenance of operating infrastructure. With flood protection actions, the project will consequently reduce the loss of area, crop losses and investments. Rational and regular irrigation because of energy availability and sizing will reduce the risk of drying out plots and increase production and incomes. Better management of drought pockets will also reduce economic losses. The groups' capacity-building activities will help to better manage cash-flow. Reducing plots operating costs and improving yields are likely to improve producers' incomes.

In addition, the project targets more women's groups who are generally good managers. This will ensure the sustainability of the actions.

Provide information on additional actions to be undertaken by public and private sector or civil society as a consequence of the project/programme implementation for scaling up and continuing best practices.

The project will help attract private and public sector investment to strengthen the climate resilience of agriculture. If the project is well executed, it will transform loss-making agriculture in the intervention areas into a lucrative activity that could attract private investment. Farmers' groups and cooperatives will be able to form partnerships with private operators involved in the chain of production, processing, and marketing of agricultural products. Communications on the project, sharing of experiences and lessons learned, radio and television debates, publications in the official gazette and the private press will play an important role in attracting both private and public investors.

In Niger, there are private and para public operators or associations which provide support, support for production, access to credit, purchase, processing, or gross marketing of agricultural products. This is for example the Network of Chambers of Agriculture (RECA) which has the mission, among other things, to help rural producers in the promotion and realization of their project, to represent and defend the interest of the whole agricultural profession; (v) to represent the regional chambers before public authorities or any other institution. This network will serve as an information, awareness-raising and sharing channel for lessons learned during the implementation of this project. We also note the Federation of Vegetable Cooperatives of Niger (FCMN) which works mainly in improving market gardening through the supply of inputs, production, marketing, access to credit, and the structuring / organization of producers and vegetable producers.

Vulnerable farmers' groups and cooperatives have many difficulties to access low cost financing for climate resilient technologies and clean energy for sustainable irrigation due to: i) the lack of capacity of Banks and Microfinance Institutions (MFIs)in green lending, ii) the high interest rates charged by banks and MFIs on lending products for climate smart agriculture , iii) the weak and/or inexistent regulatory frameworks on agriculture resilience and renewable energy technologies financing. Interest rates in the banking and microfinance institutions sector can reach to 20% and this for a short-term loan. This explains the extremely low penetration of agricultural credit. Thus, it is necessary to work with the financial sector to development financial instruments which can lower interest rates (limit the interest rates to at most 15% in the worst case) and make the loans more affordable (with longer tenors) for agriculture groups and cooperatives and improve the profitability of their farms while increasing the resilience to climate change.

The project will contribute to create a favorable environment and promote private sector financing for climate smart agriculture through a concessional line of credit of Euro 6 million from GCF. This will be implemented through : Activity 3.3.1: Building the capacity of the private financial sector to promote and scale innovative financing for climate smart agriculture and activity 3.3.2: Set up an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support of regional or international development financial institutions (the "Agricultural Loan Facility").

The financial sector in Niger has over USD 2.1 billion in total assets, hence, constitutes an important source of finance to catalyze in order to meet the significant investment gap for climate smart agriculture. The credit line financed by the GCF will serve as a lever to mobilize significant low-cost financial resources for Niger's banks and financial institutions. The implementation of this mechanism will reduce the current ruinous interest rates on agricultural credit. This will enable the development of a replicable model of climate-smart agriculture financing with solar energy, innovative irrigation techniques, fields protection against flood, to be promoted with cost-effectiveness.

In total, the table below presents how to exit the AHAs unsustainability for resilient AHAs.

Old unsustainable AHAs	**New AHAs resilient to climate adverse effects, Reducing GHG, Cost-effective agricultural production, mainstreaming gender, Considering vulnerable people, Replicable with efficient private funding**
• AHAs face critical adverse effects of climate change: irregular rainfall, short rainy season, droughts, flooding, lack of water availability for cropping beyond the rainy season • AHAs production technologies not adapted to address their vulnerability to climate change: water losses with inadequate irrigation networks, greenhouse gas emission with thermal generators used for water pumping • Insufficient technical capacity of national and local administrations, and farmers involved in agriculture development to fight against climate change • Lack of capacity of banks, MFIs in green lending: high interest rates, difficulties for medium- and long-term lending • Farmer's difficulties to access low-cost financing to acquire innovative resilient techniques and clean energy • AHAs land not secured • Agrometeorology data insufficiently available • Women and youth insufficiently involved in the climate smart agriculture development • Low crop productivity	• AHAs climate resilient with flood control techniques, water available • AHAs climate resilient with economic water saving with clean energy for GHG mitigation • sustainable water and renewable energy management: adoption of technical itineraries adapted to the major climatic risks of irrigated areas for crop production • Incentive line of credit in place to improve Bank lending capacity for low interest rate-, medium- and long-term lending • National and local agriculture technical administration in place for agriculture resilient to climate change • Farmers' groups and cooperatives technical capacities, organizational, knowledge and farming practices strengthened and resilient to the adverse effects of climate change • AHAs land registered and secure • Agrometeorology data available at time • Women and youth have increased productivity capacity and resilience to the adverse effects of climate change • Production cost-effective • Private funding strengthened for scaling up financing for climate resilient AHA.

C. FINANCING INFORMATION

C.1. Total financing

(a) Requested GCF funding (i + ii + iii + iv + v + vi + vii)		Total amount		Currency	
		30,138,772		Euro (€)	
GCF financial instrument		**Amount**	**Tenor**	**Grace period**	**Pricing**
(i)	Senior loans	**5,890,000**	20 years	10 years	0.75%
(ii)	Subordinated loans	____	Enter years	Enter years	Enter %
(iii)	Equity	Enter amount			Enter % equity return
(iv)	Guarantees	Enter amount	Enter years		
(v)	Reimbursable grants	Enter amount			
(vi)	Grants	**24,248,772**			
(vii)	Results-based payments	Enter amount			

(b) Co-financing information	Total amount		Currency			
	45,542,415		Euro (€)			
Name of institution	**Financial instrument**	**Amount**	**Currency**	**Tenor & grace**	**Pricing**	**Seniority**
BOAD	Senior Loans	9,244,444	Euro (€)	13 years* 3 years	3.5%*	senior
Republic of Niger[35]	Grant	6,159,199	Euro (€)	Enter years Enter years	0%	Options
Click here to enter text.	Options	Enter amount	Options	Enter years Enter years	Enter%	Options
Click here to enter text.	Options	Enter amount	Options	Enter years Enter years	Enter%	Options

(c) Total financing (c) = (a)+(b)	Amount	Currency
	45,542,415	Euro (€)

(d) Other financing arrangements and contributions (max. 250 words, approximately 0.5 page)	* Please note that the pricing of BOAD is indicative and will depend on market conditions.

[35] The State of Niger is partly contributing to the financing of the AHA-IAC project for (Euro 6,121,399), by abandoning fiscal and customs taxes to which equipment, works and services should be subject (Euro 6,056,608) and grant (Euro 64,791) which will be used for Rental of PMU offices. The Project Management Unit will be the recipient of this grant.

C.2. Financing by component

Please provide an estimate of the total cost per component and output as outlined in section B.3. above and disaggregate by source of financing. More than one co-financing institution can fund a single component or output. Provide the summarised cost estimates in the table below and the detailed budget plan as annex 4.

Component	Output	Indicative cost Euro (€)	GCF financing		Co-financing		
			Amount Euro (€)	Financial Instrument	Amount Euro (€)	Financial Instrument	Name Institutions
Component 1. Sustainable development and rehabilitation of perimeters vulnerable to the adverse effects of climate change and reducing GHG emissions	1.1: Irrigation areas are developed with techniques resilient to the adverse effects of climate change	15 123 743	7 149 179	Grants	5 667 552	Senior loans	BOAD
					2 307 012	Grants	Republic of Niger
	1.2: The Irrigation areas are developed with total water control and a clean energy system	16 287 131	13 802 653	Grants	2 484 478	Grants	Republic of Niger
Component 2: *Support of the sustainable increase in agricultural productivity and income of farmers' groups and cooperatives in irrigated areas on developed and rehabilitated perimeters*	2.1: Producers organized for optimal development of irrigated areas	205,074	0	Choose an item.	173,791	Senior loans	BOAD
					31,282	Grant	Republic of Niger
	2.2: Technical itineraries adapted to the major climatic risks of irrigated areas are adopted for crop production	1,081,848	0	Choose an item.	916,821	Senior loans	BOAD
					165,028	Grant	Republic of Niger
	2.3: Integrated and outsourced water and energy management system set up and operational for optimal development of irrigation areas	1,493,863	1,113,536	Grants	152,449	Senior loans	BOAD
					227,877	Grant	Republic of Niger
	2.4: Funding and market access mechanisms for products from irrigated areas are strengthened	508,156	0	Choose an item.	430,641	Senior loans	BOAD
					77,515	Grant	Republic of Niger
Component 3: Stakeholders' technical, organizational and financial capacities	3.1: Knowledge and practices of agriculture resilient to the adverse effects of climate change are strengthened	242,851	160,071	Grants	45,735	Senior loans	BOAD
					37,045	Grants	Republic of Niger

development for the climate-resilient agricultural practices promotion	3.2: The technical and organizational capacities of farmers' groups and cooperatives are strengthened for the implementation of climate change-resilient actions	907,181	362,520	Grants	406,277	Senior loans	BOAD	
					138,383	Grant	Republic of Niger	
	3.3: An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the replication of the AHA-AIC project	6 378 709	414,160	Grants	74,549	Grants	Republic of Niger	
			5,890,000	Senior loans			Click here to enter text.	
	3.4: Control, supervision, and M&E of project activities	1,223,989	121,959	Grants	854,340	Senior loans	BOAD	
					247,690	Grants	Republic of Niger	
	3.5: Lessons learned are shared among stakeholders and disseminated for an overall strengthening of the agriculture sector facing climate change pervert effects	692,576	575,495	Grants	11,434	Senior loans	BOAD	
					105,647	Grant	Republic of Niger	
Coordination and management of the project	4.1: Investments in the acquisition of tools, management equipment	490,650	0	Choose an item.	366,259	Senior loans	BOAD	
					124,391	Grants	Republic of Niger	
	4.2. Recurring costs	528,876	402,465	Grants	45,735	Senior loans	BOAD	
					80,676	Grant	Republic of Niger	
	4.3.: Support for NPC meetings and Communication	377,769	146,732	Grants	173,411	Senior loans	BOAD	
					57,626	Grant	Republic of Niger	
Indicative total cost (EUR)		45,542,415	30,138,772		15,403,643			

This table should match the one presented in the term sheet and be consistent with information presented in other annexes including the detailed budget plan and implementation timetable.

In case of a multi-country/region programme, specify indicative requested GCF funding amount for each country in annex 17, if available.

C.3 Capacity building and technology development/transfer (max. 250 words, approximately 0.5 page)	
C.3.1 Does GCF funding finance capacity building activities?	Yes ☒ No ☐
C.3.2. Does GCF funding finance technology development/transfer?	Yes ☒ No ☐

If the project/programme is expected to support capacity building and technology development/transfer, please provide a brief description of these activities and quantify the total requested GCF funding amount for these activities, to the extent possible.

The project takes into account a transfer of technology in particular in its Components 1 and 2, in particular: (i) soil

conservation techniques and protecting irrigation areas against the adverse effects of climate change; (ii) total water control technologies through the installation of drip-drip and California irrigation systems; and (iii) a system of water pumping from solar energy. As these techniques are not yet widespread in the intervention areas, the project has proposed on-site capacity building activities and training sessions to ensure ownership of these techniques and technologies.

Additionally, the project aims to enhance the private financial sector capacities in creating an incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change.

The activities involved and the relative costs are presented in the following table.

Activities	Amount (Euro)
Activity 2.3.1: Design and implementation of a mechanism for the maintenance of hydraulic infrastructures	656,986
Activity 2.3.2: Design and implementation of a maintenance mechanism for electrical equipment	656,986
Activity 3.1.2: Strengthening the technical capacities of local actors and producers for the promotion of agriculture resilient to the adverse effects of climate change	105,952
Activity 3.2.1. Training of producers in climate-smart farming practices that can sustainably preserve soil and water resources	205,044
Activity 3.3.1: Building the capacity of the private financial sector to promote and scale innovative financing for climate smart agriculture	414,160
TOTAL	**2,039,128**

D. EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

This section refers to the performance of the project/programme against the investment criteria as set out in the GCF's Initial Investment Framework.

D.1. Impact potential (max. 500 words, approximately 1 page)

Describe the potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas. As applicable, describe the envisaged project/programme impact for mitigation and/or adaptation. Provide the impact for miteconomic

igation by elaborating on how the project/programme contributes to low-emission sustainable development pathways. Provide the impact for adaptation by elaborating on how the project/programme contributes to increased climate-resilient sustainable development. Calculations should be provided as an annex. This should be consistent with section E.2 reporting GCF's core indicators.

In the project's intervention areas, generators and motor pumps are largely used as sources of irrigation water pumping energy. What causes GHG emissions.

According to Niger's Third Communication on Climate Change (TCN, 2016) of Niger, on hydro-agricultural development: (i) the fuel used is diesel; (ii) the pumps are used during the dry season for an average of 100 days corresponding to the three months of the campaign and the pumping is carried out 1 day out of 2 or 50 days of actual use; (iii) the average pumping time is 4 hours per day for a specific consumption of 20 l/ha[36]. On this basis, the average consumption per hectare per agricultural season in the dry season is estimated at 1,000 liters. Considering that only half is consumed during the normal season, i.e., 500 liters per hectare, the annual consumption is 1,500 liters of fossil fuel, or 2,250,000 liters per year for the 1500 hectares of the project. This equates to 67.5 million liters over 30 years, corresponding to the lifespan of solar panels.

The number of expected direct beneficiaries of the project is 121,615 distributed as follow: (i) 56,056 people from producers' households on the new irrigated Agriculture areas (AHAs); (ii) 41,895 people on the AHAs to be rehabilitated; (iii) 12,320 Beneficiaries of the line of credit for private financial sector for scaling up; (iv) 10,920 beneficiaries of income-generating activities (39 groups with an average of 40 members (households)); (v) 424 state workers who benefited from capacity-building activities.

[36] TCN, 2016 P.26

The number of indirect beneficiaries is 1 million. This was estimated considering the population in the villages, communes and regions benefiting from the project. They are the people who will benefit from project's crops, awareness-raising activities, dissemination of agro-meteorological information, dissemination of good practices, radio programs, etc.

Reducing GHG emissions (Please see the detail in Annex 22A and 22B:

Baseline Emissions:

The common practice for powering irrigation systems in agricultural value chains in Niger is using diesel generators. Solar systems are capital intensive at start up and farmers do not see the need to invest in expensive technology. Without this project, irrigation systems in AHAs would be powered by diesel generators. The average size of the generators will be below 15 kW and will operate for 5 hours daily.

The baseline emissions as per CDM ASM-I.F are therefore the annual electricity generated by the renewable energy unit times an emission factor for a modern diesel generating unit of the relevant capacity operating at optimal load. Diesel generators would have run at 50% of their capacity as explained above. As the baseline diesel generator capacity in all cases will be below 15kW and the generators will be operated for an average of 5 hours daily, the emission factor used for baseline calculations is therefore 1.4 tCO2/MWh as provided in methodology AMS.I-F (Please see annex 22B). These baseline emissions are therefore summarized in the following table:

Yearly Electricity Generation by the Renewable Energy systems.	4.588 MW*1740 hours = 7,983.12 MWh
Emission Factor of Diesel on Electricity	1.4 tCO2/MWh
Resulting yearly baseline emissions for electricity	11,176.3 tCO2 eq

Project´s own Emissions:

The project will install solar PV systems and will not have any diesel generators running concurrently or as a backup. The project will therefore not contribute to the production of any emissions through power generation. Figure 30 below shows the approach taken, which is the complete displacement of fossil fuel. There will also be no electricity consumption from the grid, therefore no leakage.

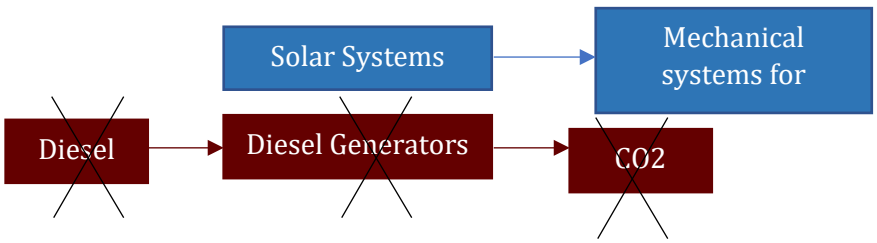


Figure 30: Complete Displacement of Diesel for electricity generation.

Leakage Emissions

No leakage emissions are associated with the funded activity, as only new equipment will be installed.

Emissions Reduction calculation assumptions:

Given that the project will not generate emissions nor have any leakage, Emissions Reduction are Baseline Emissions in the absence of GCF project.

The project's aggregated installed solar capacity is 4.558 MWp which will generate electricity for an average yearly efficient insolation of 1,740 hours including system efficiencies as provided in the map in fig2a and fig 2b of annex 22A. As can be seen on fig 2a, the yearly total insolation in the project area is between 1,750 hours and 1,826 hours, which confirms solar potential. The irrigation campaigns and electricity supply will be limited at a daily average of 4.8 hours, which translates to a total annual generation of 1,740 hours.

Project Mitigation Lifetime:

Total project Emissions Reduction for 5 years (tCO2e)	35,317
Total project Emissions Reduction by 2030 NDC Contribution (tCO2e)	77,117
Total project Emissions Reduction by project lifetime (tCO2e)- 25 years	227,551

Monitoring and reporting arrangements

The monitoring and reporting frequency will be annual. Sampling will be done to cover at least 10% of the systems installed and to monitor electrical parameters that relate to the amount of GHG abatement achieved. Arrangements will be made to monitor the energy generated by the solar power systems. This will be done through energy meters on at least 10% of the solar power systems to monitor the amount of electricity generated.

ONAHA's Director of Infrastructure of Materials and Workrooms will be the Technical Coordinator of site development actions and GHG reduction data collection. The GCF National Designated Authority (NDA; CNEDD) will supervise the collection of the data by ONAHA. The results will be sent to the Project management unit (PMU), which will present them in the annual report submitted to the Accredited Entity (BOAD).

D.2. Paradigm shift potential (max. 500 words, approximately 1 page)

Describe the degree to which the proposed activity can catalyze impact beyond a one-off project or programme investment. Describe the following, if applicable:

- *Potential for scaling up and replication*

The AHAs are facing: (i) critical recurring and increasingly pronounced adverse effects of climate change, namely irregular rainfall, shorter rainy season, droughts, floods, lack of water availability for cropping beyond the rainy season; (ii) high cost using diesel generators to pump irrigation water; loss of water due to inefficient irrigation techniques; and (iii) lack of sustainable private sector funding for cost-effective production.

The proposed climate smart agriculture project will be one of the first of its kind on Irrigated Agriculture Developments (Aménagements Hydro-Agricoles – AHAs) in Niger, with a strong transformative potential as it can be replicated and scaled up across Niger, the West African region and beyond. The unique model AHAs will be climate resilient with GHG emission reduction and better production cost-effectiveness. The crop yield and production will increase to solve the problem of food insecurity and improve farmers' groups and cooperatives revenues. The project is well designed to: (i) prevent the continued decrease of crop production due to the adverse effect of climate change and mitigate the increasing of GHG emission on AHAs; ii) improve food security and the livelihoods of famers, and (iii) boost private sector financing for climate smart agriculture through the mobilization of the financial sector and (iv) increase the participation of women and youth in food security.

The irrigation areas of the AHAs will be developed based on scalable and replicable climate resilient and GHG mitigation techniques including flood control techniques and water-saving and clean energy system techniques. The climate smart agriculture business model in this project will be cost-effective through: (i) optimal organization for land registration and distribution; (ii) sustainable water and renewable energy management; (iii) adoption of technical itineraries adapted to the major climatic risks of irrigated areas for crop production. In addition, the project will provide incentives to set up a favorable technical, organizational, and financial environment for climate smart agriculture.

GCF funds will allow local financial institutions to extend loans at lower interest rates and longer tenors to end beneficiaries. The farmers' groups and cooperatives technical capacities, knowledge, and farming practices resilient to the adverse effects of climate change will be strengthened. Women and youth will acquire more productive capacity and resilience to the adverse effects of climate change.

Complimentarily, GCF loans will contribute to the development of climate-smart credit scoring tools that ensure that loan applications are appropriately screened to reduce risks to the lenders, thereby also contributing to the reduction

in interest rates. It is expected that GCF's interventions will reduce significantly reduce interest rates from 20% to at most 15% in the worst case in the long term. Subsequently, financial sector loans will gradually become more attractive once the project has ended, as interest will have been reduced, thus stimulating more loan applications and investment in resilient agriculture and create a self-sustaining loan portfolio that ensures the adoption at scale of climate-smart agriculture practices in the long term.

The financial sector in Niger has over USD 2.1 billion in total assets, hence, constitutes an important source of finance to catalyze to meet the significant investment gap for climate-smart agriculture. The credit line financed by the GCF will serve as a lever to mobilize significant low-cost financial resources for Niger's banks and financial institutions. The implementation of this mechanism will reduce the current prohibitively high interest rates on agricultural credit. This will enable the development of a replicable model of climate-smart agriculture financing combined with solar energy, innovative irrigation techniques and protection of fields against floods, which will enhance cost-effectiveness. GCF's concessionality will be passed on to end-beneficiaries.

Decision makers in the financial institutions will acquire a better understanding of risk/return profiles of financing climate-resilient agricultural techniques and to enhance their ability to implement appropriate governance, lending procedures and credit risk tools that reduce their lending risks. In the long term, capital returns on loan repayments from agriculture groups and cooperatives will increase lending power and reduce interest rates from private sector sources to enhance greater investment in agricultural resilience in Niger. The socio-economic and environmental benefits and resilient agricultural techniques of the project will be shared through knowledge management, marketing and diffusion of best practices and the interventions of the project to facilitate the upscaling and replication of these climate resilient techniques across Niger, the West African region, and beyond. The lessons learned and increased technical capacity will also further enable local financial institutions to raise additional funds from development finance organizations to continue providing loans to their clients through a blended finance approach. The project will also support the strengthening of the government's (central and local) technical and institutional capacity to promote green financing and climate smart agriculture and raising the awareness of agriculture cooperatives.

In fact, to combat the adverse effects of climate change, Niger's NDC prioritizes adaptation, particularly in the Agriculture Forestry and other Land Use (AFOLU) sector. At the same time, Niger's National Communications report that the AFOLU and energy sectors account for 89% and 9% of Niger's total GHG emissions, respectively. So, whether in the field of mitigation or adaptation, the vision of the NDC in Niger is to promote climate-smart agriculture (CSA) and access to modern energy services for all, by 2030. To achieve this vision of the NDC requires all national and international actors involved in climate change responses to integrate the approach of climate-smart agriculture, to achieve food security and increase farmer incomes, in their agricultural development policies, programs, and projects. Therefore, the current project adopted the CSA approach. The government's commitment to CSA through the NDC, requires all agricultural development national and international actors to include these climate-smart farming techniques in future agricultural investment projects following the model of the current project. This will ensure the scaling up of the current project.

Potential for knowledge sharing and learning

Component 3 of the proposed project focuses developing technical and organizational capabilities and disseminating lessons learned. Capacity-building activities concern all the actors involved in the project, i.e., public services, farmers' organizations and private operators who support famer's organizations, producers/farmers' groups and cooperatives, etc. These activities will allow the actors to assimilate the techniques promoted in the project. Uptake of new techniques and ownership of the project by producers will be strongly promoted through the strengthening of organizational capacity, management of means of production (water-land-energy), awareness, etc. Knowledge sharing and learning will be based on a project knowledge management strategy, with communication activities tailored to target groups. Communication strategies such as community theatre, radio broadcasts and the project website will be promoted. Documents on lessons learned will be produced and experience-sharing meetings will be held. The farmers' groups and cooperatives including women, famers' organization, public services and private operators will all be targeted by these activities. The project's communication materials will be adapted to each target group.

- *Contribution to the creation of an enabling environment*

The project includes a component on building technical and organizational capacity for the promotion of solar energy that can reduce GHGs, the consumption of 67.5 million liters of fossil fuels over 30 years, the reduction of energy costs over producers' operating account, and water savings. Through this project, the technical capacity of producer support officers for the development of hydro-agricultural development will be strengthened. Cooperatives and agriculture groups will be strengthened and/or created. Water, input and electricity management mechanisms will be put in place.

Their capacity to intervene will increase the use of good production techniques.

The need for sustainable management of AHAs in a context of climate change is particularly important in Niger. Unfortunately, this need is not covered due to a lack of means, among others, technical and financial. Despite all the expectation expressed by the populations to adopt smart agriculture techniques resilient to climate, the proposed project (i.e., AHA-AIC Project) will be able to cover only a relatively small part of the overall needs. While the AHA-AIC Project has several benefits for Niger and its rural populations by strengthening the climate-smart agriculture approach, the challenge for the coming years will be to adopt this approach at the national level if food insecurity is to be tackled in a sustainable manner.

This is obviously an opportunity for the sustainable financing of Nigerien agriculture through its private financial sector by the development of credits, which are nevertheless less expensive and less prohibitive to the profitability of the farm. Current financial institutions can therefore meet these needs if the issue of financing their own agricultural activities at incentive rates is resolved.

In this sense, an incentive environment favourable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change will be created through Output 3.3. of Component 3 of the project for scaling financing for climate smart agriculture, and promote a paradigm shift by means of an adapted private financing mechanism that will take over from the current public financing provided by the State of Niger, the BOAD and the GCF in the form of grants and soft loans. Key activities are designed and will be progressively developed by the project to create an enabling environment to prepare stakeholders for the promotion of climate-resilient agricultural finance adapted to the needs of the sector through direct support in the form of an agricultural loan facility mechanism to subsidize interest rates and stimulate innovation in terms of dedicated financial products and services. These activities are: (i) Activity 3.3.1: Building the capacity of the private financial sector to promote and scale innovative financing for climate smart agriculture ; (ii) Activity 3.3.2: Set up an attractive on-lending mechanism for climate-smart agriculture through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the “Agricultural Loan Facility”); all aiming the Output 3.3. An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the scaling up of the AHA-AIC project; included in component 3.

- *Contribution to the regulatory framework and policies*

To create a favorable legal organizational framework, the project will establish a water and energy management framework at the operator level. The project planned at the activity 3.1.4, the Improvement of texts binding the State, ONAHA and cooperatives and operators. The improvement of the texts in terms of climate change will result in: (a) the integration in the plan contract and the management contract of the provisions relating to the technical, financial, operational and managerial consideration of the issues relating to the reinforcement of new AHAs or those to be rehabilitated by the introduction of new AHAs: (i) Techniques and technologies related to the adaptation of AHAs to the adverse effects of climate change; (ii) solar energy techniques and technologies; (iii) techniques and technologies for the reduction of greenhouse gases; (b) the integration in the operating contract between ONAHA and the AUEi, the dimensions of: (i) maintenance and sustainable management of the technologies and techniques proposed for strengthening the resilience of the AHAs; (ii) maintenance and sustainable management of solar equipment and other GHG reduction technologies; (c) integration in the operating contract between ONAHA and the cooperatives of the dimension maintenance and sustainable management of techniques, technologies and equipment contributing to the resilience of AHAs and to the improvement of agricultural yields; (d) the establishment and promotion of the implementation of a collaboration contract between the cooperatives and the AUEi taking into account: (i) maintenance and sustainable management of the technologies and techniques proposed for strengthening the resilience of AHAs; (ii) maintenance and sustainable management of solar equipment and other GHG reduction technologies.

AHAs are facing land problems. This project establishes a methodology to promote AHAs land registration to secure the land programmed for AHAs development and replication (see F.1. Risk factors and mitigations measures 4 and Annex 29).

In addition, in view of the expected results in the implementation of the project including water savings and GHG emission reductions, the lessons learned from the project will encourage the Nigerien government to promote a regulatory and strategic framework to promote innovative agricultural techniques and technologies resilient to climate change in terms of clean energy and water savings, incentives such as subsidizing the cost of agricultural equipment, importing equipment, setting up small assembly plants and/or construction of equipment .

- *Overall contribution to climate-resilient development pathways consistent with relevant national climate change*

adaptation strategies and plans

- The project opting for solar instead of fossil fuels (diesel for generators) and promoting actions of economy and sustainable management of water, protection of irrigated areas from floods, adaptation of crop calendars, will implement the NDC which identifies actions to co-benefit adaptation-mitigation as priorities to contribute to the achievement of the objectives set by Niger. **Evaluation of the project's contribution to adaptation, mitigation and production of climate-smart agriculture**

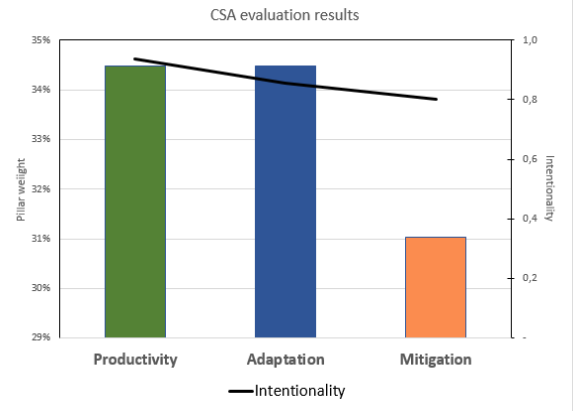
The project in its triple ambition of: (i) strengthening the resilience of populations to the adverse effects of climate change; (ii) increasing production to reduce food insecurity; and (iii) contributing to the reduction of GHG emissions, has identified techniques and technologies to be implemented. These include techniques for soil conservation, flood control, sustainable water control and management, technical and organizational capacity building for site development, etc.. To ensure the effective contribution of these technologies to the achievement of the objectives of Climate Smart Agriculture (Adaptation-Production-Mitigation), they were evaluated using the CSA Programming and Indicator Tool of CCAFS. This tool assesses the potential contribution of one technology / techniques or a group of techniques to the improvement of adaptation, crop production and GHG mitigation. The assessment is based on the contribution that each technology provides to the three dimensions of Climate-Smart Agriculture. The results are presented in the following table.

Table 12: Adaptation and mitigation techniques contributions to combat climate adverse effects if used only.

Technologies	**Contributions**		
	Adaptation	Production	Mitigation
Stony cords	36%	44%	20%
Filter dikes	36%	44%	20%
Planting of grass / windbreaks	36%	39%	25%
Organic manure	32%	44%	25%
Gabionnage / Spreading threshold	51%	44%	5%
Half Moon	36%	44%	20%
Agroforestry	36%	28%	36%
Solar pump	14%	40%	46%
Drip irrigation system	40%	39%	21%
California irrigation system	40%	39%	21%

The table above indicates that in terms of adaptation, intentionality varies from 0.21 to 0.54. In terms of production, intentionality ranges from 0.31 to 0.63. In terms of mitigation, the weight of the technology ranges from 0.05 to 0.45. Analysis of the results of the technology assessment shows that, when each technology is developed individually, some contribute better to adaptation, others to production and still others to mitigation. From the above table, no single technology offers optimal performance for all 3 dimensions of climate-smart agriculture, hence the idea of considering their combination in this project on a site-specific basis.

The combination of water management/conservation technologies, sustainable energy technology for irrigation, sustainable agricultural land management techniques, capacity building and knowledge activities offers CSA's three-dimensional benefits. The following figure and table present the outcome of the overall project.



Dimension	Contribution
Production	0,94
Adaptation	0,86
Mitigation	0,80

Figure 31: Contribution of climate smart agriculture techniques to adaptation, mitigation, and production.

Table 13: Contribution of adaptation and mitigation techniques to combating the adverse effects of climate
climate if they are combined

The results of the combination of technologies show that the intentionality of production remains high (0.94) followed by adaptation (0.86) and finally mitigation (0.80). This shows that the present project contributes effectively to the achievement of the triple ambition of climate-smart agriculture. Compared to technologies taken in isolation, the highest intentionality is 0.63 for production, 0.54 for adaptation and 0.45 for mitigation. This shows that the present project, by opting for a combination of technology, contributes effectively and sustainably to the achievement of the triple ambition of climate-smart agriculture.

D.3. Sustainable development (max. 500 words, approximately 1 page)

Describe the wider benefits and priorities of the project/programme in relation to the Sustainable Development Goals and provide an estimation of the impact potential in terms of:

- *Environmental co-benefits*

The environmental benefits of the project are: (i) sustainable management of water resources; (ii) reducing fossil fuel consumption and greenhouse gas emissions; (iii) improving or maintaining soil quality and maintaining biodiversity.

Sustainable management of water resources and their quality: The irrigation system currently practiced on AHA consists mostly of open channels with an estimated irrigation yield of 60%. With an average need of 15,000 m^3 per hectare of rice, the water pumped at the source and returned to the perimeter is 25,000 m^3 per hectare. The water loss is 10,000 m^3 per hectare per countryside, i.e., 20,000 m^3 per year for two campaigns and 30,000 m^3 for 3 campaigns. If the old non-resilient practices are renewed, the water losses will amount to 30 million m^3 per year for the 1,500 ha to be developed as part of the project. Under this project, the promoted system has a return of 85% compared to 60% in the old system, a gain of 25%, i.e 18.6 million m^3 per yer.

Soil and Crop Protection: Strengthening the support of technical services and training producers in good practices for the use of inputs and soil conservation will help maintain and / or improve soil quality. This will have a positive impact on agricultural yields. The project devotes part of its Component 2 to the protection of productive capital against threats from the effects of climate change through combined actions to combat erosion, flooding and silting up on the areas to be developed as well as planting trees. Planting actions with local species and the practice of agroforestry will be beneficial to the development and maintenance of biodiversity. The methods that will be promoted as part of the project will improve soil quality, facilitate carbon storage in the soil and maintain local biodiversity.

- *Social co-benefits including health impacts*

The social benefits of the project include: (i) Better access to energy for irrigation; (ii) Improving the food security of beneficiaries; (iii) Promoting sustainable agricultural development; (iv) Improved health and safety; (v) Improved access to education; (vi) Reducing the phenomenon of rural exodus.

Table 14: Agriculture production with the project

Cultures	yield (Kg)	Post-harvest losses	Yield after post-harvest loss (Kg)	Area per crop (ha)	Production (ton)	Coef in Cereal Equivalent (EC)	**Production in EC of the project**	
							1 agricultural campaign	**2 Agricultural campaigns per year**
Onion	30 338	10%	27304	267	7 290	0,11	802	1 604
Potato	17 821	10%	16039	171	2 743	0,23	631	1 262
Tomato	20 858	10%	18773	175	3 285	0,06	197	394
Cabbage	23 964	10%	21568	133	2 868	0,07	201	402
Wheat	1 332	10%	1199	157	188	1	188	376
Corn	1 422	10%	1280	238	305	1	305	609
Watermelon	13 164	10%	11848	37	438	0,1	44	88
Cassava	21 942	10%	19748	137	2 705	0,42	1 136	2 273
Sorghum	702	10%	632	10	6	1	6	13
Rice	4 392	10%	3953	53	209	1	209	419
Lettuce	8 326	10%	7493	5	37	0,05	2	4
Moringa	4 214	88%	506	51	26	0,114	3	6
Anise	2 274	10%	2047	77	158	0,048	8	15
TOTAL				**1 511,00**	**20 259,79**		**3 731,75**	**7 463,51**

Better access to energy for irrigation: The promotion of solar energy as part of the project will increase producers' access to safe energy services. After water, energy is the second largest factor in agricultural production in Niger' irrigated system. Its precariousness profoundly influences agricultural yields or simply limits the ability of agricultural producers to develop crops. Producers using generators must be able to permanently diesel. By promoting the use of solar energy, a locally available resource, for water exploration, the project will have allowed producers on the selected irrigation areas to have continuous, safer and better energy access.

Improving the food security of beneficiaries: The rehabilitation of 749 ha and the development of 1000 new hectares will increase the availability of food both among producers and at the national level. Following the occupation of the land by promoted speculations, the project will make the following quantities available to the population.

Promoting sustainable agricultural development: The project will contribute to agricultural development sustainable irrigated agriculture. Indeed, the current system of water-consuming irrigation (exceptionally low irrigation yield) and based on fossil fuels whose reserves are depleted and cannot be replenished, future generations have no insurance of finding their sufficient share of water or fossil fuel resources to meet their agricultural development. The project will enable the use of renewable energy and the intelligent use of water resources to avoid disaster for future generations.

Improving health and access to education: Malnutrition and food insecurity affect the health and safety of people. The project, by improving agricultural production and people's incomes, will improve the health and safety of people. The benefits generated by the project will improve access to care services for beneficiaries. In rural areas, the low enrolment rate of children in school and the dropping out of classes are generally due to the parents' lack of financial resources.

Reducing the phenomenon of rural exodus: The project will be implemented by the beneficiary populations. It will provide stable incomes for beneficiaries, especially young people who, due to lack of work and income, migrate to more developed countries. the project will therefore help to limit the phenomenon of rural exodus.

- *Economic co-benefits*

Economic benefits are linked to (i) job creation; (ii) reducing energy bills; (iii) improving operating accounts; (iv) reducing imports and improving the trade balance; (v) reducing the budget deficit in the agriculture sector.

Job creation: The implementation of the project will create direct jobs consisting mainly of local labor and indirect jobs around the sites and supply and distribution channels for raw and semi-finished agricultural products. Approximately 12,000 farmers will benefit, not counting the labor for clearing, plowing, sowing, maintenance, harvesting, etc. The project will enable the development of agricultural marketing chains as well as product processing and conservation activities.

Reduction of energy bills: Since the price of diesel fuel at the pump is 0,82Euros per liter in Niger, the annual savings on the energy bill for the 1 500 ha of AHA will be 1 851 734,73 Euros, or 37 034 694 Euros over 20 years, or another 55 552 041 Euros over 30 years. Considering that the project will allow each household to develop 0.125 ha, the household saving on the energy bill for agricultural production will be 154,31 Euros per year per beneficiary, i.e., 3 086,22 Euros over 20 years of life of the solar panels.

Improved operating accounts and capacity to take out a bank loan for agriculture resilient activities development: financial support and supervision of producers will improve their operating accounts. The project will reduce the costs of production factors (water, electricity, inputs, etc.), improve agricultural yields and increase the number of agricultural campaigns per year and make profits through the sale of surpluses.

On older AHAs that are not protected from the adverse effects of climate change and use an expensive thermal electric energy source that emits greenhouse gases, farmers' benefits are marginal and sometimes are null or negative in the event of flooding, silting up and drought.

The development of AHAs with innovative climate-smart agriculture techniques ensure both the resilience of cultivated areas against the perverse effects of climate change, the mitigation of greenhouse gases, food and nutrition security, increased incomes. Thus, there are several benefits for farmers. It is expected from this project:

- A significant improvement in production and yields between 21% and 78% according to speculations;
- The adoption of 3 agricultural campaigns per year with a substantial increase in production;
- The creation of new income streams as the resources coming from agroforestry income, water economy, GHC emission saving, Energy Savings which can represent 198% of agriculture production income;

- a significant improvement in the operating accounts of agricultural groups and cooperatives;

The economic and financial analysis at the agricultural groups and cooperatives presents the indicators below.

Table 15: The economic and financial analysis in the case of agricultural groups and cooperatives

	Project		**Cooperative de 50 ha**		**Farmers' group with 5 ha**	
	Only agriculture production	**With new income streams**	**Only agriculture production**	**With new income streams**	**Only agriculture production**	**With new income streams**
Internal Rate of Return (IRR)	47,02%	92,88%	28,01%	64,55%	23,7%	79%
Profitability Index (PI)	2,63	2,04	2,45	5,27	2,25	7,26
Debt service coverage Rate	Loan with 7% interest and 24 months deferred		447%		450%	
	Loan with 10% interest and 12 months deferred		392%		394%	

The ability of cooperatives and agricultural groups to take out a bank loan adapted to develop their irrigation areas will be increasingly assured. This CSA approach, if extended to other farms by the Ministry in charge of agriculture and supported by the financial mechanism to be put in place, will decrease the country's independence from grant and other public funding and ensure that agriculture is taken over by agricultural groups and cooperatives that can rely on national private financing.

Even in cases of polyculture that offered no variation to farmers, and which did not provide food security and good nutrition in the baseline scenario, the approach offers, allow the producer to develop all the speculations he needs for his food security and good nutrition. The production allows to feed well with his household and to free up some of the products for his income.

- *Gender-sensitive development impact*

In the selection of direct beneficiaries, the gender criterion is included to give women, young people and adults the opportunity to participate fully in the project. Jobs will be created for women in sowing, maintenance, harvesting, threshing, marketing, etc. as well as for men. About 50% of direct and indirect beneficiaries will be women.

Capacity building will be particularly beneficial for women and young people, providing them with a unique opportunity to participate in a lucrative activity in the same way as men and improve their level of organization. Gardening crops, agricultural land development, the conservation of production for commercialization, etc. are all activities of the project that will reduce the vulnerability of women and young people. The Gender Action Plan outlines the various actions planned to strengthen the project's impact on gender.

D.4. Needs of recipient (max. 500 words, approximately 1 page)

Describe the scale and intensity of vulnerability of the country and beneficiary groups (e.g. the level of exposure to climate risks for beneficiary country and groups, overall income level, etc.).and elaborate how the project/programme addresses the issue (Describe how the project/programme addresses the following needs:

- *Economic and social development level of the country and the affected population*

This project focuses on Niger, in which is often ranked last among countries globally in terms of the human development index and is one of the hottest and driest countries in the world, with most of its area covered by the Sahara Desert. Niger is one of the Least Developed Countries (LDCs) and among the Low Income and Deficit Countries (PFRDV). A quarter (24.3%) of the population is vulnerable to multidimensional poverty. For rural populations for whom agriculture is the main source of income and livelihoods, the negative effects of climate change are felt most severely.

- *Vulnerability of the country and/or specific vulnerable groups, including gender aspects (for adaptation only)*

From 1983 to 2013, the average temperature increased by 0.35°C per decade. Rainfall has been generally declining with isohyet sliding southwards. There is a sequence of deficit years with implications for agricultural production. At a rate of 86% of the food needs covered by agricultural production since the 1980s, domestic agricultural production is currently structurally in deficit due to climate change.

According to climate projections, Niger will face: (i) an average temperature rise of around 1.6-2.9°C by 2050 with the

largest increase between June and September (during wintering)[37]; (ii) an increase in the frequency and intensity of rainfall during the second half of the rainy season (July-October) by 2050); (iii) an increase in the interannual and spatial variability of rainfall with sudden fluctuations between dry and wet years; and iv) increased frequency and intensity of torrential rains as well as drought pockets.

These risks could undermine the Nigerien government's efforts and investments to reduce food insecurity and combat climate change. Niger has therefore developed policies, strategies, plans and programmes that show that the country's priority is to strengthen the resilience of the agriculture and water sectors.

This project is part of Niger's country programme, to mobilize funding from the GCF to promote intelligent farming techniques on the production hubs of hydro-agricultural development. Promoted irrigation techniques will effectively reduce water stress from rising temperatures and increased drought, while ensuring the sustainability of national water resources through water savings. Drainage channels sized to reflect extreme rainfall, the promotion of agroforestry and the integration of climate information into the development of hydroelectric developments should reduce impacts (floods, floods, silting, break dikes) that could be caused by heavy rains.

At the local level, the beneficiaries of the project are vulnerable farmers' groups and cooperatives, especially small producers of wheat, maize, rice and vegetables. Soil poverty, low levels of irrigation and low agricultural areas, which are individually exploited, increase the vulnerability of producers and limit their ability to adapt to climate risks**.**

Soils are low in nutrients and organic matter, with low water retention capacity and vulnerable to erosion and are therefore transported to cause silting of hydro-agricultural developments. These phenomena will be exacerbated by the resurgence of heavy rains. In addition, high population growth is creating increasing pressure on arable land, increasing soil degradation and increasingly limited (fallow) restoration opportunities. The project will improve soil fertility through resilient agricultural techniques and promote organic matter. Activities to ensure land security for farmers' groups and cooperatives to facilitate the implementation of sustainable soil restoration options are also planned.

Producers' adaptation strategies are also extremely limited by access to irrigation (approximately 0.1% of irrigated arable land), adequate seed and fertilizers. Rising temperatures, increased precipitation irregularity and increased torrential rains threaten to change the effectiveness of subsistence methods traditionally used by farmers (crop/livestock integration, seasonal migration, dependence on community networks). Extreme temperatures in Niger have already reached 48 degrees Celsius, exceeding the threshold temperatures for millet growth and flowering (46 and 42 degrees Celsius) and sorghum growth (44 degrees Celsius). An increase in average temperature of more than 2oC, for example, could reduce yields by 15 to 25% for millet and sorghum in Niger. One study indicates that in small areas of southern Niger, rising temperatures could make sorghum unviable by 2030 and black millet unviable by 2050. The project through the rehabilitation and establishment of 1749 ha of irrigated areas will help increase the irrigation rate of the agricultural sector. Irrigation, the use of adapted seeds, easier access to inputs and the creation of microclimate through the promotion of agroforestry will help reduce crop water stress.

In addition to droughts, floods, crop diseases, and high winds are directly or indirectly linked to rising temperatures and precipitation and pose threats to crops.

The project by implementing a management plan for pests and pesticides, and installing windbreaks will help reduce the impacts of these threats to farmers' groups and cooperatives. Prolonged pockets of drought, early end-of-wet season, and damage from crop pests during the 2018 crop year have created production deficits, causing food crises and declining incomes. 2,682 localities (3,252,112 victims) of which 1,552 are in the areas of intervention in this project. The agricultural calendar with increasing variability in precipitation will certainly be impacted in the medium term. The resilient technical routes promoted by the project; the sustainable availability of water will minimize these impacts.

- *Absence of alternative sources of financing (e.g. fiscal or balance of payments gap that prevents government from addressing the needs of the country; and lack of depth and history in the local capital market)*

Niger, a poor country, does not have a local capital mobilization market. Access to financing is through loans with relatively high interest rates. National banks are reluctant to invest in agriculture because of the risks associated with climate change. Mobilizing internal funding and putting them available to finance agricultural adaptation is therefore exceedingly difficult.

[37] Temperatures are expected to increase by a minimum of 1.5°C across the project target regions of Diffa, Agadez and Tahoua, and 1°C across the Zinder and Maradi regions by 2050 compared to 1980-2018 according to the RCP 4.5.

- *Need for strengthening institutions and implementation capacity*

The use of solar energy for irrigation on hydro-agricultural development (AHA) has not yet expanded in Niger. The technical institutions involved in the project are used to piloting AHA development activities from thermal power generators or electrical power from the national grid. Few actors therefore master the use of clean energy in the context of AHA. Potential beneficiaries of the irrigation areas to be developed do not have the technical and organizational capacity to implement the project's activities on the sites. To do this, institutional and technical capacity building will be undertaken as part of the project to promote solar in the development of AHAs.

D.5. Country ownership (max. 500 words, approximately 1 page)

To strengthen people's resilience to climate change, Niger has developed policies, strategies, plans and programs such as: (i) the Sustainable Development Strategy and Inclusive Growth Vision 2035; (ii) the 3N Initiative for Food and Nutrition Security and Sustainable Agricultural Development; (iii) the Small Irrigation Strategy in Niger; (iv) the National Climate Change Adaptation Plan; (v) the National Environmental Protection Policy and (vi) the Nationally Determined Contribution.

The National Action Plan for Adaptation to Climate Change (PANA) developed under the United Nations Framework Convention on Climate Change (UNFCCC), which Niger signed and ratified on 11 June 1992 and 25 July 1995, respectively. Pana's development objective is to help mitigate the adverse effects of climate change on the most vulnerable populations, with a view to sustainable development and poverty alleviating in Niger. This project will reinforce the positive impacts of the priority activities in the PANA for the adaptation of the agriculture and water sectors (diversification and intensification of irrigated crops; mobilization of surface water and groundwater exploitation; promotion of income-generating activities and the development of mutual...).

The project will contribute to the implementation of the 2017-2020 Four-Year Contract-Plan between the Niger State and ONAHA signed between the National Office of Hydro-Agricultural Development (ONAHA) and the Niger State. The State considers ONAHA to be a central player so that: (a) the productive base (AHA) is permanently functional; (b) irrigated agriculture on AHAs is sustainably productive and profitable; (c) the day-to-day management of AHAs is rational and efficient;(d) investments in new AHA or rehabilitations are made in such a way that they are functional and sustainable. This four-year contract-plan targets 4000 hectares of new hydro-agricultural development, 2000 ha rehabilitated hydro-agricultural developments and the construction of 8 water mobilization works.

The National Environmental Protection Policy aims to ensure a healthy environment and sustainable development by taking the environmental dimension into account in any decision that affects the design, planning and implementation of policies, plans, programmes and development activities through the accountability and commitment of all stakeholders. It intends to: (i) actively contribute to the efforts undertaken at the sub-regional, regional, and international levels in the protection, restoration, and management of the environment; (ii) ensure food security and the supply of products in quantity and quality; and (iii) promote job creation. The present project, through the promotion of techniques for soil conservation and improvement, agroforestry, protection of developed areas, reduction of the use of chemical inputs by favoring integrated approaches, is likely to protect the environment.

The '3N' Initiative for Food and Nutrition Security and Sustainable Agricultural Development 'Nigeriens feed Nigeriens', a major focus of the President's Programme for the Rebirth of Niger adopted by the government in May 2012, built on the achievements of the Rural Development Strategy (SDR) while implementing the Detailed Development Plan for Agriculture in Africa (PDDAA), the common Agricultural Policy of the CEDEAO (ECOWAP) and the UEMOA Agricultural Policy (PAU).It stipulates that appropriate solutions must be found to reduce the frequency of cereal and forage deficits, improve the nutritional quality of meals for households and especially children, and ensure a regular supply of and ensure their accessibility to all social categories in the country in a context of increasing population pressure, the growing need to adapt to climate change, and the increase in livestock with the reduction of equity and regional integration, etc. This project is in line with I3N's ambitions and objectives and will contribute primarily to "strengthening national capacity for food production, supply and resilience in the face of food crises and disasters".

The Sustainable Development and Inclusive Growth Strategy (SDDCI) Vision 2035 promoted by the Ministry of Planning, Land Development and Community Development, engages forward thinking to: (i) build a knowledge base economic, social, and cultural change dynamics; (ii) engage development actors to analyze policies for change; and (iii) define a short-, medium- and long-term strategy and action plan. This project, which promotes climate-resilient technologies, will contribute to the implementation of its strategic axis "Energizing and Modernizing the Rural World" aimed at sustainably increasing agricultural production and productivity to strengthen agricultural Rural households'

resilience to climate change.

This project is one of the projects identified by Niger's country programme to mobilize funding from the GCF to implement adaptation and mitigation projects.

The project is consistent with Niger's National Determined Contribution (NDC), particularly on promoting climate-smart agriculture (CSA) and considering adaptation, mitigation, and food security, while strengthening development at the grassroots level. It meets CSA's triple objectives of: building resilience (adaptation), reducing GHG emissions from the sector (mitigation), improving agricultural productivity and incomes (production). Indeed, the development of hydro-agricultural developments with climate-resilient techniques and a solar water pumping system to replace thermal power generators, is in line with the co-benefit actions of adaptation and mitigation advocated by NDC. The project will also contribute to the achievement of the results associated with the national priorities of the AFOLU sector, of water resources and the reinforcement of the capacities of the actors at all levels identified in the CDN, the related benefits of the AFOLU sector being, in fact, constituted by the results of implementation and scaling up of CSA activities (strengthening of assisted natural regeneration (RNA), recovery of degraded land; improvement of the cereal and forage balance and of food and nutritional security...).

The designated national authority of the Green Climate Fund (CNEDD of Niger) will have the role of: (i) monitor the alignment of the project's actions with the national priorities defined in the NDC and the National Action Plan for Adaptation to Climate Change (PANA); (ii) mobilize stakeholders around the project (iii) oversee the preparation of the funding proposal; (iv) ensure that the GCF investment criteria and the gender aspect are taken into account; (v) facilitate the administrative procedures for obtaining the necessary authorizations at the national level; (vi) provide the letter of non-objection for the project; and (vi) supervise the implementation of the project. Civil society and farmers' organizations (mixed and women's) actively contributed to the preparation of the project through the public consultations organized in the beneficiary villages (Cf. public consultation report in the appendix). During these consultations, vulnerable groups expressed their interest and support for the project activities. To this end, they are the main target of the project in its areas of intervention.

D.6. Efficiency and effectiveness (max. 500 words, approximately 1 page)

Describe how the financial structure is adequate and reasonable to achieve the proposal's objectives, including addressing existing bottlenecks and/or barriers, and providing the minimum concessionally to ensure the project is viable without crowding out private and other public investments. Refer to section B.5 on the justification of GCF funding requested, as necessary.

The Government of Niger wishes to carry out climate-resilient hydro-agricultural developments (as stipulated in the five-year plan contract between ONAHA and the Niger State, in the NDC, etc.). Thus, the financing of this project through a GCF grant has been requested, to compensate for the lack of financial capacity of the State and to avoid increasing the level of indebtedness. This GCF investment will have several benefits for Niger in terms of (i) adaptation of the most vulnerable populations; (ii) mitigation efforts, improvement of soil quality and conservation, (iii) promotion of irrigation based on clean energy; (iv) rational management of irrigation water, (v) strengthening the resilience of vulnerable populations to the climate. The project activities will improve agricultural production to reduce the vulnerability of the populations to food insecurity and increase the protection of ecosystems through the construction of anti-erosion structures. Taken together, these activities will support and promote sustainable agricultural development in the context of climate change.

The effectiveness of interventions will be ensured using climate-smart agriculture practices, informed by studies by the Advisory Group for International Agricultural Research (CGIAR), the AGRHYMET Regional Centre, etc. Implementation of these smart agriculture actions requires little investment. The solar technology promoted has a lifespan of about 30 years and its maintenance is relatively inexpensive. The profitability of the developed irrigation areas (see Feasibility Study, Economic and Financial Analysis) shows that producers, in the short term, will be able to bear the costs of replacing irrigation systems with a lifespan of 5 to 10 years.

The effectiveness of the project will be further enhanced using best practices and lessons learned from ongoing and previous projects on building people's resilience to the adverse effects of climate change. (see Appendix 2: Feasibility Study) of this project. In addition, a report on best practices and lessons learned from this project (Output 1.2), as well as on-site learning visits, knowledge sharing and capacity building in the project (Output s 1.1 and 1.2), will enable knowledge sharing between technical services and local communities. Such sharing will further increase the efficiency of the project.

Please describe the efficiency and effectiveness of the proposed project/programme, considering the total financing

and mitigation/ adaptation impact the project/programme aims to achieve, and explain how this compares to an appropriate benchmark. Please specify the expected economic rate of return based on a comparison of the scenarios with and without the project/programme. NA Please specify the expected financial rate of return with and without the Fund's support to illustrate the need for GCF funding to illustrate overall cost effectiveness. NA Please explain how best available technologies and practices have been considered and applied. If applicable, specify the innovations/modifications/adjustments that are made based on industry best practices.

The project aims to promote solar energy instead of thermal generators to ensure the water pumping. The California irrigation and Drip irrigation systems are promoted in place of the open-channel irrigation system. These promoted systems have a return of at least 85% compared to about 56% for open-channel systems. In the latter case, the losses are high, and the maintenance costs are significant. To ensure the quality and performance of the equipment to be acquired as part of the project, the contracting contractor must necessarily commit to providing equipment that will have a lifespan of at least 10 and 25 years respectively for the pumps and solar panels. It will be required to provide a manufacturer's performance certificate if necessary. Users of the equipment (beneficiaries) must also commit to operating and maintaining the equipment in accordance with the manufacturer's requirements. To ensure the safety of the project's equipment and to avoid theft or vandalism, solar panels, electro pumps, the Californian will have to carry the mark "Property of Niger/ONAHA" with an identification number. If possible, the supplier should integrate a geo-referenced warning system connected to cooperative mobile phones into equipment, including solar panels and electro pumps. Solar equipment presented in the form of portable kits (solar panel and pump cases) could be preferred in some It will be required to provide a manufacturer's performance certificate if necessary. Users of the equipment (beneficiaries) must also commit to operating and maintaining the equipment in accordance with the manufacturer's requirements. To ensure the safety of the project's equipment and to avoid theft or vandalism, solar panels, electro pumps, the Californian will have to carry the mark "Property of Niger/ONAHA" with an identification number. If possible, the supplier should integrate a geo-referenced warning system connected to cooperative mobile phones into equipment, including solar panels and electro pumps. Solar equipment presented in the form of portable kits (solar panel and pump cases) could be preferred in some cases.

The project aims to enable the farmers for 3 agriculture campaigns per year. With pessimistic scenario (2 campaigns per year) the project is feasible. The project Internal Rate of Return (IRR) is 35.48%, and its Profitabiliy Index (PI) is 2.13, See Annex 3 Economic_financial_analysis_Spreadsheet_AHA Niger.

NET PRESENT VALUE (NPV)	**51 411**
Discount rate 10%	
Internal Rate of Return (IRR)	**35.48%**
Profitabiliy Index (PI)	**2.13**

With the basic scenario, the project economic rate of return (ERR) is 45.06%. The project lower ERR sensitivity analysis with the project pessimistic scenarios is 27.43%, See Annex 3 Economic_financial_analysis_Spreadsheet_AHA Niger.

	Conversion factor 0,85	**Ratio 1,1**	**Ratio 1,2**	**Ratio 0,1**	**Ratio 0,2**
	Basic Scenario	**10% increase in investments**	**20% increase in investments**	**Decrease in revenue of 10%.**	**20% decrease in revenue**
ERR	**45.06%**	**30.99%**	**27.43%**	**29.28%**	**29.82%**

E. LOGICAL FRAMEWORK

This section refers to the project/programme's logical framework in accordance with the GCF's Performance Measurement Frameworks under the Results Management Framework to which the project/programme contributes as a whole, including in respect of any co-financing.

E.1. Paradigm shift objectives

Please select the appropriated expected result. For cross-cutting proposals, tick both.

☒ Shift to low-emission sustainable development pathways

☒ Increased climate resilient sustainable development

E.2. Core indicator targets

Provide specific numerical values for the GCF core indicators to be achieved by the project/programme. Methodologies for the calculations should be provided. This should be consistent with the information provided in section A.

E.2.1. Expected tonnes of carbon dioxide equivalent (t CO_2 eq) to be reduced or avoided (mitigation and cross-cutting only)	Annual	11,176.3 t CO_2 eq
	Lifetime	227,551 t CO_2 eq
E.2.2. Estimated cost per t CO_2 eq, defined as total investment cost / expected lifetime emission reductions (mitigation and cross-cutting only)	(a) Total project financing	45 542 415 Euros
	(b) Requested GCF amount	30 138 772 Euros
	(c) Expected lifetime emission reductions	227,551 t CO2eq
	(d) Estimated cost per t CO2eq (d = a / c)	200.14 Euros / t CO2eq
	(e) Estimated GCF cost per t CO2eq removed (e = b / c)	132.448 Euros / t CO2eq
E.2.3. Expected volume of finance to be leveraged by the proposed project/programme as a result of the Fund's financing, disaggregated by public and private sources (mitigation and cross-cutting only)	(f) Total finance leveraged	_____ Choose an item.
	(g) Public source co-financed	_____ Choose an item.
	(h) Private source finance leveraged	_____ Choose an item.
	(i) Total Leverage ratio (i = f / b)	_____
	(j) Public source co-financing ratio (j = g / b)	_____
	(k) Private source leverage ratio (k = h / b)	_____
E.2.4. Expected total number of direct and indirect beneficiaries, (disaggregated by sex)	Direct	Male 60 808 and Female 60 807
	Indirect	Male 500 000 Female 500 000
	For a multi-country proposal, indicate the aggregate amount here and provide the data per country in annex 17.	
E.2.5. Number of beneficiaries relative to total population (disaggregated by sex)	Direct	Male 60 808 (0,25%) of country population which is 24 207 000 Inhabitants Female 60 808 (0,25%) of country population which is 24 207 000 Inhabitants
	Indirect	Male 500 000 (2,06%) of country population which is 24 207 000 Inhabitants Female 500 000 (2,06%) of country population which is 24 207 000 Inhabitants
	For a multi-country proposal, leave blank and provide the data per country in annex 17.	

E.3. Fund-level impacts

Select the appropriate impact(s) to be reported for the project/programme. Select key result areas and corresponding indicators from GCF RMF and PMFs as appropriate. Note that more than one indicator may be selected per expected impact result. The result areas indicated in this section should match those selected in section A.4 above. Add rows as needed.

Expected Results	**Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions**
				Mid-term	Final	
A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions	*A1.1 Change in expected losses of lives and economic assets (US$) due to the impact of extreme climate-related disasters*	Household surveys National crop production and disaster impact statistics Results of agricultural surveys/assessments Follow-up assessment reports in recipient areas	Currently, the primary economic assets of smallholder farming households in rural Niger impacted by extreme climate-related disasters are crops. Without any climate-resilient measures in place to prevent such losses, potential yields (T/ha) are reduced by 30-	Estimated change in expected losses/losses avoided with project scenario (20% increase in yield): Millet – $54/ha Rice – $415/ha Cowpea –	Estimated change in expected losses/losses avoided with project scenario (30% increase in yield): Millet –	Climate smart agriculture practices introduced by the project are actively taken up by beneficiaries Climate smart agriculture practices introduced by the project increase crop yields and reduce the adverse impacts of extreme climate-relate disasters

			50%. Baseline productivity of selected crops: Millet – 0.45 T/ha (lower than potential yields of 0.64–0.9 T/ha, with losses of $103–$244 per ha); Rice – 2,55 T/ha (lower than potential yields of 3.6–5.1 T/ha, with losses of $830–$2,076 per ha); Cowpea – 0.19 T/ha (lower than potential yields of 0.27–0.38 T/ha, with losses of $43–$103 per ha); and Maize – 1.05 T/ha (lower than potential yields of 1.47–2.1 T/ha, with losses of $152–$380 per ha)[38,39]	$22/ha Maize – $76/ha	$73/ha Rice – $627/ha Cowpea – $33/ha Maize – $116/ha	
	A1.2 Number of males and females benefiting from the adoption of diversified, climate resilient livelihood options (including fisheries, agriculture, tourism, etc.)	Household surveys	0 males and females In the project area, the practices resilient to the adverse effects of climate change are not known or implemented	15,000 Female 15,000 Male	60,807 Female 60,808 Male	Beneficiary households actively adopt the climate smart agriculture options introduced by the project. Climate smart agriculture options are successful, improving production and income generation. Manifest political will. Mobilization and strong support of beneficiary communities. Land security of developed irrigation areas. Good organization of beneficiaries in functional cooperatives. Institutions at the national, regional, and local levels sufficiently strengthened to plan, implement, and monitor infrastructures and ensure its sustainable management.
A2.0 Increased resilience of health and well-being, and food and water security	*A2.2 Number of food secure households (in areas/periods at risk of climate change impacts)*	Household surveys National crop production statistics Follow-up-assessment reports in recipient areas	45,687 food secure households[40] out of 94,124 households in the project area	4,285 additional households	11,353 additional households	

[38] Crop prices (per tonne): Millet – $543; Rice – $814; Cowpea – $543; Maize – $362. Source: https://fews.net/sites/default/files/documents/reports/PB_NE_202106_EN.pdf
[39] Potential yields: 30 or 50% more than baseline yields.
[40] Household food security exists when individuals in a household at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Source: http://www.fao.org/3/y4671e/y4671e06.htm

M1.0 Reduced emissions through increased low-emission energy access and power generation	*M1.1 Tonnes of carbon dioxide equivalent (t CO2eq) reduced or avoided - gender-sensitive energy access power generation*	Agricultural asset registers Solar equipment installation monitoring and evaluation reports.	0 tCO2eq currently reduced or avoided in target areas In the project area, the electricity is produced with thermal power plants. There is no off grid solar energy plants installed for hydro agricultural development areas irrigation	13747 tCO_2eq (6873.5 tCO_2eq for female beneficiaries and 6873.5 tCO_2eq for male beneficiaries)	35,317tCO_2eq (17658.5 tCO_2eq for female beneficiaries and 17658.5 tCO_2eq for male beneficiaries)	The conversion to solar power is actively supported by beneficiary communities. Solar installations are not stolen or vandalized. Capacity for the maintenance of solar power installations is in place and the installations are adequately maintained. The Clean Development Mechanism (CDM) methodology, Option B2, is applied Project lifetime : 25 years (corresponding to the lifetime of the solar equipment to be installed) Annual emission reductions : 11,176.3 tCO2eq Lifetime emission reductions : 227,551 tCO2eq

E.4. Fund-level outcomes

Select the appropriate outcome(s) to be reported for the project/programme. Select key expected outcomes and corresponding indicators from GCF RMF and PMFs as appropriate. Note that more than one indicator may be selected per expected outcome. Add rows as needed.

Expected Outcomes	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term)	Final	
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	*A7.1 Use by vulnerable households, communities, businesses and public-sector services of Fund-supported tools instruments, strategies and activities to respond to climate change and variability*	Follow-up assessments and related reports of beneficiaries and other stakeholders Household surveys	0 smallholder farmers are implementing agricultural practices that respond to climate change and variability in the target areas	48,646 smallholder farmers (24,323 female and 24,323 male) with crop production increases of 30–50% as a result of using the climate-resilient agricultural practices introduced by the project to respond to climate change and variability	121,617 smallholder farmers (60,807 female and 60,808 male) with crop production increases of 30–50% as a result of using the climate-resilient agricultural practices introduced by the project to respond to climate change and variability	Strong support for from beneficiaries and stakeholders for the uptaking of tools, instruments, strategies and activities introduced by the project to respond to climate change and variability. Climate-resilient agricultural practices introduced by the project result in increases in crop production under conditions of climate change and variability.

	A7.2 Number of males and females reached by [or total geogrpahic coverage of] climate-related early warning systems and other risk reduction measures established/strengthened	Follow-up-assessment reports in recipient areas. Household surveys.	0 males and females In the project area, any system is not in place for climate-related early warning systems and other risk reduction measures	24,323 Female 24,323 male	60,807 Female 60,808 male	Strong people's support for the project. Existence of technical and organizational capacity Involvement of technical extension services
A8.0 Strengthened awareness of climate threats and risk-reduction processes	*A8.1 Number of males and females made aware of climate threats and related appropriate responses*	Follow-up-assessment reports in recipient areas. Household surveys.	0 males and females In the project area, any system is not in place for climate threats and risk-reduction processes	280,404 Female 280,404 male (including both direct — 60,808 — and indirect — 500,000 — beneficiaries)	560,807 Female 560,808 male (including both direct — 121,615 — and indirect — 1,000,000 — beneficiaries)	Beneficiaries strong support for the project. Strong technical and organizational capacity Involvement of technical extension services. Increased awareness results in the increased uptake of climate-resilient agricultural practices amongst project beneficiaries.
M6.0 Increased number of small, medium and large low-emission power suppliers	*M6.3 MWs of low-emission energy capacity installed, generated and/or rehabilitated as a result of GCF support*	Follow-up-assessment reports in recipient areas. National energy sector statistics. NDC reporting.	0 MW Use of electrical thermal generators on the hydro agricultural development areas for irrigation needs	2.2 MWp of solar energy installed	4.5 MWp of solar energy installed	Quality of acquired solar equipment Existence of technical capacity to ensure installation and maintenance of equipment

E.5. Project/programme performance indicators

The performance indicators for progress reporting during implementation should seek to measure pre-existing conditions, progress, and results at the most relevant level for ease of GCF monitoring and AE reporting. Add rows as needed.

Expected Results	**Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions**
				Mid-term	**Final**	
Result 1.1: Irrigation areas are developed with techniques resilient to the adverse effects of climate change	Tonnes of food produced using climate-resilient agricultural techniques to contribute to food security	Results of agricultural surveys/assessments Annual Technical Reports Mid-term and final evaluation reports	0 Tonnes of food currently produced using climate-resilient agricultural techniques In the project area, the practices resilient to the adverse effects of climate change are not known or implemented, thus, the agricultural productivity and production is at least	Contribution to Food security with 2,600 Tonnes of cereal equivalence production per year using climate-resilient agricultural techniques	Contribution to Food security with 6,617 Tonnes cereal equivalence production per year using climate-resilient agricultural techniques	Mastery of techniques promoted by beneficiaries Appropriation of the project by the actors involved Food security under the project entails the provision of an additional 6.6 tonnes of food per year to target

			30 to 50% lower than the ones expected with the project			communities under conditions of climate change, meaning that they have physical, social and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life[41]
Result 1.2. The irrigation areas are developed with and a clean energy system	Cubic meters (m^3/CM) of water saved per year	Mid-Term and Final Evaluation Reports Monitoring and Evaluation Reports Annual Technical Reports Annual Producer Operating Account Farm survey/assessment Reports, which will include information and data on water use and electricity production	0 m^3 of water currently saved per year across AHAs (40% of water currently used is lost) On the AHAs, the irrigation networks are the open channel system, which is vulnerable to water losses (about 40% of that used).	5000 m^3 of water saved by year	Promotion of irrigation equipment to save at least 18,632,784 m^3 of water each year during the project (a reduction in water losses of 25% per year)	Effective deployment of drip techniques (90% efficiency) and the California network (85% efficiency) Good quality of solar energy equipment and/or suitable for sufficient water pumping Implementation of a sustainable royalty and equipment management mechanism deployed Existing skills for technology maintenance and monitoring
	MWh of energy produced by off grid solar installed to replace thermal generators electricity production on AHAs		0 MWh energy currently produced by off-grid solar Off-grid energy used on AHAs is from thermal energy generators	2 MWh of off-grid solar energy produced	9,8 MWh of off-grid solar energy produced	
Results 2.1. Producers organized for optimal development of irrigated areas	Number of sites registered with land titles	Monitoring and Evaluation Reports Formalization Reports of Farmers' Organizations Documents/status of farmers' organizations Annual Operating	On the old AHAs, 14 AHAs have their land title	7 new AHAs registered with land titles	13 AHAs registered with land titles	Cultural and ethnic barriers Strong involvement of local authorities
	Number of farmers groups and co-operatives established for sites exploitation		Co-operatives are organized on all the old AHAs	7 co-operatives organized established in the new AHAs of the project	20 co-operatives organized in the new AHAs 20 co-operatives established in the new AHAs of the project	

[41] http://www.fao.org/3/y4671e/y4671e06.htm

	Number of Association of Irrigation Water Users (AUEi) established for sites management	Reports Mid-term and Final Evaluation Reports	25 Irrigation Water Users Association (AUEi) are established on the old AHAs. The work is ongoing with ONAHA office to establish the AUEis on all the old AHAs.	7 Irrigation Water Users Association (AUEi) on established in the new AHAs (7)	23 Irrigation Water Users Association (AUEi) in new AHAs (20)	
Result 2.2: Technical itineraries adapted to the major climatic risks of irrigated areas are adopted for crop production	Percentage (%) of improvement in yields for each crop	Monitoring and Evaluation Reports Farm start-up reports Results of agricultural surveys/assessments Mid-term and Final Assessment Report	Current average crop yields[42]: Millet 0.45 T/ha Sorghum 0.31 T/ha Cowpea 0.19 T/ha Maize 1.05 T/ha Rice 2.55 T/ha Peanut 0.41 T/ha As current agricultural practices are not adapted to climatic risks, agricultural production and yields are negatively affected, and lower than they could be. For example, 6,633 tonnes of white rice were lost due to flood damage to AHAs in 2015.	20% improvement in agricultural yield and production on the AHAs which will be implemented	30% improvement in agricultural yield and production on the AHAs which will be implemented (for example: Rice 3 to 6 tonnes, Corn 1,4 to 2,6 tonnes, potato 15 to 23 tonnes, Cassava, 13 to 25 tonnes, tomato 22 to 27 tonnes, cabbage 18 to 27 tonnes)	Strong collaboration between the agri-meteorological services, agriculture services, hydraulic services and ONAHA
Result 2.3: Integrated and outsourced water and energy management system set up and operational for optimal development of irrigation areas	Number of hydraulic infrastructure and solar energy systems being maintained by local technicians	Annual activity Reports Mid-term and Final Evaluation Report	0 hydraulic infrastructures and solar energy systems maintainers in the project area	100 hydraulic infrastructures and solar energy systems being maintained by local technicians 200 hydraulic infrastructures and solar energy systems being maintained by beneficiaries on a day-to-day basis	761 hydraulic infrastructure and solar energy systems being maintained by local technicians	Strong commitment and support from members of agricultural groups and cooperatives Implications of services of ONAHA and Agriculture
	Number hydraulic infrastructure and solar energy systems being maintained by beneficiaries on a day-to-day basis		0 hydraulic infrastructures and solar energy systems being maintained by beneficiaries on a day-to-day basis	200 hydraulic infrastructures and solar energy systems being maintained by beneficiaries on a day-to-day basis	761 hydraulic infrastructure and solar energy systems being maintained by beneficiaries on a day-to-day basis	

[42] https://www.yieldgap.org/niger

Result 2.4: Funding and market access mechanisms for products from irrigated areas are strengthened	Number of beneficiary groups which has received project support for the development of income generating activities	Monitoring and Evaluation Reports Mid-term and final evaluation report	0 agriculture groups operational on AHAs for income generating activities in project area	20 agriculture groups operational for income generating activities with project' support	40 agriculture groups operational for income generating activities with project' support	Available local partners have accompanied the initiatives Good organization of the beneficiaries' groups
	Percentage of agricultural products produced for selling sold on the market		0 produced for selling currently sold on the market from AHAs	100% of agricultural products produced for selling sold on the market	100% of agricultural products produced for selling sold on the market	
Result 3.1 The local government officials' Knowledge and technical skills of climate smart agriculture are strengthened	Number of the local government officials' members which have integrated the climate smart agriculture practices in their production techniques	Monitoring and Evaluation Reports Reports of capacity building workshops Mid-term and final evaluation reports	0 beneficiaries The beneficiaries do not have knowledge and Technical skills in the climate smart agriculture integrating adaptation, mitigation, production, and income needs	17,276 direct beneficiaries with 50% female, have integrated the climate smart agriculture Knowledge and technical skills in their production techniques	79,471 direct beneficiaries with 50% females have integrated the climate smart agriculture knowledge and technical skills in their production techniques	Commitment of agriculture, hydraulic services in the project Strong commitment and support from members of agricultural groups and cooperatives
Result 3.2. The technical and organizational capacities of farmers' groups and cooperatives are strengthened for the implementation of climate change-resilient actions	Number of cooperatives which are aware of climate threats and related appropriate responses in their production techniques	Monitoring and Evaluation Reports Reports of Technical and Organizational Capacity Building Activities Mid-term and Final Evaluation Reports	0 cooperatives The farmers groups of the project area did not have capacities for the implementation of climate change-resilient actions	5 cooperatives are aware of climate threats and related appropriate responses in their production techniques	23 cooperatives are aware of climate threats and related appropriate responses in their production techniques	Commitment of agriculture, hydraulic services in the project Strong commitment and support from members of agricultural groups and cooperatives
Result 3.3. An incentive environment favorable to the promotion of a private and sustainable financing mechanism for agriculture resilient to climate change is created for the replication of the AHA-AIC project	Improvement of Agriculture and commercial Banks' rate for climate smart agriculture financing	Banks' reports on lending made for climate smart agriculture (shared by the banks with the EE based on an MOU signed at project inception) Surveys across beneficiary communities, agriculture cooperatives and groups to assess lending rates provided by banks Monitoring and	Current Bank commercial rate at 10% to 20%	Lending rate for climate smart agriculture around 7% for the agriculture cooperatives and groups involved in climate smart agriculture development for long term lend	Lending rate for climate smart agriculture around 7% for the agriculture cooperatives and groups involved in climate smart agriculture 4 Cooperatives and their farmers' groups accessed low-cost finances and innovative	Commitment of the agriculture and commercial banks selected to improve their financial mechanism for agriculture climate resilient funding through establishing an incentive environment favorable to the promotion a private and sustainable financing mechanism, including capacity building of the private financial sector, and the

		Evaluation Reports			resilient techniques and clean energy for climate smart agriculture development for long term lend	setting up of an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility. These measures will ensure a reduction of commercial lending rates. Cooperatives and agricultural groups non reluctant to borrow and invest in agriculture resilience and renewable energy technologies
	Number of agriculture cooperatives and groups whose borrow from banks enhanced for sustainable funding of climate smart agriculture		0 cooperatives and farmers' groups	2 Cooperatives and their farmers' groups accessed low-cost finances and innovative resilient techniques and clean energy for climate smart agriculture	4 Cooperatives and their farmers' groups accessed low-cost finances and innovative resilient techniques and clean energy for climate smart agriculture development for long term lend	
Result 3.4: Control, supervision, and M&E of project activities	Control, supervision and M&E of project activities	Monitoring and evaluation reports Audit engagement reports ESIA Surveillance mission reports Monitoring and evaluation reports	0 frameworks in place to control, supervise, monitor and evaluate climate-resilient low-emission activities at project sites Supervision, and monitoring-evaluation activities on old AHAs did not integrate climate smart agriculture integrating adaptation, mitigation, production, and income needs	Daily, weekly, and monthly technical control of AHA activities report integrate climate smart agriculture integrating adaptation, mitigation, production, and income needs Weekly and monthly supervision reports by the DGGR integrate climate smart agriculture integrating adaptation, mitigation, production, and income needs Annual, mid-term and final monitoring and evaluation by the Accredited Entity integrate climate smart agriculture integrating adaptation, mitigation, production, and income needs	Mid-term and final evaluation reports integrate climate smart agriculture integrating adaptation, mitigation, production, and income needs Monitoring and Evaluation Reports integrate climate smart agriculture integrating adaptation, mitigation, production, and income needs	Good organization of Control, supervision, and monitoring-evaluation services in integrating climate smart agriculture integrating adaptation, mitigation, production, and income needs
Result 3.5: Lessons learned are shared among stakeholders and disseminated for	Number of cooperatives and direct beneficiaries provided with the	Monitoring and evaluation reports Study report on	0 cooperatives and direct beneficiaries	The project knowledge and lessons learned compilation	The project knowledge and lessons learned	Involvement of all stakeholders in the project Involvement of all

an overall strengthening of the agriculture sector facing climate change pervert effects	project knowledge and lessons learned compilation documents, as well as the technical and manual sheets developed for the operators	lessons learned and good practice sheets developed Mid-term and final evaluation reports	Weak of data on lessons learned on climate resilient farming techniques	documents, the technical and manual sheets developed for the operators, and the sharing workshops reports are shared with 5 Cooperatives and available for the 17,276 direct beneficiaries with 50% female,	compilation documents, the technical and manual sheets developed for the operators, and the sharing workshops reports are shared with the 23 Cooperatives and available for the 79,471 direct beneficiaries with 50% female.	stakeholders in the project

E.6. Activities

All project activities should be listed here with a description and sub-activities. Significant deliverables should be reflected in the implementation timetable. Add rows as needed.

Activity	Description	Sub-activities	Deliverables
Activity 1.1.1: Development of irrigation areas with climate-resilient techniques	Under this activity, it is planned to develop 1000 hectares of irrigation areas operated by cooperatives and farmers' groups with climate-resilient techniques. The sizing chosen for the development of each site, serves as a basic parameter for the definition of the volume of work to be carried out, the dimensions of the structures of mobilization and management of water resources for the needs of irrigation. For the entire project, the reference area of the hydraulic district is set at 5 hectares. Each 5-hectare water district is divided into 40 plots of 0.125 hectares.	1.1.1a: Preparation of sites and construction of plots 1.1.1b: Drilling and Protecting Sites from Water Erosion by Building Anti-Erosion Structures 1.1.1c: Strengthen Perimeter Flood Protection measures at plots 1.1.1d: Plant trees around plots and sites, developing Farmer Managed Natural Regeneration (FMNR) to arrest erosion	1.1.1a: 200 5-hectare water districts, each of which are sub-divided into 40 0.125-hectare plots 1,000 ha of irrigation areas (200 water districts/8,000 plots) are developed with climate-resilient techniques including: 1.1.1b Anti-erosion structures **New AHAs** Gabioning 2 524 **m3** Mesh protection 92 015 meters **Old AHAs** Gabioning 5000 **m3** Mesh protection 10700 meters 1.1.1c Perimeter flood protection measure **New AHAs** Protective dike3 100 **m3** **Old AHAs** Protective dike3000 **m3** 1.1.1d Trees to

			arrest erosion Windbreaker New AHAs 46 617 meters Old AHAs 20 600 meters
Activity 1.1.2: Rehabilitation of 749 hectares of the old AHAs	Rehabilitation will involve the sites of Djirataou 1, and Galmi. These sites are victims of the adverse effects of climate change, which seriously compromise their functioning. Production and investment losses are recorded each year. It will therefore be a question of strengthening their resilience to the adverse effects of climate change.	1.1.2a: Establish processing koris 1.1.2b: Implement anti-erosion measures 1.1.2c: Rehabilitate 43 boreholes 1.1.2d: Drill 11 new boreholes 1.1.2e: Rehabilitate and install new pumps 1.1.2f: 1.1.2f: Replace 65,000 m of irrigation canals with buried PVC pipes 1.1.2g: Rehabilitate 18,000 m of drains by re-profiling and curing 1.1.2h: Rehabilitate of 61,000 m of access roads to the sites	512 ha of AHAs rehabilitated and 247 ha of AHAs strengthened with climate-resilient techniques, including: 1.1.2a: Processing koris 1.1.2b: Anti-erosion measures 1.1.2c: 43 rehabilitated boreholes 1.1.2d: 11 new boreholes 7281.1.2e: Functioning pumps 728 1.1.2f: 65,000 m of buried PVC irrigation piping 1.1.2g: 18,000 m rehabilitated drains 1.1.2h: 61,000 m of rehabilitated access roads
Activity 1.2.1.: Drilling of boreholes equipped with solar pumps and installation of drip and California irrigation systems	Niger being a Sahelian country the flow of surface water is relatively low for remote areas of the Niger River. These waters are subject to high evaporation and are widely used for both human consumption and livestock. Conflicts of use are common especially between farmers and herders limiting the supply of water necessary for the development of crops. This project proposes to use relatively abundant groundwater in the project areas but at different depths through drilling and to develop total control of this irrigation water The irrigation system on most AHAs is classic type with open-air canals. This system has shown its inefficiency through recorded water losses of between 40% and 50%. Evaporation due to the high temperatures currently experienced in Niger in connection with climate change, percolation to the underground, water diversion by other users, etc. are the sources of these water losses. These losses may increase further due to climate projections predicting a rise in temperature in the coming decades. To limit these losses and achieve water savings, the project aims to promote drip and California irrigation systems. These systems have an irrigation yield of	1.2.1a: Install (drill and establish) 688 boreholes and storage basins 1.2.1b: Install piezometers (2 per 5ha) 1.2.1c: Install the drip irrigation units (5ha module) on 5% of the landscaped area 1.2.1d: Install the California irrigation network units (5ha module) on 95% of the area developed 1.2.1e: Construction of reservoirs (5 of 10m^3 for 5 ha) for storing irrigation water 1.2.1f: Construction of major irrigation canals (California and drip)	1,000 ha of new AHAs and 512 ha of old AHAs irrigated, including: 1.2.1a: 688 boreholes and storage basins 1.2.1b: ~600 piezometers 1.2.1c: 75 ha equipped with a drip irrigation system 1.2.1d: 1,425 ha equipped with a California irrigation system 1.2.1e: Irrigation water storage reservoirs (5 per each 5 ha) 1.2.1f: Irrigation canals

	90% and 85% respectively. These systems will therefore save between 35% and 50% of water.		
Activity 1.2.2 installing and equipping boreholes with clean energy systems.	This activity consists of equipping boreholes with electric pumps and installing solar panels for energy supply. This solar energy will replace the diesel generators usually used on irrigation areas.	1.2.2a: Install solar panels for the supply of energy (Kits composed of solar pumps, solar panels, inverter, regulator, and connection accessories for pumping will be dimensioned to ensure the irrigation of 5ha units). 1.2.2b: Construct 37 solar fields and boreholes for livestock watering	1.2.2a: 803 solar panel installations (728 for the new AHAs and 75 for the rehabilitated AHAs) 1.2.2b: 37 solar fields for livestock drinking
Activity 2.1.1: Conducting the land registration process at selected sites	Securing land is a key element in the sustainable development of developed areas. It secures investments and beneficiaries' access to land for cultivation. In accordance with the texts in force in Niger, the State entrusted the management of the land to ONAHA to secure all the irrigation areas on the old AHAs as well as on the new AHAs which will be operated under its supervision.	2.1.1a: Conduct information and awareness meetings on the expected objectives and outcomes of land registration, including the preparation and dissemination of material on the land registration process. 2.1.1b: Support the process for the issuing of land titles (filing of the application with the required administrative documents, publication of the notice of land advertising by the curator, boundary of the plots, registration of the land rights of the operators, issuance of land title) 2.1.1c: Set up and support the activities of the land redistribution commission on the basis of the results of the perimeter registration.	2.1.1a: Material on the land registration process; and attendance registers 2.1.1b : Registration documents for land titles prepared for 13 AHAs 2.1.1c : Site Security documents indicating results of the land redistribution process, including title deeds
Activity 2.1.2: Distribute hydraulic quarters and allocate plots to beneficiaries	After the development work, the project will divide the irrigation areas into hydraulic districts and cultivation plots. Within the framework of this project, hydraulic districts will have a surface area of 5 ha and the parcel unit selected is 0.125 ha (Cf. Component 1). The project will support: (i) set up at the level of each site a parcel allocation committee; (ii) draw up lists of beneficiaries per site. An access rate of at least 35% of women will be sought in the allocation of plots. A plot unit will be allocated to a producer or a household.	2.1.2a: Develop gender-based attribution criteria to ensure a clear allocation of social classes. These criteria will provide women and vulnerable groups with a greater opportunity to benefit from the exploitation plots. 2.1.2b: Allocate hydraulic quarters to a group of producers according to the number of members of the group. 2.1.2c: Support the signing of land use contracts for each producer.	2.1.2a : Set of gender-based attribution criteria to inform the allocation of hydraulic quarters and plots 2.1.2b : Hydraulic quarters distributed across 82,000 beneficiaries of developed sites 2.1.2c : Signed land use contracts
Activity 2.1.3: Support for the establishment of farmers' organizations and their functioning	In Niger, farmers' organizations are made up of producer groups, cooperatives, and the Irrigation Water Users Association (AUEi). Several groups form a cooperative. This organization is of undeniable importance in the development of irrigation areas. Indeed, it has been noted that the mismanagement of irrigation areas is, after climatic phenomena, the cause of insufficient development of certain irrigated areas. Faced with this observation, the Ministries in charge of Agriculture and Hydraulics issued joint order n°63 MAG/EL and MH/A of 29 September 2016 for the establishment of an association of irrigation water users (AUEi). These structures will be set up for each irrigation area. In accordance with the order mentioned above, the cooperative oversees production, supply, marketing, processing, and management of the agricultural fee. The AUEi, for its part, oversees water distribution, infrastructure maintenance and management of the water tax.	2.1.3a: Establish management structures (GMP, Cooperatives and AUEis) 2.1.3b: Implement the statutory texts of each of the cooperatives. 2.1.3c: Develop and disseminate the operating rules of AUEi and AHA cooperatives 2.1.3d: Organize an awareness campaign for beneficiaries, local and customary authorities to identify from the beginning of activities the role of each of these actors in the sustainable exploitation of irrigation areas. 2.1.3e: Provide support to ensure proper functioning of AUEis and Cooperatives on irrigation areas, including the provision of guidance on the implementation of statutory texts and operating rules, and equipping members to perform their roles and responsibilities	2.1.3a: Formally established management structures (list of GMPs, cooperatives and AUEis) 2.1.3b: Basic operating statutes of management structures 2.1.3c: Operating rules of AUEis and AHA cooperatives 2.1.3d: Roles and responsibilities of beneficiaries and authorities (group members) defined Fully functioning

			management structures managing irrigation areas
Activity 2.1.4: Establishment of operating contracts with cooperatives and AUEi	To ensure the sustainable operation of the developed irrigation areas, the project will support ONAHA for the signing of operating contracts with cooperatives and AUEi set up through the Activity 2.1.3. Operating contracts should, among other things: (i) set administrative and financial procedures for resource management; (ii) define how plots are operated, how to adapt, mitigate and improve production to be adopted by producers, and how irrigation water is managed sustainably; (iii) define the expected results at the end of each crop year; (iv) define the responsibilities of the different farmers' organizations and those of the project.	2.1.4a: Prepare typical operating contracts for cooperatives and AUEIs 2.1.4b: Sign contracts with each cooperative and AUEi on each project site 2.1.4c: Monitor compliance with the clauses of operating contracts	2.1.4a,b: 20 signed operating contracts for cooperatives and 23 for AUEis
Activity 2.2.1. Support in planning activities at site level	The success of an agricultural campaign depends on its planning. In this way, the project will support cooperatives in planning the activities of the agricultural campaign. This planning: (i) will provide an exhaustive list of all activities involved in irrigation area farming; (ii) will quantify and estimate each of the activities financially; (iii) will establish a timeline for the execution of activities on a campaign. In this planning of activities, the crop calendar is especially important. In view of climate change manifested by delayed rains, pockets of prolonged and unusual droughts, abrupt ending of rainy seasons and heat waves during dry seasons, the project will work with meteorological services to disseminate adapted agro-meteorological information at the producer level. This information will make it possible to adapt the cropping calendar and thus improve yields. This activity is complementary to Activity 3.2.3.	2.2.1a: Improve the dissemination of agro-meteorological information adapted to producers 2.2.1b: Support the development of technical routes that will use adapted agro-meteorological information to update crop calendars, sustainable endogenous practices of fertilization, maintenance, and crop protection. Updates will be made in collaboration with producers (see 2.2.1c) 2.2.1c: Organize exchange meetings on the sites between technical agents and producers. Participatory approaches will be used primarily to identify the climatic risks inherent in each speculation and to determine adequate endogenous adaptation options.	2.2.1a: Agro-meteorological information available to beneficiaries (producers) 2.2.1b,c: Updated crop calendars, and sustainable endogenous practices of fertilization, maintenance, and crop protection
Activity 2.2.2. Support to vulnerable groups in the acquisition of small operating equipment	During the fieldwork, potential beneficiaries identified the lack of small equipment as a major difficulty in the development of irrigation areas. The project will equip beneficiaries with small agricultural equipment (wheelbarrows, rakes, cutters, axes, dabas/hoes, etc.). This support will only take place in the first year of perimeter development.	2.2.2a: Define eligibility criteria for vulnerable groups including women, widows, young people 2.2.2b: Purchase small agricultural equipment and distribution to eligible groups.	2.2.2a,b: Small agricultural equipment distributed to vulnerable groups
Activity 2.2.3. Strengthening agronomic monitoring and agricultural input acquisition mechanisms	Agronomic monitoring is important in obtaining better crop yields. The project will provide support to cooperatives in identifying agricultural input needs at the start of activities. A process of progressive empowerment of these cooperatives in identifying agricultural input needs will be promoted by the project. The project will identify partner services whose collaboration will be necessary (INRAN, Centrale d'Approvisionnement des Intrants et du Matériel Agricoles (CAIMA), Office des Produits Vivriers du Niger (OPVN), Agriculture, Protection des végétaux, etc.). However, to facilitate the availability on irrigated areas of inputs needed for the rapid integration of resilient practices into cropping practices, the project will provide technical and financial support: (i) to micro-projects of production of adapted seeds, production of biopesticides or insect traps; (ii) to set up input shops. The project will provide financial support for the acquisition of inputs by producers during the first crop year.	2.2.3a: Support the identification of agricultural input requirements (resilient seeds, fertilizers and pesticides), monitoring crop changes, periods of application of fertilizers and plant health treatments 2.2.3b: Search for partnerships with input management structures. 2.2.3c: Establish seed committees at each site to promote local development of suitable agricultural inputs adapted in time with the support of the competent state structures. This will guarantee the availability of these inputs on the different project sites. 2.2.3d: Develop and validate an implementation plan for the operation of the seed committees. 2.2.3e: Acquire agricultural inputs for beneficiaries in the first year of site development	2.2.3a: Mechanism for agronomic monitoring and acquisition of agricultural inputs established 2.2.3b: Partnerships developed between producers and national seed management and distribution services 2.2.3c: Seed committees at each site 2.2.3d : Implementation plan for operation of seed committees 2.2.3e: Agricultural inputs distributed to

			beneficiaries
Activity 2.2.4. Promotion of composting and the use of organic fertilizers on irrigated perimeters	To minimize the use of chemical fertilizers that deteriorate the quality of the soil in the medium and long term as well as the shelf life of market garden products, the project aims to promote organic fertilizers. These organic fertilizers have proven to be good restorers, improvers, and conservators of soil fertility in the medium and long term. Organic manure will therefore be promoted on sites developed through a composting incentive mechanism that will provide financial support for the construction of compost pits in the case of pit composting and support for the acquisition of equipment in the case of composting in heaps. The groups will contribute to the promotion of organic manure by bringing in the raw materials (harvest residues, animal droppings) needed for composting. The number of smoke pits and heap composting sites will depend on the size of the site.	2.2.4a: Strengthen producer awareness to promote organic fertilizer development 2.2.4b: Establish smoke pits and compost heaps at each site 2.2.4c: Support the acquisition of raw materials (harvest residues, animal droppings) needed for composting by producers	2.2.4a,b: Smoke pits and compost heaps at each site for organic fertilizer 2.2.4c: Raw materials needed for composting accessible to producers
Activity 2.3.1: Design and implementation of a mechanism for the maintenance of hydraulic infrastructures	Network maintenance is a prerequisite for normal water circulation and optimal irrigation area development. There are two types of maintenance. These are preventive maintenance and curative maintenance. Preventive maintenance takes place before the campaign and, as the name suggests, it consists of maintaining irrigation works and this is done every year. The curative maintenance takes place during the campaign and especially in case of emergency. To do so, the project will define a maintenance mechanism that considers the types of hydraulic infrastructure, the fees to ensure the repair and replacement of the structures once their lifespan is over. The management of fee is an important element in the sustainable use of the irrigation areas and will be determined by consensus with all stakeholders.	2.3.1a: Support the implementation of the outsourced water management system (AUEi, sharpeners, pumpers, water tower, equipment, etc.). 2.3.1b: Design a maintenance plan for hydraulic infrastructures. 2.3.1c: Develop an annual maintenance program for the works, categorizing the nature of the interventions (work that can be done manually at the expense of the cooperatives; work requiring the intervention of machines and qualified personnel) 2.3.1d: Develop a maintenance manual for irrigation networks. 2.3.1e: Determine the amount of the water charge integrating the expenses related to the maintenance of the works, the depreciation of irrigation equipment. 2.3.1f: Assist the Irrigation Water Users Association in setting up accounts with microfinance institutions and agricultural banks to facilitate their water and energy royalties' payment.	2.3.1a : Implementation of outsourced water management system Maintenance plan for hydraulic infrastructure 2.3.1d: Maintenance Manual for irrigation networks 2.3.1f: Accounts in Financial Institutions facilitating the water and energy royalties' payment.
Activity 2.3.2: Design and implementation of a maintenance mechanism for electrical equipment	The project will use solar energy in order to reduce GHG emissions from irrigation activities on AHAs. To ensure the sustainability of the investments, the project will define a mechanism for the maintenance of the electrical water pumping installations. The project will develop and make available to the producers' manuals for the operation of the solar equipment as well as manuals for minor maintenance that can be carried out by the producers. For major maintenance works, the project will contract young technicians trained at the local level and, if the work requires it, national companies. The project will provide support for the integration of the maintenance of solar works into the remit of AUEi	2.3.2a: Develop manuals (in local languages) for the operation of solar equipment as well as manuals for small maintenance to be used by producers. 2.3.2b: Train young local technicians (men and women) on the maintenance and repair of solar equipment, and produce training reports to ensure that competencies, attendance and records of completion/certification are captured. 2.3.2c: Train committees specializing in the management of solar equipment; (iv) determining the amount of the energy charge considering maintenance costs and depreciation of the equipment, and produce training reports to ensure that competencies, attendance, and records of	2.3.2a: Operation and maintenance manuals for solar equipment 2.3.2b: Local technicians trained to maintain and repair solar equipment 2.3.2c: Committees trained to manage solar equipment

		completion/certification are captured.	
Activity 2.3.3: Implementation of a program for close monitoring of the efficiency of the hydraulic and electrical structures.	The project will develop a close and permanent monitoring program of the physical investments made on the sites. The program will include: (i) monitoring networks: protection, irrigation, drainage, and circulation; (ii) monitoring of structures: supply channels, pumping stations, siphons, regulators for mask modules, sockets, etc.; (iii) monitoring of various interventions on the works and equipment installed. This close and permanent monitoring will be ensured by the decentralized services of ONAHA and Agriculture. The latter will benefit from technical and material capacity building activities to carry out this monitoring program.	2.3.3a: Develop a close monitoring program for the operation of hydraulic structures and solar equipment 2.3.3b: Undertake a monitoring mission of the decentralized technical services of ONAHA and the Ministry of Agriculture 2.3.3c: Provide financial support for the project to facilitate missions	2.3.3a: Monitoring program for the operation of hydraulic structures and solar equipment 2.3.3b: Report on missions to monitor the operation of hydraulic structures and solar equipment
Activity 2.4.1. Support for the implementation of business plans drawn up at the level of groups and cooperatives	Knowledge of entrepreneurial tools is necessary to trigger the effective functioning of agricultural cooperative societies. The project will provide, in the first 3 years, support for the development of business plans and the linking of cooperatives with their target customers.	2.4.1a: Organize working and awareness sessions with cooperatives, including the development and dissemination of material on business planning and entrepreneurship. 2.4.1b: Provide support to cooperatives in the development of business plans adapted to each developed site, considering the ventures developed	2.4.1a : Material on business planning and entrepreneurship; and attendance registers 2.4.1b : 23 Business plans for 23 cooperatives
Activity 2.4.2. Support for the development of income-generating activities (IGAs) based on the conservation and processing of agricultural products	As the market garden products promoted under the project are perishable, producers in times of abundance are often confronted with post-harvest losses and consequently a drop in their income because they are limited by the conservation of the products. Drying and processing remain options for adding value to the products. In Niger, traditional drying systems have been improved to preserve products longer, improve their quality and thus provide additional income to producers. In rural areas where there are few opportunities to sell agricultural surpluses at a good price and where transport costs are high, dried products could be a significant source of income and the promotion of solar drying would be an economic development tool for beneficiary groups. Beyond the promotion of the conservation of market garden products, the project aims to support the development of market garden value chains by supporting women's and youth organizations in the promotion of micro-units for processing market garden products. Thus, the project will optimize the use of solar installations on the sites by setting up micro-processing units to consolidate the income of women and youth groups. These micro-units will operate during periods when crops are not irrigated and will create new jobs and increase the income of producers.	2.4.2a: Dissemination of information (material) on drying techniques that are more efficient than traditional drying methods 2.4.2b: Advertise for expressions of interest to benefit from financial and technical support 2.4.2c: Select of women's and youth groups to benefit from financial and technical support for income-generating activities 2.4.2d: Provide support to selected groups for the acquisition of solar dryers 2.4.2e: Install micro-transformer units with the off grid solar energy source installed on the irrigation areas	2.4.2a: Material on efficient drying techniques; and list of names to whom information has been disseminated 2.4.2c: 50 women's and youth groups identified and selected 2.4.2d: Selected women's and youth groups equipped with 50 solar dryers 2.4.2e: 50 Micro-transformer units with off grid solar energy source installed
Activity 2.4.3. Support for warrantage and group sales initiatives	Cereal products (rice, wheat) are marketed at harvest during a period when producers' financial needs are often high (debt repayments, school fees, etc.). However, this period corresponds to that when the presence of many buyers on the market leads to a drop in selling prices. Taking advantage of existing stores next to irrigation areas, the project intends to promote the group sale of cereal products during lean periods when prices are higher, while allowing producers to improve the profitability of operating accounts. To do this, the project will provide support	2.4.3a: Identify sites / villages that can accommodate group sales 2.4.3b: Create infrastructure to facilitate the storage of agricultural products offered for sale	2.4.3a: Grouped sales outlets (sites/villages) defined and known by the producers 2.4.3b: 23 Storage warehouses inf place for agriculture product

	for warrantage and group sales initiatives.		
Activity 3.1.1: Strengthening of knowledge on rainfall trends and temperature variability in the project area for local government officials	Improving agro-meteorological forecasts represents a challenge for building capacity to adapt to the climate, particularly at the local level. Also, it is critical for each locality to know the agro climatic and agro ecological trends so as not to be surprised by the change in climate. Given the limited technical capacity in the project implementation areas, the project will collaborate with the national meteorological services as well as with specialized institutions such as Agrhymet based in Niamey, to strengthen the regular monitoring of climatic characteristics in the project area. As part of the project, this will involve collecting or producing information processed and directly usable by the actors. The project will provide financial support to produce local data.	3.1.1a: Produce yearly climate data and translate data for direct local use 3.1.1b: Produce local agro-climatic maps yearly	3.1.1a,b:Knowledge-sharing reports on rainfall trends and temperature variability trends in the project area and adaptation measures
Activity 3.1.2: Strengthening the technical capacities of local actors and producers for the promotion of agriculture resilient to the adverse effects of climate change	The sustainability of project activities depends on its appropriation, increased participation, transfer of knowledge and skills and strengthening of technical capacities at all levels of intervention, for local extension services which are called upon to provide technical support and advice to producers in the implementation of resilient actions. Adapting agriculture to climate change requires skills and calls on local actors in charge of agriculture and the environment to increase their knowledge in climate-smart agriculture technologies and techniques. Capacity-building sessions for relevant stakeholders in project implementation will be organized. They will focus specifically on the needs of practitioners - while considering the needs of local communities - and will analyze the challenges related to water, soil, and energy in the intervention areas and the dissemination of good agricultural practices that consider adaptation, agricultural productivity and mitigation of GHG emissions.	3.1.2a: Prepare training Terms of Reference (ToR) 3.1.2b: Recruit an expert in climate-smart agriculture to prepare technical tools on climate-smart technologies 3.1.2c: Organize regional capacity building and knowledge sharing workshops for project stakeholders in the use of technical tools on climate smart technologies, including post-workshop assessments to measure gains in capacity/skills	3.1.2b: Technical tools on climate-smart technologies 3.1.2c: Capacity building workshop reports 3.1.2c,d: 300 agents implementing technical tools on climate smart technologies
Activity 3.1.3. Training of stakeholders in the use of tools for monitoring changes in natural resources in the framework of the implementation of environmental and social management plan	The project lays particular emphasis on the sustainable management of natural resources, including water, soil and vegetation, as agricultural inputs. Within the framework of the project, the capacity of local agents of ONAHA, Rural Engineering and Environment services will be strengthened at the level of the project's areas of intervention to optimize the monitoring of changes in the state of natural resources to recommend techniques for their sustainable management. This will make it possible: (i) the production of a reliable database on the impact of the actions carried out on the resilience of the populations to climate change; (ii) the monitoring and analysis of the evolution of water resources through piezometers and the yields of irrigation equipment; and (iii) the production of a reliable database on the impact of the actions carried out on the resilience of the populations to climate change. To ensure a transparent integration of the environment in the implementation of the project, it is necessary to strengthen the technical and institutional capacities of the State services that will be involved in the implementation of the project. These include the deconcentrated services in charge of: (i) hydro-agricultural development; (ii) agriculture; (iii) hydraulics; (iv) environment; (v) plant protection. This training will be conducted by the National Environmental Assessment Office (BNEE) in collaboration with the National Council for the Environment and Sustainable Development (CNEDD), with the support of consultants if	3.1.3a: Prepare training ToR 3.1.3b: Recruit an expert for training 3.1.3c: Organise the training workshop to help technical officers to improve their knowledge and management of rainfall trends and temperature variability in the project area, including post-workshop assessments to measure gains in capacity/skills 3.1.3d: Produce data for case studies, particularly on good practices for adaptation to climate change. 3.1.3e: Preparation of training ToR 3.1.3f: Recruit a specialist in environmental and social safeguard standards from the GCF 3.1.3g: Organise the training workshop for project stakeholders in the use of tools for monitoring changes in natural resources related to the implementation climate smart technologies for buffering the impacts of climate change in the framework of the implementation of the environmental and social management plan, including post-workshop assessments to measure gains in capacity/skills 3.1.3h: Establish an environmental monitoring program with emphasis on continuous	3.1.3c: Technical Service Officer Training Reports 3.1.3d: Case studies of good practices for adaptation to climate change in agriculture 3.1.3g: Project stakeholder training reports 3.1.3h: Implement environmental monitoring programme and produce environmental and social monitoring and follow-up reports

	necessary.	monitoring, supervision, mid-term evaluation and annual evaluation	
Activity 3.1.4: Updating contracts and agreements between the State, ONAHA, cooperatives and irrigation water user's associations (AUEi) to incorporate climate change adaptation and mitigation provisions.	The improvement of the texts in terms of climate change will result in : (i) the integration into the planning and management contract of provisions relating to the technical, financial, operational and management aspects of issues relating to the strengthening of new or rehabilitated AHAs (ii) the integration into the operating contract between ONAHA and the AUEi of the adaptation and mitigation dimensions; (iii) the integration into the operating contract between ONAHA and the cooperatives of the maintenance and sustainable management of techniques, technologies and equipment contributing to the resilience of the AHAs and the improvement of agricultural yields; (iv) the establishment and promotion of the implementation of a collaboration contract between cooperatives and AUEi taking into account resilience to climate change and mitigation of GHG emissions	3.1.4a: Integration into the plan contract and the management contract of the provisions relating to the consideration at the technical, financial, operational and management level of the issues relating to the strengthening of new AHAs or those to be rehabilitated by the introduction of new AHAs: (i) techniques and technologies related to the adaptation of AHAs to the adverse effects of climate change; (ii) off grid solar energy techniques and technologies; (iii) greenhouse gas reduction techniques and technologies. 3.1.4b: Inclusion in the operating contract between ONAHA and the AUEi of: (i) maintenance and sustainable management of the technologies and techniques proposed for strengthening the resilience of the AHAs; (ii) maintenance and sustainable management of solar equipment and other GHG reduction technologies. 3.1.4c: Integration into the operating contract between ONAHA and cooperatives of the maintenance and sustainable management dimension of techniques, technologies and equipment contributing to the resilience of AHAs and to the improvement of agricultural yields. Establishment and promotion of the implementation of a collaboration contract between cooperatives and AUEi considering: (i) maintenance and sustainable management of the technologies and techniques proposed for strengthening the resilience of AHAs; (ii) maintenance and sustainable management of solar equipment and other GHG-reducing technologies.	3.1.4a,b,c: Documents of contracts, agreements, etc. improved in terms of adaptation and mitigation and disseminated to stakeholders
Activity 3.2.1. Training of producers in climate-smart farming practices that can sustainably preserve soil and water resources	The success of crop intensification in an irrigated system is based on the control of varietal performance, rigorous management of irrigation water and soil fertility, efficient management of irrigation areas and mastery of different cultivation techniques. To facilitate the implementation of the actions promoted by the project, training will be organized for the benefit of producers. Manuals/guides of good practices to be adopted in water management, control and monitoring of plants, management of water pumping energy, and crop planning will be developed and made available to producer groups.	3.2.1a: Prepare training guides and sheets/manuals for producers in climate-smart farming practices likely to conserve soil and water resources in a sustainable manner 3.2.1b: Organization and holding of training sessions at each project site by the technical services of the Ministry of Agriculture and ONAHA, including post-training assessments to measure gains in capacity/skills	3.2.1a: Training guides and sheets/manual on climate-smart farming practices for producers 3.2.1b: Producer training report on climate-smart farming techniques
Activity 3.2.2: Strengthening the organizational capacities of operators for local government officials	The success of the project will depend on the organization of the producers. During fieldwork, it was noted that some producers are in groups and others including individually. Difficulties in the functioning of the groups were noted due to the lack of management capacity of the said groups. The project will therefore provide support to the various groups to strengthen their organizational and management capacity for the developed areas. Individual operators will also be organized into groups and will benefit from the technical and organizational support necessary for their proper functioning. Modules on the organization of farmers, the planification of crops, the distribution of water usage in turn, the recovery of expenses, accounting / management, marketing will be given to the various producer groups. This activity is complementary to Activity 2.1.3	3.2.2a: Hold 23 organizational capacity building meetings for beneficiaries, and hold post-training survey to assess capacity gains 3.2.2b: Support the formalization of groups for the 23 cooperatives on the new sites that are not yet formal 3.2.2c: Preparation of operating guides for agricultural groups and cooperatives	3.2.2a: Producers' organizational capacity building reports 3.2.2b: Formalized producers' groups 3.2.2c: Operating guides

Activity 3.2.3: Support for access to agro-meteorological information adapted by producer groups	Access to meteorological and climatic information in real time allows better programming of agricultural activities, enhances agricultural productivity and production. It considerably reduces the risk of loss of agricultural investments due to lack of delay and / or irregular rains. Huge losses recorded on AHAs due to unusual weather events. It is for this reason that the project would like to strengthen producers' access to suitable agro-meteorological information. To eliminate information asymmetry, mobile phone services are becoming an important means of providing farmers' groups and cooperatives with weather forecasts and market data. In each locality, three to five mobile phone numbers (chosen by the beneficiary groups) will be registered and will receive weather information in time. The latter will disseminate the information received to the rest of the members of the group. Their capacities will be strengthened to ensure the flow of information in both directions. The dissemination of weather information through mobile phones will still be reinforced by radio broadcasts in local languages. The implementation of this activity calls for collaboration between meteorological services, the National Office for Solar Energy (ONERSOL), which has now become the National Center for Solar Energy (CNES), AGRHYMET and the Development Department. The project will also set up an early warning system to alert community members, using a computer system, of disasters (floods, severe droughts, locust invasions, etc.).	3.2.3a: Acquire and install a direct-reading rain gauge kit, thermometer, and anemometric recorder in each beneficiary village. 3.2.3b: Collect local weather information, and process and disseminate it using ICTs in a language understandable to producers. 3.2.3c: Establish, in each village, a committee composed of at least 5 people (from different groups of producers) to ensure the relay of weather information to the rest of the producers. 3.2.3d: Develop and validate an implementation plan for the operation of the committees. 3.2.3e: Establish an early warning system through a contract with the institution in charge of agroclimatic information production for treatment and analysis of data collect on site	3.2.3a: Weather stations installed in each village 3.2.3b: Agro-meteorological information adapted to the needs of producers for planning production activities 3.2.3c,d: Weather information dissemination committees in each village 3.2.3e: Service contract for the dissemination of agrometeorological information to producers through TI 3.2.3e: Early warning system providing agroclimatic information to local producers
Activity 3.3.1: Building the capacity of the private financial sector, farmers groups, associations, and cooperatives to promote and scale innovative financing for climate smart agriculture	This activity will be conducted to facilitate the setting up of an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the "Agricultural Loan Facility"). This activity is take into account: The sub Activity 3.3.1.1 will complete the sub activity 3.3.1.3. through a training workshop for the establishment of an incentive environment for more massive climate-smart agriculture funding proposed for the benefit of Niger's private Financial sector, farmers groups, Irrigation Water Users Associations and Cooperatives. Sub Activity 3.3.1.2 will be an Technical Assistance to cooperatives for the formalities of opening bank accounts with financial institutions in order to promote smart agriculture through private financing. This will facilitate their financial relation with the Financial Institutions for for the loans that will be granted to them. With the sub Activity 3.3.1.3, and prior to the disbursement of funds for Output 3.3 of the Funded Activity, the accredited entity shall finalize and submit to the Fund an additional report, in a form and substance satisfactory to the GCF Secretariat containing an in-depth market and design study that : - assesses the financial viability of the Agricultural Loan Facility, including consideration of likely default rates ; and - proposes a design for the Facility that can maximize potential both to crowd in private	Sub Activity 3.3.1.1: Niger's private financial sector, farmers groups, Irrigation Water Users Associations and Cooperatives training workshop for the establishment of an incentive environment for more massive climate-smart agriculture funding. Sub Activity 3.3.1.2: Assistance to cooperatives for the formalities of opening bank accounts with financial institutions to promote smart agriculture through private financing. Sub Activity 3.3.1.3 Technical Assistance to build operational and institutional capacities of Financial Institutions involved in the agriculture loan facility execution	3.1.1.1: 10 bank executives, 10 Microfinance Institutions Staff, 30 Representatives of the 10 Irrigation Water Users Associations organized by agriculture groups, 20 Representatives of the 10 Cooperatives organized with Irrigation Water Users Associations, 2 representatives of the Green Climate Fund National Authority, 2 representatives of the Ministry in charge of Banking Institutions, 2 representatives of the Directorate in charge of Microfinance Institutions, 2 Heads of the AHA-AIC Project Management Unit, 2 members of AHA-AIC Executing Entity (ONAHA) trained in a workshop to set up an incentive environment for a more massive

	finance and to help vulnerable farming communities adapt to climate change. If the market study confirms the potential for the loan facility, then prior to the disbursement of funds for Output 3.3 of the Funded Activity, the AE should provide, in form and substance satisfactory to the Secretariat: - a detailed technical assistance programme targeting both lenders and borrowers to ensure successful implementation of the loan component.		financing of farmers in the context of climate-smart agriculture 3.3.1.2: Assistance fund of 20 000 Euros set up for cooperatives for the formalities of opening bank accounts or with microfinance 3.3.1.3 : The report of the Market and design study available
Activity 3.3.2: Set up an attractive on-lending mechanism for climate smart agriculture through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the "Agricultural Loan Facility")	From a general observation, and despite the existence of a bank specialized in the agricultural sector, Niger's private financial system does not provide an innovative and sufficient offer that responds effectively to the needs of the national agricultural sector. The available fund does not allow access to mid and long-term credit to fund equipment or structure finance to meet the sector's supply or value chain needs. However, agriculture contributes more than 35% of GDP and employs almost 85% of Niger's working population. As of 31 January 2020, BAGRI's total outstanding loans, all terms included, amounted to 81 million USD, of which 13 million USD were in favour of agriculture, i.e. 17% of the total portfolio, while the estimated costs of the Agricultural Value Chain Development of the Strategic Programme for the period 2016-2020 was more than 268 million USD. From 2021 to 2025, the estimated annual financial requirements for priority resilience, water management and sustainable land management programmes are $520 million. The Government and international public financing can't cover these needs. Therefore it is vital to set up an attractive on-lending mechanism with private financial institutions on the characteristics of smart, climate-resilient, and clean energy-based agricultural value chains through local financial institutions in the form of an agricultural loan facility with funding from GCF, which could be scaled up at a later stage, in the context of other projects, with the support regional or international development financial institutions (the "Agricultural Loan Facility"). *For this objective, the GCF will provide 5.89 million Euros to allow BOAD to put in place the Agricultural Loan Facility".*	3.3.2a: Implement the subsidized refinancing mechanism in favor of Niger's financial sector will enable private Banks and microfinance institutions to access affordable financial resources to fund the beneficiaries on the AHAs to be rehabilitated, by granting microcredits to the beneficiaries (agricultural cooperatives and groups, Associations of irrigation water users, women and youth groups, etc.) to finance the replication of the AHA-AIC project, in particular: - climate-resilient techniques on the irrigation areas; - total water control by a Californian or drip system and a clean energy system; - the integrated system of outsourced water and energy management; - technical routes adapted to the major climatic risks of the irrigation areas for sustainable agricultural production.	3.2.2a: Records indicating the granting of microcredit to beneficiaries, indicating the establishment and functioning of the subsidized refinancing/on-lending mechanism with local financial institution; and 1 report on capacity building for the sustainable funding of climate-smart agriculture for at least 454 people, including: i) 55 bank executives, ii)80 microfinance institutions executives, iii)150 Cooperatives and agricultural Groups Managers, iv)159 regional administrative and agriculture leaders
Activity 3.4.1: Control and supervision of works	The technical control of the construction of the hydraulic works and the installation of the solar equipment will be carried out by a consulting engineering firm which will be recruited for this purpose. It can be the engineering office that has carried out the studies. As for the supervision of the works, it is ensured by the General Directorate of Rural Engineering (DGGR) and its branches with the support of other structures of the Ministry of Agriculture or any other Ministry concerned by the project. To this end, the project will provide the General Directorate of Rural Engineering	3.4.1a: Prepare the ToRs for the recruitment of an engineering firm for the supervision of construction works and the installation of electrical equipment. 3.4.1b: Recruitment of a firm for the supervision of construction works and installation of electrical equipment. 3.4.1c: Support the conduction of supervision missions by the DGGR.	3.4.1c: Work control reports 3.4.1c: Site Development Supervision Reports

	with adequate means through the Project Management Unit.		
Activity 3.4.2: Monitoring of the Project	According to Niger's NDC, the monitoring-evaluation and capitalization mechanism will be based, among others, on the definition of corrective measures for climatic, environmental, economic and social safeguards, the monitoring of risks and the evolution of vulnerability to climate change at the national level as well as the capitalization of experiences and lessons learned. To this end, a monitoring and evaluation (M&E) system for project activities will be put in place to assess progress through the results achieved in relation to the objectives set. This will help identify strengths and weaknesses in order to make informed decisions on time. Monitoring will focus on the implementation of project activities and will be based on measuring progress at each critical stage of the process. The project will introduce a gender-disaggregated data collection and reporting system for each project component, through gender mainstreaming in climate smart agriculture. The M&E system will, in fact, be designed to measure the rate of implementation in relation to the planned objectives and targets, as reflected in the Annual Work Programs and Budget (AWPB). It will monitor: (i) the rate of execution of project activities; (ii) the evolution of the financial data of the project; ii) regular and systematic recording and reporting of progress made against the planned project objectives through the establishment of a database; and (iii) evaluation of the impact of project activities on the target group and the environment. Monitoring and evaluation activities will follow the policies and guidelines in force of the Green Climate Fund as well as those of BOAD. The progress of the project will be checked through field visits, reviews and programming meetings with field actors; weekly points, semi-annual and annual reviews at the project team level; annual evaluations, mid-term evaluation, independent final evaluation. The quantitative indicators will be approved by the stakeholders at the start of the project during the review of the logical framework considering the intervention sites. As mentioned above, a mid-term review and a final evaluation are planned to assess the changes observed at the start. The M&E system will support decision making for the adoption of resilience actions or activities for further projects. It will facilitate learning, replicating, and upgrading the results and lessons learned from the project	3.4.2a: Implement a Project Monitoring and Evaluation System in accordance with the requirements of GCF and BOAD to monitor: (i) the rate of execution of project activities; (ii) the evolution of the financial data of the project; (ii) regular and systematic recording and reporting of progress made against the planned project objectives through the establishment of a database; and (iii) evaluation of the impact of project activities on the target group and the environment; (iv) gender-disaggregated data collection and reporting system for each project component3.4.2b: Develop participatory tools to measure project performance. 3.4.2c: Conduct beneficiary surveys to measure the effects/impacts (beginning, mid-term and completion). 3.4.2d: Recruit a consultant in gender mainstreaming for supporting the executive entity 3.4.2e: Conduct an annual analysis/evaluation of the technical, economic and financial performance of the project. 3.4.2f: Undertake mid-term evaluation. 3.4.2g: Undertake final evaluation.	3.4.2a: Monitoring and evaluation reports through field visits, reviews and programming meetings with field actors; weekly points, semi-annual and annual reviews at the project team level; annual evaluations, mid-term evaluation, independent final evaluation 3.4.2b: Use of participatory tools to measure project performance 3.4.2c: Beneficiary survey reports (baseline, mid-term and completion) 3.4.2d: Gender disaggregated data and reports 3.4.2e: Annual reports on technical, economic and financial performance of the project 3.4.2f: Mid-term evaluation report 3.4.2g: Final evaluation report
Activities 3.5.1: Capitalization of results and compilation of lessons learned from the project	The project monitoring and evaluation system will make a significant contribution to the management of technology performance and traceability of operations that have made it possible to achieve results and to make decisions useful for action. In this perspective, the results (outputs, outcomes and impacts) will be: (i) capitalized and archived electronically and physically to strengthen the documentation of lessons learned. The compiled lessons learned will be processed and will be the subject of the preparation of user manuals adapted to the various actors intervening in the agricultural sector, particularly the hydro-agricultural development sub-sector. To allow a better assimilation and implementation of the lessons learned by farmers, farmers' groups and cooperatives the manuals will be translated into graphic images and into the official local language of Niger.	3.5.1a: Organise exchanges with beneficiaries to appreciate the lessons learned on a practical level by producers 3.5.1b: Support exchanges with the technical services involved in the project	3.5.1a: Lessons Learned Documents 3.5.1b: Exchange reports

Activity 3.5.2. Development of technical and manual sheets for the operator	This will involve the production and dissemination of documents and documentaries on lessons learned and best practices tested under the project in terms of on actions to strengthen resilience to the adverse effects of climate change, increase productivity and production and mitigation of GHG emissions in the agriculture sector. To this end, the project will develop several technical sheets on the technologies and practices implemented by the project. These sheets will be designed at the end of the third year of the project and disseminated in the fourth year of the project.	3.5.2a: Development of: (i) a fact sheet on the drip irrigation system; (ii) a fact sheet on the Californian system; (iii) a fact sheet on the system of water pumping with off grid solar energy and the maintenance of solar equipment; (iv) a fact sheet on the sustainable management of hydro-agricultural development soils and the use of agricultural inputs; (v) a fact sheet on the optimal profitability of irrigation project activities with modern techniques.	3.5.2a: Climate smart agriculture fact sheets (including best practices and lessons learned implemented under the project) for the producers
Activity 3.5.3: Knowledge sharing and dissemination of good practices for a climate resilient agricultural sector in Niger.	This activity aims to share knowledge and disseminate good practices for a climate resilient agricultural sector in Niger in with Representatives of: the 25 Cooperatives and agriculture groups (Men, women, youth) ; local decentralized Authorities, local agriculture and environment offices ; Private Banks and Microfinance Institutions executives of Niger; Niger's international technical and financial partners ; National Authority of the Green Climate Fund ; Commissioner to the 3N (les Nigériens Nourissent les Nigériens) Initiative ; Project management Unit and Executing agency ; Ministries in charge of agriculture, plan, and finance; Directorate in charge of Microfinance Institutions, National Debt, agriculture investment, Rural Engineering ; National Office of Environmental Assessments.	3.5.3.a Consultant's hiring for the technical documents preparation and presentation for the workshops, the facilitation of the worshop on sustainable agriculture funding by private financial; 3.5.3.b Organization of workshop for the benefit of stakeholders able to share Knowledge and disseminate good practices to adopt climate resilient agricultural in Niger	3.5.3: stakeholders have acquired Knowledge and good practices for a climate resilient agricultural sector in Niger, for the project scaling up.

F. RISK ASSESSMENT AND MANAGEMENT

F.1. Risk factors and mitigations measures (max. 3 pages)

Selected Risk Factor 1		
Category	Probability	Impact
Forex	Medium	Medium
Description		
Currency exchange rate fluctuation		
Mitigation Measure(s)		
All currency coming from GCF will be expressed in Euro. All currency coming from BOAD will be expressed in FCFA. The FX risk is largely mitigated as the F CFA is pegged to the EURO, which is a natural hedge.		

Selected Risk Factor 2		
Category	Probability	Impact
Credit	Medium	Medium
Description		
BOAD will put in place an agricultural loan facility to lend to local financial institutions. GCF will bear the credit risk of the local financial institutions.		
Mitigation Measure(s)		
The risk is partly mitigated as the financial institutions will be selected based BOAD's solid assessment criteria, among others including: solid financial standing, sound governance and management, credit underwriting standards, and compliance with the central bank etc.		

Selected Risk Factor 3		
Category	Probability	Impact
Governance	Medium	Low
Description		
Deteriorating security conditions in the Project area.		
Mitigation Measure(s)		
Cooperate with regional and communal security services and set up an alert system in case of terrorist attack. Implement a participatory approach involving producers. Give priority to local methods of conflict management based on best practices.		

Selected Risk Factor 4		
Category	Probability	Impact

Governance	Low	Low
Description		
Acts of vandalism and theft of solar panels, electric pumps, etc.		
Mitigation Measure(s)		
An agreement will be signed with the groups to ensure continuous monitoring of the installed equipment. The solar panels, the electric pumps, the Californian will have to bear the mark " Owned by Niger/ONAHA" with an identification number. If possible, the supplier must integrate into the equipment, particularly the solar panels and electric pumps, a geo-referenced warning system connected to the cooperatives' mobile phones. Stolen equipment can thus be found thanks to the installation of a system of connected objects that can be tracked using the GPS tracker. This technology has proven itself in the monitoring of large construction sites in the construction sector.		
Selected Risk Factor 5		
Category	Probability	Impact
Governance	Low	Low
Description		
Lack of support from local administrative authorities (town hall and regional councils)		
Mitigation Measure(s)		
Obtain the firm support of local administrative authorities by involving them from the project design phase through meetings and public consultation workshops in each selected region, department, and commune.		
Selected Risk Factor 6		
Category	Probability	Impact
Governance	Low	Low
Description		
Non securing lands for AHAs development		
Mitigation Measure(s)		
Dispositions are in place for AHA's land Governance, land voluntarily entrusted by a landowner, land acquisition for AHAs development, land secure, registration, and distribution, land tenure security activities in the perimeters, land management, land tenure conflict management on AHAs: Litigation and dispute resolution, favorable conditions to be adopted with the AHA-AIC project approach in communes that are currently excluded from it because of "land problems", land documents archiving, land audit, etc. and monitoring-evaluation, etc. *See annex 29 of Funding proposal: Land securing methodology for AHA-AIC development and it replication*		
Selected Risk Factor 7		
Category	Probability	Impact
Technical and operational	Low	Medium
Description		
The techniques promoted by the project remain confined to the first beneficiary regions		
Mitigation Measure(s)		
Disseminate lessons learned and focus on replication and scaling up through incentive private financial mechanism		
Selected Risk Factor 8		
Category	Probability	Impact
Technical and operational	Low	Low
Description		
Poor quality of off grid solar energy equipment and/or unsuitable for sufficient water pumping		
Mitigation Measure(s)		
Drilling equipped with solar pumps' Contract awardees must be required to provide sufficient Bank guarantee to enable the project to ensure that: (i) the solar energy equipment's and pumps are excellent quality one in the biophysical context of the Niger; (ii) the required quantity of water on each 5ha parcel are reached and supplies water regularly throughout the year. The quality and efficiency of solar equipment and pumps must be controlled by the National Solar Energy Centre (CNES); The quality and efficiency of solar equipment and pumps must be certified by Certified international experts experienced in the technical control of standardized solar equipment adapted to the context of the project area in Niger.		
Selected Risk Factor 9		
Category	Probability	Impact
Technical and operational	Low	Low
Description		
Risk of misuse and poor maintenance of equipment		

Mitigation Measure(s)		
Train artisans at the national and local level for the installation and repair of equipment		
Selected Risk Factor 10		
Category	Probability	Impact
Technical and operational	Low	Low
Description		
Fear of innovation manifested by farmers' groups and cooperatives' reluctance to apply knowledge and practices on climate change adaptation		
Mitigation Measure(s)		
Organize ongoing awareness sessions on the merits of climate change adaptation measures. Organize visits to successful achievements in other regions.		
Selected Risk Factor 11		
Category	Probability	Impact
Technical and operational	Low	Medium
Description		
Insufficient mastery of the technologies promoted by the project with consequences on the yields and production		
Mitigation Measure(s)		
Plan training and advisory support for the beneficiaries to enable them to assimilate as soon as possible the operation of the project equipment by the beneficiaries		
Selected Risk Factor 12		
Category	Probability	Impact
Technical and operational	Low	Low
Description		
Over the life of the project, new facets of climate disturbance emerge		
Mitigation Measure(s)		
Train the various actors (technical support services and producers) to gradually adapt the means of control to the various manifestations of the new facets of climate disturbances		

Selected Risk Factor 13		
Category	Probability	Impact
ML/FT	Medium	Medium
Description		
The risks of non-compliance with BOAD Financial Security Policy and procedures to combat illicit financial flows, money laundering and terrorist financing.		
Mitigation Measure(s): BOAD will conduct an assessment and a thorough ML/FT Due Diligence as part of the prevention and fight against money laundering on any beneficiaries and counterparties before the start of the Project financing activities. This is a standard practice and policy as part of our project approval process. In accordance with BOAD's Financial Security Policy and procedures relative to AML/FT, this due diligence will take in account: (i) an assessment of the risks and vulnerabilities of money laundering (ML), terrorist financing (TF), prohibited practices (PP) and integrity issues in the project, activities and counterparties; (ii) the level of detail undertaken for the said assessment, appraisal, evaluation, consideration; (iii) a summary of any risks and vulnerabilities identified; (iv) an indication of severity for those risks and vulnerabilities; and (v) mitigation strategies proposed to avoid and control those risks and vulnerabilities. BOAD has a solid risk management framework to combat money laundering (ML), terrorist financing (TF), prohibited practices (PP) and corruption issues. The BOAD's sovereign lending portfolio in Niger alone is about USD 568 million and the Bank has successfully managed ML/FT risks in the country. Similarly, BOAD's lending portfolio to financial institutions within the UEMOA region is about USD 1.3 Billion; which is well managed with stringent screening on ML/FT risks. This provides further comfort on BOAD's ability to manage ML/FT risks in Niger based on its extensive lending experience and the robustness of its ML/FT risk management framework.		

GCF POLICIES AND STANDARDS

G.1. Environmental and social risk assessment (max. 750 words, approximately 1.5 pages)

Provide the environmental and social risk category assigned to the proposal as a result of screening and the rationale for assigning such category. Present also the environmental and social assessment and management instruments developed

for the proposal (for example, ESIA, ESMP, ESMF, ESMS, environmental and social audits, etc.). Provide a summary of the main outcomes of these instruments. Present the key environmental and social risks and impacts and the measures on how the project/programme will avoid, minimize and mitigate negative impacts at each stage (e.g. preparation, implementation and operation), in accordance with GCF's ESS standards. If the proposed project or programme involves investments through financial intermediations, describe the due diligence and management plans by the Executing Entities (EEs) and the oversight and supervision arrangements. Describe the capacity of the EEs to implement the ESMP and ESMF and arrangements for compliance monitoring, supervision and reporting. Include a description of the project/programme-level grievance redress mechanism, a summary of the extent of multi-stakeholder consultations undertaken for the project/programme, the plan of the Accredited Entity (AE) and EEs to continue to engage the stakeholders throughout project implementation, and the manner and timing of disclosure of the applicable safeguards reports following the requirements of the GCF Information Disclosure Policy and Environmental and Social Policy. Describe any potential impacts on indigenous peoples and the measures to address these impacts including the development of an Indigenous Peoples Plan and the process for meaningful consultation leading to free, prior and informed consent, pursuant to the GCF Indigenous Peoples Policy. Attach the appropriate assessment and management instruments or other applicable studies, depending on the environmental and social risk category as annex 6.

By referring to the performance standards of the Green Climate Fund and to the environmental and social safeguard standards of BOAD, the performance standards triggered are: ESS1: Assessment and management of environmental and social risks and impacts, ESS2: Labor and working conditions, ESS3 : Rational use of resources and pollution prevention, ESS4: Community health, safety and security, ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, and ESS8 :Cultural heritage. Considering these performance standards, the project activities will not have significant irreversible negative impacts. Moreover, these negative impacts can be mitigated by the implementation of appropriate mitigation measures. The project does not affect forest resources or indigenous people. It is not developed in areas of litigation, in areas sensitive to land issues or in nature reserves. Nor does it require involuntary resettlement of populations. **Thus, the project is classified in category B.**

The environmental and social assessment and management instruments developed for the proposal are:

- Environmental and Social Management Framework (ESMF)
- Integrated Pest and Pesticide Management Plan (IPPMP)
- Public consultation

The main outcomes of these instruments are: i) an Environmental and Social Management Plan Framework (ESMPF) including an environmental and social procedure of the project (Chapter 6), an Environmental and social monitoring Program (Chapter 7) and Public consultation (Chapter 9) and ii) an Integrated Pest and pesticide management action plan. The project has been issued an environmental and social compliance certificate (see Annex 27: EMSF compliance agreement AHA-AIC Niger) by the National office of Environmental Assessment (BNEE) upon a national validation workshop.

Some of the main environmental and social risks and impacts as well as the mitigation measures are presented in the table below.

Triggered Performance Standards	**Potential impacts / risks**	**Avoidance / Mitigation Measures**
PREPARATION / CONSTRUCTION PHASE		
ESS1.Assessment and management of environmental and social risks and impacts	Risk of non-compliance with performance standards	Comply with the measures recommended by the sub-project ESIAs.
ESS3. Rational use of resources and pollution prevention	Surface and groundwater pollution	- Awareness raising among company staff and workers on the risks of chemical pollution of surface water. - Rigorous control of the liquid waste of the building site as well as at the base of the building site as well as at the level of the irrigation areas in development. - Equipment of the site base-vies with a place of rest for the personnel - Collection and tightly wrapping of chemically contaminated materials and rags and hand them over to specialized institutions for treatment and disposal.
ESS4.Community Health, Safety and Security	Damage to the health and safety of workers and the population	- To make workers aware of the risks of accidents linked to the non-observance of safety instructions and their activities. - Equip all workers with personal protective equipment (boots, gloves, nose mask, helmet, etc.). - Equip the construction site basements with a first-aid unit equipped with basic necessities. - To sensitize the staff, workers and the population on the risks of contamination by sexually transmitted infections (STIs) and HIV-AIDS.

		- Raise awareness among the population and drivers of lorries and machinery about the risks of accidents when driving through built-up areas.
ESS6.Biodiversity conservation and sustainable management of living natural resources	Disturbance, destruction of wildlife habitat and poaching	-Mark out the work rights-of-way and avoid any unnecessary overflow, especially when opening new access roads to the sites. -Prohibit raiding and poaching practices by staff and workers
ESS8.Cultural Heritage	Unintentional destruction of archaeological remains	Stop the work and put in place devices to secure the remains discovered and inform the competent authorities of the appropriate measures to be taken.
OPERATING PHASE		
ESS3.Rational use of resources and pollution prevention	Soil Salinization	- Periodically monitor salt concentration levels in irrigation water - Ensure that drainage systems are in good condition and working order. - Soil leaching (remediation) after harvesting
	Lack of effective water management mechanisms	- Set up Irrigation Water Users Association for sustainable water using management - Operating contract between ONAHA and Irrigation Water Users Association for sustainable water using management - Establish, on each site, a periodic maintenance system for water collection and distribution installations and equipment - Replace, as soon as possible, defective, damaged or dilapidated installations and equipment - Locally train, among the beneficiaries of the project, young technicians capable of urgently carrying out certain small jobs such as closing a valve and replacing a broken pipe letting water flow, etc.
ESS6.Biodiversity conservation and sustainable management of living natural resources	Proliferation of invasive plants and pests	- Regular weeding of the fields. - Cut and pull out unwanted seedlings - Development of an integrated pest and pesticide management plan - Use chemical or biological control in consultation with the specialized services of the Ministry of Agriculture (plant protection).

There is currently within ONAHA, an Environmental Unit directly attached to the General Management and led by an agricultural engineer specializing in the environment and a captain of Water and Forests. This unit will be reinforced in human, material and financial resources, within the framework of the implementation of the ESMF/ESMP. The main institutions involved in the implementation of the ESMF are as follows.

- The Project Management Unit (PMU): It will coordinate the implementation of the ESMF and act as an interface with other stakeholders. It will coordinate capacity building and training of agricultural agents and producers and other technical structures involved in the implementation of the ESMF. The PMU will recruit two Experts in Environmental and Social Safeguards (ESES/GRN and ESS/G) who will ensure the coordination of local monitoring of environmental and social aspects for the work and interface with other actors. These experts will coordinate the preparation and local monitoring of the implementation, in relation with the municipalities and the technical services concerned (environment, agriculture, forestry, hydraulics, etc.). These experts do not have any autonomy in environmental and social terms. They will have to work in close collaboration with the BNEE.
- The BNEE: It will ensure the environmental and social monitoring (compliance control of works and environmental and social protection standards) and implementation of the ESMF and support capacity building of agents in the field. At the local level, the BNEE will be supported by the DEESE housed in the DREDD. The monitoring carried out by the BNEE will in fact be a contradictory verification based on the monitoring and follow-up reports. The project will provide institutional support to the NEEB in this monitoring under the framework of a Memorandum of Understanding. The BNEE will forward a copy of its reports to WADB for action

BOAD has established a grievance mechanism through its Grievance Policy and Procedures Manual which is an independent mechanism through which individuals who have been harmed because of a project funded or implemented by BOAD can file a complaint. The grievance mechanism, which is available to stakeholders, is part of the Environmental, Social and Economic potential for scaling up to deal with non-compliance and grievance issues arising from projects implemented by BOAD. This manual defines the complaint resolution mechanism in the implementation of any project funded or implemented by BOAD. It is intended to establish an effective dialogue between those affected by the projects they finance and all interested parties to resolve the problem(s) giving rise to an application, without seeking to attribute responsibility or fault to any of these parties.

At BOAD level, the grievance mechanism is coordinated and managed by the Compliance and Regulatory Division (CRD). Affected communities and other stakeholders who will be affected by the project may submit complaints to the BOAD, the implementing entity of this proposal, by mail, email, fax or telephone. The full address is given below:

Banque Ouest Africaine de Développement 62 av. de la Libération, BP 1172 Lomé, Togo Tel : +228 22 21 59 06 Fax : +228 22 21 52 67 E-Mail : boadsiege@boad.org Web : www.boad.org	Complaints can also be lodged with the GCF secretariat.: Songdo Business District 175 Art center-daero Yeonsu-gu, Incheon 22004 Republic of Korea +82.32.458.6059(KST) info@gcfund.org

The procedures on how to submit a complaint are available on the BOAD website (www.boad.org) or directly at https://www.boad.org/en/policies-procedures-guidelines/ (under "COMPLIANCE AND GRIEVANCE DOCUMENTS"). If the DCR finds that a complaint is admissible, it will assemble a team of internal and/or external experts to investigate the case and propose options for the complainant to consider. The grievance redress mechanism to be made available for the reporting of complaints and allegations of impropriety, wrong-doing or other related issues in the project and its activities includes a whistle-blower protection programme. Please see page of the FP.

Public consultations were organized at two levels: (i) the consultation of technical services at central and regional levels with the designated National Authority of the Green Climate Fund, the Ministry (the Directorates of Agriculture, Livestock, Land tenure, Investment, Irrigation, ONAHA, etc.), the National Environmental Assessment Office, the Ministry of Environment (Directorates of Hydrology, ESIA), the Ministry in charge of the plan, the ministry of finance, the ministry of energy, Directorate in charge of Microfinance Institutions, National Agriculture Bank (BAGRI), etc. (ii) the consultation of beneficiary communities at local level: Local consultations took place in 25 villages, 22 communes and 15 departments across the regions of Maradi, Tahoua, Agadez, Zinder and Diffa. Regional Governors, Representatives of the Departments, Representatives of Municipalities, agriculture cooperatives and groups, breeders' groups, land owners, of (Maradi, Diffa, Zinder, Tahoua, Agadez), Regional, departmental and communal offices of Agriculture, Livestock, Land tenure, Investment, Irrigation, ONAHA, Environment, Hydrology, ESIA, energy, etc. have been consulted.

The plan of the Accredited Entity (AE) and EEs to continue to engage the stakeholders throughout project implementation The manner and timing of disclosure of the applicable safeguards reports following the requirements of the GCF Information Disclosure Policy and Environmental and Social Policy.

G.2. Gender assessment and action plan (max. 500 words, approximately 1 page)

Provide a summary of the gender assessment and project/programme-level gender action plan that is aligned with the objectives of GCF's Gender Policy. Confirm a gender assessment and action plan exists describing the process used to develop both documents. Provide information on the key findings (who is vulnerable and why) and key recommendations (how to address the vulnerability identified) of the gender assessment. Indicate if stakeholder consultations have taken place and describe the key inputs integrated into the action plan, including: how addressing the vulnerability will ensure equal participation and benefits from funds investment; key gender-related results to be expected from the project/programme with targets; implementation arrangements that the AE has put in place to ensure activities are implemented and expected outcomes will be achieved, monitored and evaluated. Provide the full gender assessment and project-level gender action plan as annex 8.

This project will be carried out in areas where there are no indigenous peoples.

In accordance with the GCF's gender policy, a gender analysis was conducted.

The country has 50.3% women and 49.7% men. In 2012, life expectancy at birth was 63.5 years nationally, 64.4 years for women and 62.8 years for men. In 2015, the participation rate of women in the labor market was 40.2% compared to 89.4% for men. Only 35% of women have access to land by inheritance. The ratio of primary school enrolment to women rose from 73% in 2006 to 84% in 2012, and progress in secondary school enrolment (female-to-male ratio of 66.8% in 2016) and higher education (gender-to-male ratio of 34.3% in 2017) is more moderate. Women's national gross income (NGI) is estimated at $481 per person per year, representing 37% of men's NGI, estimated at $1292. Poverty affects 63% of the population and disproportionately women (3 out of 4 poor are women in 2006). In 2012, 40% of women aged 15 to 64 were economically active (compared to 90% of men). The proportion of households headed by women and food security is 41.7% compared to 58.8% for male-headed households.

Overall, gender analysis shows that women and young people are more vulnerable than men, particularly in terms of access to land, credit, care, education, etc. These inequalities persist despite the significant efforts of the Nigerien government and state in the legal field, including the establishment of a gender ministry, the implementation of national gender policy and the adoption of Women's Day on 13 May. The weight of cultural and religious traditions and the low level of schooling of girls/women explain much of these genders. The Gender Action Plan (GAP) recommends involving at least 50% of women and young people in all project activities.

Public consultations were held in the various areas of the project and involved all stakeholders, especially women, young

people, and men (see ESMF public consultation report). The issues raised during the exchanges were considered in the analysis of gender and the development of the action plan. They focused on: (i) the fear of a minority grabbing of the project; (ii) the method of land transfer; (iii) the criteria for making the developed plots available. These actors have proposed, among other things: (i) improving accessibility to selected sites for women and young people; (iii) the choice of youth and women's delegates considering the respective villages to ensure transparency and prevent conflicts; (iii) fair representation of young people and women in farmers' groups and cooperatives that will be strengthened; (iv) equitable access to producer training on techniques for the development of crop routes. These proposals by the actors have helped to identify the actions of the gender action plan developed (see Appendix 8) to ensure equal benefits in the distribution of project investments

The objective of the gender action plan is to enhance men and women's equal participation in the project through the improvement and diversification of the livelihoods of 121 615 people (including 50% women and girls) in rural communities currently dependent on rain-fed agriculture in 5 regions of Niger. Many actions are planned in the gender action plan (Please see Annex 8 Gender assessment and Gender action Plan) for Women, girls and young men under the results : R1 : The capacities of vulnerable groups including women in terms of gender mainstreaming in the project are strengthened; R2: The technical and organizational capacities of vulnerable actors including 50% of women are strengthened; R3: Women and men have equal access to decision-making bodies; R4 : Women and men have equal access to agricultural and climate-resilient technologies; R5 : Ensure gender equity in the development of stakeholders' financial capacities for the promotion of climate-resilient agricultural practices ; R6 : A functional relevant and gender sensitive monitoring and evaluation system for the achievement of indicators and disaggregated data according to the gender of the project is set up; R7: The capitalization, good and best gender experiences and practices of the project are disseminated. These main expected Results with Gender Mainstreaming will be achieved with the Indicators, Baseline, Target, Timeframe, Responsibilities, and Budget planned in the Gender action plan. Doing so, the women, men youth will be concretely involved in the sustainable adaptation to climate and GHG emission mitigation on the hydro agriculture area in Niger.

The gender action plan is provided for institutions/entities responsible for tracking the achievement of gender indicators. The annual monitoring and evaluation of the PMU will establish progress in gender consideration and will, if necessary, propose recommendations for continuous improvement of the system. The project also includes a mid-term and final assessment to assess the degree to which the indicators are met.

The implementation of these actions will be monitored by the PMU and the accredited entity (BOAD) in accordance with its gender policy.

G.3. Financial management and procurement (max. 500 words, approximately 1 page)

Describe the project/programme's financial management including the financial monitoring systems, financial accounting, auditing, and disbursement structure and methods. Refer to section B.4 on implementation arrangements as necessary.

Articulate any procurement issues that may require attention, e.g. procurement implementation arrangements and the role of the AE under the respective proposal, articulation of procurement risk assessment undertaken and how that will be managed by the AE or the implementing agency. Provide a detailed procurement plan as annex 10.

Financial management and procurement under this project will be guided by BOAD's relevant rules and regulations, as well as relevant provisions in the Accreditation Master Agreement (AMA) signed by BOAD and the GCF as part of BOAD's accreditation to the GCF. The provision of the grant proceeds will flow from GCF to the AE based on the agreed payment schedule, subsequently to the funded activities based on the Procurement Plan.

The provision of BOAD loan will be made to the Government of Niger and subject to a reimbursement plan to be agreed. BOAD will carry out financial transfers in accordance with its own policies, procedures and rules for which it has been accredited for.

Goods, and services funded with GCF and BOAD Loan will be acquired by either:
- limited consultation after expression of interest for sub-components - international call for tenders for the components - open consultation on a WAEMU scale of specialized design offices for the realization of the sub-components - national call for tenders.

PROCUREMENT

To ensure that financing is applied in ways that adequately secure BOAD's mandate while maximizing development effectiveness, the Bank encourages and promotes sound, fair, transparent and well performing procurement systems.

BOAD's Guidelines for procurement of consultancy services funded by a loan or advance of funds (2016); and Guidelines for the award of works contracts, goods and services (other than consultancy services) (2016) will be applied in the project's procurement.

BOAD will conduct an analysis of the procurement files and give its no objection. AML/FT Due Diligence as part of the prevention and fight against money laundering, BOAD has developed a Financial Security Policy and procedures (2016) (Please see BOAD's documents : « Politique de sécurité financière de la BOAD applicable à la prévention et la lutte contre le blanchiment de capitaux et le financement du terrorisme » ; https://www.boad.org/wp-content/uploads/2017/02/politique_de_securite_financiere_de_la_boad.pdf and « Manuel de procédures applicable à la prévention et à la lutte contre le blanchiment de capitaux et le financement du terrorisme » https://www.boad.org/wp-content/uploads/2017/02/manuel_de_procedures_de_securite_financiere_boad.pdf). This internal document constitutes the general framework of the control system covering all of BOAD's activities relating to the prevention, surveillance and management of money laundering and terrorist financing risks.

BOAD's Financial Security Policy is inspired by the international standards defined by the United Nations through its specialized structures, the Organization for Economic Cooperation and Development (OECD) whose recommendations are issued by the International Financial Action Group (FATF) and provisions of Directive 02/2015 / CM / UEMOA of 02 July 2015 on the fight against money laundering and terrorist financing in the Member States of the West African Economic and Monetary Union. ("WAEMU Directive").

The policy requires to disclose information about its clients' transactions to the relevant authorities in cases where international rules and local law require regulated financial institutions to do so, including cases of money laundering.
Under its due diligence, the Bank will assess civil / criminal and regulatory antecedents and sanctions lists. BOAD also conducts administrative investigations into corruption, fraud, coercion, collisions, and inconvenient practices, and make use of the relevant national authorities for the necessary criminal investigations.

BOAD integrates measures to combat illegal financial flows, the fight against money laundering and terrorist financing in the internal operations of the Bank Group. In the context of this project, concerning ALM/FT, the concerned stakeholder will: - ensure that the funds financing the Project are not of illicit origin and in particular are not related to fraud against Niger's financial interests, corruption, organized criminal activities, terrorism or drug trafficking; and - forward to the Bank without delay any information raising suspicions as to the unlawfulness of the sums invested in the company and in the Project; - notify the Bank without delay if it has known at any time of any information indicating the illicit origin of all or part of the funds of the structure; - not enter into a business relationship, directly or indirectly, with persons or entities on the lists established by the United Nations Security Council or its committees pursuant to Security Council resolutions, by the Council of the European Union in application of its Common Positions and / or by the African Union as well as on any other relative or complementary resolution and any act of implementation thereof in connection with the fight against the Laundering of Capital and the financing of terrorism.

The control procedure at Bank level is related to the justification of each resource disbursed. Indeed as soon as there is a first disbursement as all the resource disbursed is not justified cent by cent through validated accounting documents, no other disbursement is possible. The objective is to verify that the money disbursed is used for authorized purposes. The AE does not have any intentions to distribute or disburse to beneficiaries, either directly or indirectly, cash, vouchers, commodities or other items of value.

AUDIT

Audits will be undertaken in accordance with BOAD Guidelines for Financial Reporting and Auditing of Projects on annual basis. An independent external auditor will be recruited based on Terms of Reference acceptable to BOAD (not later than four months after effectiveness) for the entire duration of the project. The Financial Statements will be audited in accordance with international auditing standards. The local financial institutions relevant to the project will also be audited by a qualified, internationally recognized auditing firm.

BOAD has all the right to provide observations, comments, and recommendations for improvements in accounting records, systems, controls, and compliance with financial covenants in the Financial Agreements. The cost of the audit will be met from project resources. BOAD will ensure KYC standard-compliant due diligence process including anti-money laundering.

G.4. Disclosure of funding proposal

Note: The Information Disclosure Policy (IDP) provides that the GCF will apply a presumption in favour of disclosure for all information and documents relating to the GCF and its funding activities. Under the IDP, project and programme

funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Information provided in confidence is one of the exceptions, but this exception should not be applied broadly to an entire document if the document contains specific, segregable portions that can be disclosed without prejudice or harm.
Indicate below whether or not the funding proposal includes confidential information.

☒ No confidential information: The accredited entity confirms that the funding proposal, including its annexes, may be disclosed in full by the GCF, as no information is being provided in confidence.

☐ With confidential information: The accredited entity declares that the funding proposal, including its annexes, may not be disclosed in full by the GCF, as certain information is being provided in confidence. Accordingly, the accredited entity is providing to the Secretariat the following two copies of the funding proposal, including all annexes:

- full copy for internal use of the GCF in which the confidential portions are marked accordingly, together with an explanatory note regarding the said portions and the corresponding reason for confidentiality under the accredited entity's disclosure policy, and
- redacted copy for disclosure on the GCF website.

The funding proposal can only be processed upon receipt of the two copies above, if containing confidential information.

G. ANNEXES

H.1. Mandatory annexes

☒	Annex 1	NDA no-objection letter(s) **(template provided)**
☒	Annex 2	Feasibility study - and a market study, if applicable
☒	Annex 3	Economic and/or financial analyses in spreadsheet format
☒	Annex 3-B	Financial_and_Economic 50HA Model_Cooperativ-02-06-2021
☒	Annex 3-C	Financial_analysis_5HA MODEL 02-06-2021
☒	Annex 4	Detailed budget plan **(template provided)**
☒	Annex 5	Implementation timetable including key project/programme milestones **(template provided)**
☒	Annex 6	E&S document corresponding to the E&S category B **(ESS disclosure form provided)** ☐ Environmental and Social Impact Assessment (ESIA) or ☒ Environmental and Social Management Framework (ESMF) or ☐ Environmental and Social Management System (ESMS) ☐ Others (please specify – e.g. Resettlement Action Plan, Resettlement Policy Framework, Indigenous People's Plan, Land Acquisition Plan, etc.)
☒	Annex 7	Summary of consultations and stakeholder engagement plan
☒	Annex 8	Gender assessment and project/programme-level action plan **(template provided)**
☒	Annex 9	Legal due diligence (regulation, taxation and insurance)
☒	Annex 10	Procurement plan **(template provided)**
☒	Annex 11	Monitoring and evaluation plan **(template provided)**
☒	Annex 12	AE fee request **(template provided)**
☒	Annex 13	Co-financing commitment letter, if applicable **(template provided)**
☒	Annex 14	Term sheet including a detailed disbursement schedule and, if applicable, repayment schedule

H.2. Other annexes as applicable

☐	Annex 15	Evidence of internal approval **(template provided)**
☒	Annex 16	Map(s) indicating the location of proposed interventions
☐	Annex 17	Multi-country project/programme information **(template provided)**
☐	Annex 18	Appraisal, due diligence, or evaluation report for proposals based on up-scaling or replicating a pilot project
☐	Annex 19	Procedures for controlling procurement by third parties or executing entities undertaking projects funded by the entity
☐	Annex 20	First level AML/CFT (KYC) assessment
☒	Annex 21	Technical_dimensioning_manual_for_operations_AHA-AIC_Niger
☒	Annex 22 A	GHG Calculation Methodology
☒	Annex 22 B	Project GHG emission Calculation
☒	**Annex x**	**Other references**
☒	Annex 23	Terms of reference for Project Management Unit members
☒	Annex 24	Organizational Framework of ONAHA and its Stakeholder Relationships in AHA Management
☒	Annex 25	Implementation of the project work by ONAHA: Legal foundations
☒	Annex 26	Specific contract for works execution of hydro-agricultural development with smart agriculture practices resilient to climate change in Niger (AHA-AIC Project) by Hydro-Agricultural Developments National Office (ONAHA)
☒	Annex 26 B1	Detail budget_ Activities_to_be_implemented_by_ONAHA_oct 2020
☒	Annex 27	EMSF_compliance agreement
☒	ANNEX 28	Analysis of the Pressure of Irrigation Water Withdrawals from the Hydro-agricultural Development Project with Climate Smart Agriculture Practices on Groundwater Resources in Niger
☒	ANNEX 29	Land securing methodology for AHA-AIC development and it replication
☒	Annex 30	The approach to be implemented for efficient project management
☒	Annex 31	Integrated Pest and pesticide management Plan
☒	Annex 32	Project beneficiaries