
Innovative approach to protect ouadis through the promotion of non connected mini-grid solar energy in 3 municipalities (Mao, Kekedena and Nokou) of Kanem region-Chad

Part I: Project Information

GEF ID

10998

Project Type

FSP

Type of Trust Fund

GET

CBIT/NGI

CBIT No

NGI No

Project Title

Innovative approach to protect ouadis through the promotion of non connected mini-grid solar energy in 3 municipalities (Mao, Kekedena and Nokou) of Kanem region-Chad

Countries

Chad

Agency(ies)

UNEP

Other Executing Partner(s)

Executing Partner Type

Ministry of Environment, Fisheries and Sustainable Development, National Agency of
Domestic Energy and Environment, the National Great Green Wall Agency, NGO- Government
Baga-sola

GEF Focal Area

Multi Focal Area

Taxonomy

Focal Areas, Influencing models, Stakeholders, Gender Equality, Strengthen institutional capacity and decision-making, Transform policy and regulatory environments, Demonstrate innovative approaches, Convene multi-stakeholder alliances, Deploy innovative financial instruments, Climate Change, Climate Change Mitigation, Renewable Energy, Agriculture, Forestry, and Other Land Use, Land Degradation, Land Degradation Neutrality, Land Productivity, Land Cover and Land cover change, Sustainable Land Management, Improved Soil and Water Management Techniques, Income Generating Activities, Sustainable Livelihoods, Integrated and Cross-sectoral approach, Restoration and Rehabilitation of Degraded Lands, Community-Based Natural Resource Management, Food Security, Private Sector, Large corporations, Individuals/Entrepreneurs, Type of Engagement, Partnership, Consultation, Participation, Information Dissemination, Beneficiaries, Civil Society, Academia, Non-Governmental Organization, Community Based Organization, Communications, Awareness Raising, Education, Public Campaigns, Local Communities, Gender Mainstreaming, Sex-disaggregated indicators, Women groups, Gender-sensitive indicators, Gender results areas, Participation and leadership, Access to benefits and services, Capacity Development, Knowledge Generation and Exchange, Access and control over natural resources, Integrated Programs, Food Systems, Land Use and Restoration, Smallholder Farming, Sustainable Food Systems, Commodity Supply Chains, Smallholder Farmers, Capacity, Knowledge and Research, Targeted Research, Innovation, Knowledge Generation, Training, Workshop, Seminar, Learning, Indicators to measure change, Adaptive management, Theory of change, Knowledge Exchange, Field Visit, Conference

Sector

Renewable Energy

Rio Markers

Climate Change Mitigation

Climate Change Mitigation 2

Climate Change Adaptation

Climate Change Adaptation 0

Duration

48 In Months

Agency Fee(\$)

280,681.00

Submission Date

4/13/2022

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
LD-1-4	GET	1,645,370.00	11,000,000.00
CCM-1-1	GET	1,309,164.00	10,500,000.00
	Total Project Cost (\$)	2,954,534.00	21,500,000.00

B. Indicative Project description summary

Project Objective

To protect the integrity and productivity of Ouadis ecosystems and ameliorate access to renewable energy through the use of the benefits of Solar Pumping systems in 3 Municipalities of the Kanem region of Chad

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
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<p>Component 1: Promotion of gender sensitive best SLM practices to protect Ouadis ecosystems</p>	<p>Technical Assistance</p>	<p>1.1: Adequate knowledge of the land degradation dynamic in Ouadis ecosystems provide basis for the choice of appropriate technologies which generate multiple benefits for both women and men</p> <ul style="list-style-type: none"> - 1 report of Ouadis characterisation - A peer -reviewed article on Oadis ecosystems - A package of good SLM practices applicable to Ouadis restoration/protection - 1 pilot Ouadis identified for restoration using good SLM practices in each of the 3 Kanem Municipalities - 3 Land Use Plans developed and implemented for selected pilot Ouadis 	<p>1.1.1. A gender-sensitive comprehensive and documented land degradation dynamic and appropriate good restoration practices in Ouadis ecosystems in 3 Municipalities of Kanem Region and a peer-reviewed article elaborated and published in well known scientific journals;</p> <p>1.1.2. Gender sensitive Land use plans of 3 pilot Ouadis are developed and implemented using good SLM practices and solar water pumping system;</p> <p>1.1.3. 3 Ouadis are restored with the use of at least 5 good gender-sensitive SLM practices (mechanical control of sand dune, biological sand dunes fixation; drip irrigation technics, mulching; herbaceous seeding) and full participation of 1500 female and 1500 men belonging to cooperatives through local NGOs under the leadership of the decentralized offices of the department of environment</p>	<p>GET</p>	<p>1,183,775.00</p>	<p>7,000,000.00</p>
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<p>Component 2: Investment to support local communities (men and women) access to solar energy for irrigation and economic benefits</p>	<p>Investment</p>	<p>2.1: Investment on high capacity solar water pumps provide water for both women and men production systems which integrate good SLM practices and access to solar energy for multiple benefits</p> <ul style="list-style-type: none"> - Initial investment from GEF TF to construct boreholes in 3 pilot site, install a set of Solar panels, install Photo-voltaic Batteries for power accumulation, installation of small irrigation scheme - Women and men Local communities cooperative legally created and capacited for management of infrastructure and community resources - Gender sensitive Power purchase agreements negotiated 	<p>2.1.1. Solar water pumps infrastructures to benefit both women and men (boreholes, Solar panels, Batteries, network of irrigation tapes) are established in 3 pilot Ouadis in 3 Municipalities of Kanem;</p> <p>Societe Nationale d'Electricite</p>	<p>GET</p>	<p>830,069.00</p>	<p>8,000,000.00</p>
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<p>Component 2: Investment to support local communities (men and women) access to solar energy for irrigation and economic benefits</p>	<p>Technical Assistance</p>	<p>2.1: Investment on high capacity solar water pumps provide water for both women and men production systems which integrate good SLM practices and access to solar energy for multiple benefits</p> <p>Indicators:</p> <ul style="list-style-type: none"> - Initial investment from GEF TF to construct boreholes in 3 pilot site, install a set of Solar panels, install Photo-voltaic Batteries for power accumulation, installation of small irrigation scheme - Women and men Local communities cooperative legally created and capacity for management of infrastructure and community resources - Gender-sensitive Power purchase agreements negotiated 	<p>2.1.2. Women and local communities cooperatives are structured and capacitated to manage the Solar Water pumps infrastructures</p> <p>2.1.3. Gender sensitive Power purchase agreements are negotiated and agreed upon between the cooperatives and the Societe Nationale d'Electricite (SNE)</p>	<p>GET</p>	<p>100,000.00</p>	<p>2,000,000.00</p>
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<p>Component 3. Establishment of long-term gender sensitive Knowledge management and monitoring system of Ouadis ecosystem</p>	<p>Technical Assistance</p>	<p>3.1. Chad and Kanem region men and women actors including those involved in ouadis, natural resources management and energy sector are actively engaged and exposed to the potential good SLM practices for Ouadis restoration including involving solar energy</p> <ul style="list-style-type: none"> - Gender sensitive Policy brief produced and disseminated on regular basis - Gender sensitive guidelines for the use of solar power for irrigation produced - Website on Ouadis restoration created and gender sensitive knowledge produced produced and disseminated - A set of gender sensitive indicators for monitoring Ouadis ecosystems 	<p>3.1.1. Gender-sensitive policy brief to promote the use of good SLM practices and Solar water pumps developed and disseminated;</p> <p>3.1.2. Gender-sensitive guideline for upscaling the use of Solar water pumps for Ouadis restoration and Solar power mini-grid are developed and disseminated</p> <p>3.1.3. Gender-sensitive communication and knowledge products are generated by the project uploaded in a dedicated Portal on the project host website and disseminated at local, national and regional levels through different channels;</p> <p>3.1.4. Gender disaggregated Indicators for monitoring the impact of SLM practices and use of Solar pumps to restore Ouadis ecosystems and generate energy for mini-Grid are developed and necessary data for monitoring are regularly collected through a long term monitoring system;</p> <p>3.1.5. Project is adequately monitored through a well gender-sensitive established monitoring and evaluation system</p>	<p>GET</p>	<p>700,000.00</p>	<p>3,449,000.00</p>
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	Sub Total (\$)	2,813,844.00	20,449,000.00
Project Management Cost (PMC)			
	GET	140,690.00	1,051,000.00
	Sub Total(\$)	140,690.00	1,051,000.00
	Total Project Cost(\$)	2,954,534.00	21,500,000.00

Please provide justification

C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Recipient Country Government	Ministry of Environment of Environment, Fisheries and Sustainable Development	In-kind	Recurrent expenditures	500,000.00
Recipient Country Government	National Agency for Domestic Energy and Environment	Grant	Investment mobilized	500,000.00
Private Sector	SNE: Societe Nationale d'Electricitee	Grant	Investment mobilized	7,000,000.00
Recipient Country Government	Special Fund for the Environment (FSE)	Grant	Investment mobilized	1,000,000.00
Recipient Country Government	National Agency of the Great Green Wall	Grant	Investment mobilized	3,500,000.00
Donor Agency	WB/The Sahel Women's Empowerment and Demographic Dividend (SWEDD) Project	Grant	Investment mobilized	2,000,000.00
Donor Agency	European Union The Project: 'Development of drinking water supply, sanitation and pastoral hydraulic works in the Kanem region" (2021-2024)	Grant	Investment mobilized	2,000,000.00
GEF Agency	IFAD/GCF Project: The Joint Programme for the Sahel in Response to the Challenges of COVID-19, Conflict and Climate Change - SD3C	Grant	Investment mobilized	5,000,000.00
Total Project Cost(\$)				21,500,000.00

Describe how any "Investment Mobilized" was identified

While updated information will be provided at CEO endorsement following final discussions conclusions, the investments mobilized are mainly from special Government institutions institution with specific financing mandate for specific sectors or from the Government and its partners/donors projects which are operating in the project areas. Preliminary discussions were made in particularly by the GEF operational Focal Point and the National Agency for Domestic Energy and Environment, which is the executing partner of the project. These institutions and investment mobilized include: i) \$500,000 from National Agency for Domestic Energy and Environment: it receives its funding from Government and other partners and create enabling condition of deployment of renewable energy

at rural level. Its investment is mobilized through the municipalities in support of the local development plans; ii) \$7 million from SNE: Societe Nationale d'Electricitee: this Compagny is a Government owned institution with autonomous management and under the new Letter of Energy policy it has planned resources mobilization to investment including on the Solar renewable energy in rural area. The discussion were conducted with the National Agency for Domestic Energy and Environment to put in the company priority areas municipalities of the project site; iii) Special Fund for the Environment (FSE): this is a fund which generates resources from taxes and fees collected on earmarked business operations and which are channeled to the national treasury which in turn chellels it to the operation planned by the Ministry in charge of Environment to support activities including those related to the restauration of Ouadis landscape. The Ministry committed to make effort to support project planned activities on Ouadis with funds from FSE; iv) \$3,5 million from the National Agency of the Great Green Wall: Following the One Plannet Summit the GGW initiative received commitments from donors to support countries to implement their national GGW objectives. The project sites are included in Chad GGW areas and the National Agency, following meetings, committed to pull resources to support the Ouadis restoration activities and renewable solar energy deployment at local level as it is already doing in some municipalities; v)\$2 million from WB/The Sahel Women's Empowerment and Demographic Dividend (SWEDD) Project: the National Agency for Domestic Energy and Environment is partnering with this WB project to support women led activities in the project site. The related investment will support this under development GEF project; vi) \$2 million from European Union The Project: 'Development of drinking water supply, sanitation and pastoral hydraulic works in the Kanem region" (2021-2024): the National Agency for Domestic Energy and Environment is partnering with this project in the GEF project areas and will include in its planning for their partnership with EU funded project activities in the areas;vii) \$5 million IFAD/GCF Project: The Joint Programme for the Sahel in Response to the Challenges of COVID-19, Conflict and Climate Change - SD3C. The project is operation in the GEF underdevelopment project areas and this IFAD led project will invest in the areas which will support the GEF project baseline activities.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNEP	GET	Chad	Land Degradation	LD STAR Allocation	1,645,370	156,310	1,801,680.00
UNEP	GET	Chad	Climate Change	CC STAR Allocation	1,309,164	124,371	1,433,535.00
Total GEF Resources(\$)					2,954,534.00	280,681.00	3,235,215.00

E. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount (\$)

100,000

PPG Agency Fee (\$)

9,500

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNEP	GET	Chad	Land Degradation	LD STAR Allocation	56,000	5,320	61,320.00
UNEP	GET	Chad	Climate Change	CC STAR Allocation	44,000	4,180	48,180.00
Total Project Costs(\$)					100,000.00	9,500.00	109,500.00

Please provide justification

PPG development costs are consistent with Country project development conditions and requirements.

Core Indicators

Indicator 3 Area of land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
1500.00	0.00	0.00	0.00

Indicator 3.1 Area of degraded agricultural land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.2 Area of Forest and Forest Land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 3.3 Area of natural grass and shrublands restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
1,500.00			

Indicator 3.4 Area of wetlands (incl. estuaries, mangroves) restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4 Area of landscapes under improved practices (hectares; excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
1200.00	0.00	0.00	0.00

Indicator 4.1 Area of landscapes under improved management to benefit biodiversity (hectares, qualitative assessment, non-certified)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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Indicator 4.2 Area of landscapes that meets national or international third party certification that incorporates biodiversity considerations (hectares)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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Type/Name of Third Party Certification

Indicator 4.3 Area of landscapes under sustainable land management in production systems

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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1,200.00			
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Indicator 4.4 Area of High Conservation Value Forest (HCVF) loss avoided

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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Documents (Please upload document(s) that justifies the HCVF)

Title	Submitted
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Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
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Expected metric tons of CO ₂ e (direct)	1264322	0	0	0
Expected metric tons of CO ₂ e (indirect)	0	0	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
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Expected metric tons of CO ₂ e (direct)				
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Expected metric tons of CO ₂ e (indirect)
Anticipated start year of accounting
Duration of accounting

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)	1,264,322			
Expected metric tons of CO ₂ e (indirect)				
Anticipated start year of accounting	2024			
Duration of accounting	20			

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)

**Target Energy Saved
(MJ)**

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
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Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	1,500			
Male	1,500			
Total	3000	0	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Part II. Project Justification

1a. Project Description

1) The global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)

Chad is a large landlocked Sahelian country of over 16 million inhabitants which covers an area of 1,284,000 km² and is bordered to the north by Libya, to the east by Sudan, to the south by the Central African Republic and to the west by Cameroon, Niger and Nigeria. It encompasses 3 distinct geographic zones: the Sahara Desert in the north, the arid Sahelian region in the center of the country, and the relatively fertile Sudanese belt in the south. The Sahara desert covers almost half of the country but is home to less than 5 percent of the population; the Sahel accounts for 28 percent of the country's land area and 33 percent of its population; and though the Sudanese belt covers only 25 percent of the country's land area, 63 percent of the total population is concentrated there. The combination of rainfall and groundwater broadly defines livelihood zones, from pastoral nomadism and transhumant herding to agro-pastoralism and agricultural cultivation. Chad's population is young, and average life expectancy is about 51 years. Chad is also swiftly urbanizing, and the city population is projected to reach 27 percent of the total population by 2030. Five percent of Chad's population is constituted of refugees and internally displaced persons who have fled regional and domestic conflicts.

Food insecurity is a serious concern which is likely to be exacerbated by climate change. It is estimated that 1.4 million people (that is 1 out of 10) Chadians are chronically food-insecure. There are no recent data on poverty, but it is expected to have risen as a result of the pandemic, which disproportionately affected the most vulnerable. In the latest data, from 2018, 42.3% of the population was in poverty, of whom 49.7% were in rural areas, and is engaged in subsistence farming and herding activities for both households food security and income, with limited access to services and markets, for women farmers in particular. Chad ranks 140 out of 144 countries in the Global Gender Gap Index. It ranked 187 out of 189 countries in the 2020 human development index with an HDI value of 0.398, thus being one of the poorest and most deprived countries in the world.

The country is endowed with natural resources, as well as renewable and non-renewable energy resources, the exploitation of which help bring in foreign direct investments into the country. Although Chad has had relatively few COVID-19 cases, its economy has been hurt by the global consequences of the pandemic. In 2020 real GDP contracted by 0.6%, compared with growth of 3% in 2019 and 2.4% in 2018. The recession is mainly the result of a temporary suspension of oil production, the main engine of the economy, and the closure of borders to contain the pandemic, which caused a slowdown in trade. Growth is projected to reach 5% in 2022, driven by a resumption of industrial activities—particularly in cotton ginning, oil production, and the textile industry. But, despite this prospect, Chad faces enormous challenges to human development and service delivery, especially in rural areas. Nonetheless, as set out in its "Vision 2030, The Chad we want", it is committed for an emerging country with a middle-income economy, generated by diverse and sustainable growth sources and value adding activities.

Some project related Development Challenges and Key Constraints to Poverty Reduction Identified in the Systematic Country Diagnostic

Development Challenges	Key Constraints
Weak and inequitable management of public resources	<ul style="list-style-type: none"> • Insufficient budget stability • Lack of community-driven development strategies or capacity to implement projects and settle disputes • Insufficient use of clean energy for heating and cooking
Low productivity in the agricultural sector	<ul style="list-style-type: none"> • Insufficient use of techniques for sustainable management of natural resources (land, water) for crops and livestock • Lack of organization and integration of poor farmers around market-based clusters in value chains • Lack of agricultural insurance mechanisms
Women's empowerment	<ul style="list-style-type: none"> • Women's weak land tenure • Women's insufficient time for economic activities

Sources: IMF 2011, 2013, 2015, 2016, and 2019.

Land Degradation context: According to the Land Degradation Neutrality Chad National report, degraded areas have been estimated at 428,000 km², or 33.43 per cent of the total area (Chad, 2015). Open forests declined by 29 per cent between 1975 and 2013, a loss of 4,700 km² (CILSS, 2016). Agricultural expansion is largely responsible for the decline in vegetation cover between 1975 and 2013, with an average rate of expansion of five per cent. At the country level, cultivated areas increased by 190 per cent between 1975 and 2013 (CILSS, 2016). The reduction of the area of Lake Chad from 25,000 km² to 2,500 km² between 1963 and 2008 has had a negative impact on the quality of life of communities, biodiversity, and heightened the risks of migration and conflict. Priority targets to achieve LDN include: (i) Restoration of four per cent of 4,326,860 ha of degraded forests through actions of protection, the fight against

bush fires and control of transhumance for an investment of USD 16,995.79 million; ii) Fight against water and wind erosion on less than one per cent of 827,975 ha of degraded wetlands with an investment of USD 14.72 million; iii) Restoration of 44 per cent of 65,778,170 ha of barren land and other degraded lands through reforestation, agroforestry, water erosion control and transhumance control with an investment of USD 4,156.67 million (Chad, 2015).

Access to scarce natural resources has generated fierce competition and conflict in Chad. Successive and prolonged periods of drought have caused livestock production to shift from the north into sedentary farming areas of the south, causing conflict between the groups. Herders heading south early in the year damage unharvested crops, and trample newly-seeded land at the beginning of the rainy season as they return north. Farmers with bore-wells risk being overrun by livestock. The groups fight for control of wild plantations of gum arabic, which herders have traditionally used for generations and local sedentary groups have recently discovered are valuable (World Bank 2003; ADF 2004; AUC 2008).

Climate Hazards and Climate Change context:

Chad is characterized by land degradation and erratic climate conditions. The climate is generally hot and dry. Temperatures have continuously increased in Chad since the beginning of the 1980s, and different climate scenarios show an increase in the average annual temperature of 0.8 ° C in South, 1.2 ° C in the Center and 1.3 ° C in the North by 2020 compared to 1981-2010. With regards to precipitation, different models show a variation of average annual rainfall of -15 to + 9 mm per month (-28 to + 29%) by 2090. Moreover, Chad's NDC highlights that the country is affected by more intense and prolonged droughts, which are accelerating the extension of Saharan and Sahelian deserted zones, that have spread 150 km South over the last ten years. This phenomenon is also greatly contributing to the shrinking of the country's largest lake, Lake Chad, which has reduced in size from 25,000 km² in 1960 to less than 2,500 km² today. Increased desertification in Chad, a country categorized as extremely vulnerable to climate change, is causing reduced farming and pasture areas, decrease of soil fertility leading to high crops losses, food insecurity, malnutrition, livestock producers and farmers migration, resulting in an increase of existing inequality and discrimination amongst certain populations. It is hypothesized that recent declines in agricultural production (2000-2001, 2004-2005, 2009-2010) are due to the increasingly intense droughts. In fact, rise in temperatures associated with increased variability of rainfall causes malfunctions of agricultural seasons, disturbances in crop life cycles and deterioration of agricultural production. It is estimated that the agricultural sector in the country will suffer the greatest losses compared to the rest of the world, losing between 2% and 4% of its GDP (Mendelsohn et al., 2000, Boko et al., 2007).

With regards to climate change mitigation, the sector contributing the most to emissions generation is the forestry and land use representing 57.94% of total emissions in Chad. It is followed by the agriculture sector (because of slash-and-burn agriculture, bush fires and overgrazing) with 41.05%. Without sustainable mitigation measures, GHG emissions would double within 15 years (NDC 2015), with the sectors projected to be the drivers of this phenomenon being agriculture / livestock, land-use and forestry and energy. Even if GHG emissions in Chad are relatively low compared to those generated in developed countries, there is significant emission reduction potential from agriculture, land use and forestry and energy sectors.

Under its NDC, Chad reaffirms its determination to contribute to the global effort to reduce GHG emissions and reinforce its resilience to climate change, implementing coherent programmes which will enable it to become an emerging country by 2030, while favouring low-carbon development. Chad's NDC proposes increasing the renewable electricity supply from 0 to 750GWh/year by 2030. To achieve this, Government-identified priorities which include developing renewable energies for the agriculture and pastoral sectors; interconnection of the Chad–Cameroon power grids to supply Chad with hydrogenerated energy; developing wind energy; a cross-country power grid (between adjacent cities) and a national transmission line; and the use of butane gas and promotion of efficient domestic energy (Republic of Chad, 2015). Chad is ranked 207th emitter out of 210 countries worldwide and appears to be one of the countries that sequester more GHGs than it emits. The sector "Land use and land use change and forests" emits the most with 57.94% of total emissions. It is followed by the agriculture sector (slash-and-burn agriculture, bush fires and overgrazing) with 41.05%. Regarding the Energy and Waste sectors, emissions represent only 1% of total GHG emissions (Second National Communication of Chad, 2012). It is predicted that without sustainable mitigation measures, GHG emissions would double within 15 years (INDC, 2015). Sectors projected to be the drivers of this doubling of emissions include energy, agriculture / animal husbandry, land use and forestry, and waste, among others. A combination of mitigation and sequestration options would reduce GHG emissions by around 30% and increase sequestration capacities by around 40% compared to the "business as usual" scenario. A combination of mitigation and sequestration options would result in an emission reduction in the range of 18.20% to 71% depending on the scenario. The largest challenge to overcome is the move, between now and 2030, from a development model based on oil revenue, to a model based on a more diversified economy with sustainable utilisation of resources and an energy transition.

Chad with its renewables resources (water, forestry, land, etc.) is rich in potential power-generation capacity, including geothermal, biomass, wind and solar energy resources, which vary depending on the bioclimatic zone (solar from 4.5 to 6.5 kWh / m² / day and over the entire territory, wind power from 4 to 7 m / s in the North, and biomass in the South).

Solar Energy context: According to the solar radiation map of Africa produced by the **Photovoltaic Geographical Information System (PVGIS) web site** which provides free and open access to Maps, by country or region, of solar resource and PV potential, Chad enjoys remarkable sunshine throughout its territory. Solar radiation received daily is of the order of 6 kWh / m² on a horizontal surface. The number of hours of sunshine per year varies from 2,850 hours in the South to 3,750 hours in the North. However, as the rest of the continent, the country remains largely poor in energy supply and consumption. The energy deficit is worse in rural and semi urban communities. Per capita electricity consumption is one of the lowest in the world and tariffs are among the highest. Chad electricity access rate is respectively 6.4% at the national level, 20% in urban areas and 0.6% in rural areas. The average annual electricity consumption per capita in Chad is estimated at 47 kWh, while that of Central Africa is 109 kWh / pc. For comparison purposes, other African countries South of the Sahara annual electricity consumption is 525 kWh / pc, while globally it is 3.031 kWh / pc. This reality constitutes a huge constraint for its socioeconomic and cultural development. Chad's energy consumption mix is dominated by thermal. Renewable resources, primarily in the form of hydroelectricity, only contributed 8 percent. Chad's electric grid is limited to N'Djamena and suffers frequent outages. Power generation remains highly localized. The National Electricity Company SNE lacks technical and human capacity to meet growing demand because of aging infrastructure and lack of financing. This energy situation shows that if the country follows an energy strategy based on conventional fuel sources, it could lead to significant increases in the country's GHG emissions. Therefore, it is important to use the country's renewable energy resources instead of fossil fuels. This is particularly the case in rural electrification schemes, where locally available renewable energy resources can be tapped into. Mini-grid solutions have thus been targeted to provide electrification in rural areas as one of the ways to help achieve universal electrification by 2030. Chad has published its INDC targets, which include activities to improve environmental management through tree planting and pursuing a low carbon development pathway to reduce greenhouse gas emissions and contribute to addressing climate change. The proposed activities are all targeted on moving away from an oil-based economy to one based on more sustainable models of renewable

energy. The government approved a National Electricity Emergency Plan in July 2020 that sets out plans for mini-grids in 102 smaller cities across the country. It also set the objective, by 2030 to achieve (i) an electricity access rate of 53% nationwide; for (ii) a rural access rate to electricity at 20% and (iii) a 20% share of renewable energies in production national electricity starting from a current situation capped at, 6.4%, 0.6% and 1% respectively.

Chad has enormous potential in terms of investment opportunities in the sector of renewable energies (solar, wind, biomass). A company called Solaire Sahel for the of a manufacturing photovoltaic system among others to solve the problem of electrification especially in the provinces and rural areas. The company has started production of Solar Panels in the country and the region .It should be noted that an unlimited amount of glass sand is available, which is the main material for the manufacture of solar panels. In addition, Chad records, in the north, from 2850 to 3750 hours of sunshine per year with an overall intensity of radiation from 4.5 to 6.5 kWh/m² per day. Chad is also one of the Sahelian countries where the use of wind energy is less difficult. Indeed, the average speed of calm winds varies from 2.5 m / s to 5m / s from south to north.

The current economic growth path set out at 6.1% in 2021 and 5% in 2022 while realistic is a carbon-intensive one. Greenhouse gas (GHG) emissions would continue to increase, if the current economic activities are to continue at its present rate as described in Phase 1 below of the Energy Access Plan where all projects of the National Electricity Emergency Plan are all thermal project. It is expected that the GHG emissions of Chad are expected to rise from 18 million tCO₂eq to 28 million tCO₂eq between 2020 and 2030 in the business as usual scenario. Adopting a low emissions path will be achieved by various means, including increasing its renewable electricity supply from 0 to 750 GWh/year in 15 years from the 2015 baseline.

Current renewable energy projects include: i) The World Bank \$295 million grant from the International Development Association (IDA)* to help Chad expand its access to energy. The Chad Energy Access Scale Up Project (PAAET) approved in May 2022. and it aims to increase access to electricity and clean cooking solutions via expansion of the main power grid and mini-grids, standalone solar systems, deployment of improved stoves, and natural resource management; ii) the Djermaya Solar : Located 30km north of the country's capital, N'Djamena, the Djermaya Solar project has been developed by InfraCo Africa, through Anergi Africa Developments Ltd (AADL), with its partner Smart Energies. Denham Capital recently entered the project as long-term investors through Neo Themis. Djermaya Solar will be developed in two phases totalling 60MW and is the first solar project to be designed, financed, built and operated by an independent power producer (IPP) in Chad. The project will also pioneer utility-scale energy storage in th country, incorporating a 4MWh Battery Energy Storage System (BESS), 18km transmission line and a substation funded with €6.35 million of concessional debt from the EU-Africa Infrastructure Trust Fund (EU-AITF); and the iii) Sahel Solaire is operating since 2019 and has started production of Solar Panels in the country and the region.

Introduction to the Projet Site: The Kanem Region:

The Kanem region, located northeast of Lake Chad and on the border with Niger, is one of the most vulnerable to climate change and the most impacted by the chronic food and nutrition crisis in the Sahel. For example, the Kanem region has some of the most critical nutritional indicators in the Chadian Sahel with 56% of its population being in the state of food insecurity. The region is subject to recurring environmental shocks such as drought and locust plagues. Farmable land (the Ouadis) are affected by silting and the decrease of the water table. It is essential to combine the improvement of cultivation practices and techniques with effective management of facilities and environment in order to save fertile land for agriculture. Structural vulnerabilities, linked to low

investments in basic social services, are aggravated by destabilising events such as the Lake Chad crisis. Despite favourable access to ground water, access to water remains a challenge in the Kanem region. Since the break-out of crisis in the Sahelian strip as well as climatic warming and the arrival of refugees, the regions of the Lake and the Kanem have endured problems with access to the drinking water, proper hygiene and sanitation, and education and protection of the environment. During a joint mission in the regions of the Lake and the Kanem in February 2018 by UNDP country Office and national NGOs, notably Humanitarian and Development NGOs, various needs including access to energy for domestic use and water pumping systems were identified. The existing boreholes require rehabilitation or maintenance but still will not meet needs, creating a necessity to have supplementary points of water. The investments required for the extraction of ground water limit its availability and contribute to inter-community tensions. A mapping of remaining pockets of water Sites in the Kanem-region with the objective of establishing Solar energy water pumping based mini grids technologies for securing agricultural production by strengthening the protection of the Ouadis through the enhancement by water control systems, for productive uses such as market gardening. crop diversification and post harvest systems for agriculture products, could be very effective to address continued land degradation and climate change impacts that is impacting this region.

The project will be working in three (3) municipalities of Kanem region (Mono, Kekedena and Mokou). The Ouadis system in these municipalities are presented in Annex A. In each of the municipalities 10 Ouadis will be selected for landscape restoration and among the 10 Ouadis, One (1) Ouadis will be selected in each municipality to install Borehole and Solar panels to pump water for irrigation and the excess energy to be used in the mini-grid for distribution.

Root Cause of Land Degradation: The main causes of land degradation in Chad include, inter alia, demographic growth, conflicts and wars with expanded refugees' settlements, inappropriate soil management, deforestation, shifting cultivation, insecurity in land tenure, variation of climatic conditions and intrinsic characteristics of fragile soils in diverse agro-ecological zones. The land degradation process is driven by both climate (direct) and human (indirect) factors. The Climate change drivers of land degradation include changes in temperature, rainfall intensity, windstorms and changes of the distribution and intensity of extreme weather events. Change in rainfall regimes drive changes in vegetation cover and composition and trigger processes such as erosion of agricultural soils. Soil erosion rates for example, tend to increase with increasing mean annual rainfall. Human drivers of land degradation in Africa include demographic growth, grazing pressures, agricultural practices, agricultural expansion, forest clearing and fuel wood harvesting. The degradation of soil quality due to cropping, made worse by climate change, results in a loss of productive potential of the land, driving conversion of non-agricultural land, such as forests to agriculture. Reduced productivity of most agricultural crops will continue to drive land-use changes in Chad. In arid, semi-arid and dry sub-humid areas of Africa, land degradation due to erosion and salinization is exacerbated by poor agricultural practices (in particular poor management of irrigation and fertilization). Poor agricultural practices are also at the root of soil acidification. Acidification increases with the duration of land use, especially in ferruginous and ferralitic soils, which are the most prevalently cultivated.

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Root Causes of Greenhouse Gas Emissions:

Current Power Generation and Production: The power sector in Chad is characterized by low energy access rates which are as low as 2% in the rural areas, and high reliance on fossil fuel and biomass to cover the growing energy needs. The limited access to electricity and the high production costs of thermal electricity by the national electricity company, Société Nationale d'Electricité (SNE), as well as the absence of an interconnected national grid resulting in isolated production facilities supplying different cities, means that electricity is expensive with high costs being an obstacle to the economy's effectiveness.

Chad is the third largest country in the Central Africa subregion, where the medium and low voltage are the most expensive (178 CFA per KWh of low voltage). The decrease in the production cost per KWh by SNE and hence of the consumer price to be accessible (100F/KWh) is foreseeable neither in the short nor in the medium term. Energy supply is a real problem in Chad due to the large deficit it has in energy production. The country uses diesel fired power plants for a large part of the produced electrical energy. Apart from the capital N'Djamena which totals almost 80% of electricity production in the country, there are only very few electrified cities and secondary centers with independent distribution networks. A large portion of non-electricity energy needs is still covered by biomass, which has led to the depletion of forests over the years. Electricity supply further represents an opportunity for land conservation in the Sahel country such as Chad where energy poverty leaves the communities with no other alternative for cooking or heating water than to burn biomass from Savannahs. For instance, 90% of the forests in Chad have been cleared between 1970 and 2019, mainly to cover basic energy needs. 90% of the energy used is provided by firewood and charcoal, 6-7% by petroleum products and 3-4% by thermal sources. In 2000, the Government launched a program in N'Djamena to replace the use of wood fuels through the use of butane gas. The majority of Chadian households (69 %) use electricity for lighting and 11% of households use it as cooking fuel. Over 80% of electricity is consumed by households in the capital N'Djamena. The population also uses biomass as an energy source and the Société Sucrière du Tchad – Sugar Company of Chad (CST) – uses bagasse to produce energy. The predominance of wood fuels in the energy supply and the coverage of a quality basic service of electricity in a continuous way are still and will remain for a long time a challenge. Aware of this situation, Chad launched in 2012 a comprehensive program for renewable energy. Thus, to make energy accessible to a majority of the population and especially to promote renewable energy, the Government established the Agency for Renewable Energy Development (ADER).

Electricity grids: Existing electricity networks across Chad were not designed to integrate non-dispatchable renewable energy. With power distribution infrastructures that are operating at the edge of acceptable voltage ranges, connecting additional variable renewables such as solar or wind to these distribution grids requires careful consideration. In addition, the lack of interconnection between national grids make it impossible to dispatch renewable energy generation surplus across the countries, thus widely limiting the uptake of a national or regional solar market and private sector investments.

Energy Access: A significant proportion of the population in Chad is made of isolated communities who live far from national electricity grids. Expanding the grid to these communities is significantly more expensive and time consuming than deploying decentralized solutions. As mentioned above, the rate of access to electricity in rural areas is very low, at less than 1%. Despite the important fossil fuel sources and excellent solar radiation, the rate of access to electricity in Chad is among the lowest in world 6.4% against 48% in subsaharan Africa[1]. The lack of a modern energy solution in rural areas favors the use excessive wood fuel. These energy sources rich in monoxide carbon are very harmful to health. By 2030, the objective of the government is to achieve (i) an electricity access rate of 53% nationwide; for (ii) a rural access rate to electricity 20% and (iii) a 20% share of renewable energies in production national electricity starting from a current situation capped at 6.4%, 0.6% and 1% respectively. By 2023, within the framework of the Emergency Plan for Access to Electricity, the objective is to install an output power estimated at 1056.61 MW, for the energy needs of about 6,898,568 inhabitants thus bringing the rate of access to electricity to 38.12%. Therefore more than 6 million people will need to be electrified with decentralised solutions across the country. Chad has already identified several decentralised electrification projects to connect some of these households, including in the Kanem Province.

Long-term solution and Barriers

The long-term solution planned through this project is to have adequate understanding of land degradation dynamic in Ouadis ecosystems in order to identify appropriate SLM practices which can be supported through the promotion of solar energy to facilitate access to water for irrigation and for domestic use in the mini-grid system as contribution to the national objective of 6 million people with electricity by 2023 in the country and in the Kanem Province. During the PPG more assessment will be conducted and stakeholders will be engaged in prioritization of which ones to address but also clearly reflect all in the Report of the Assessment and the peer-review article envisaged in component 1. This will allow the country to have comprehensive overview of what needs to be overcome in order to include it in national environment action plan and resources mobilization strategy. In mean time to achieve the project objectives the following barriers need to be addressed by the project:

Barrier 1: Inappropriate selection of SLM technologies for Ouadis ecosystems restoration to address land degradation. The inherent vulnerability of soils to degradation under various land-use options also limits the level of application and success of good land management practices. It is therefore expedient to have area- and case-specific technological packages for land degradation interventions. In addition, there is continued high reliance on inefficient biomass fuel technologies. The national government with support from partners has identified through a participative process hot spots of land degradation which include the Ouadis of Kanem. Various SLM technologies have been piloted in various part of the country. Furthermore, the international partners have done a comprehensive work of capitalization of good SLM practices which are categorized according to ecological situations. These SLM practices have been also been compiled to respond on integrated approach and strategies to generate multiple benefits. The need for water for irrigation by organized communities groups (women and men cooperatives) to ameliorate agricultural production will be most effective if coupled with establishing ecological infrastructures for SLM using solar energy. The excess energy will be use to generate revenue for local communities (both men and women).

Barrier 2: Lack of support for the initial investment to access solar panels for irrigation water pumps to address land degradation in Ouadis : Experience elsewhere established that solar pumps are decidedly preferable to expensive-to-run diesel pumps used by men and women farmers for irrigation so far, but also better than subsidized grid-power from power company. However, high capital investment in solar panels as major deterrent as farmers are not willing to take the risk at the beginning as they are neither sure whether solar pumps will deliver enough water nor whether Power Company will actually pay for the surplus power farmers evacuate to the mini-grid. When both men and female farmers are convinced of many benefits of Solar Power as a Remunerative Crop (SPaRC), farmers will be willing to invest more in solar pumps. The project will learn more from *The Dhundi Solar Pump Irrigators' Cooperative Enterprise (SPICE) of India to promote the concept of Solar Power as a Remunerative Crop (SPaRC)*. *The GEF fund will be use to remove the barriers of initial investment for solar power for organised farmers cooperative. Also, the project will support the process of developing the Power Purchase Agreement between the both men and female farmers cooperatives and the National Power Electricity Compagny under the leadership of Agence pour l'Energie Domestique et l'Environnement.*

Barrier 3: Insufficient knowledge management, monitoring and evaluations of land degradation dynamic and the use of solar power for multiple usages: According to UNCCD Knowledge hubs, SLM plays a pivotal role in the commitments to combating desertification, land degradation, and drought (DLDD), and is a vital element to the achievement of LDN, by avoiding or reducing land degradation. The knowledge Hub presents resources on SLM, including best practices in SLM technologies, and how they can be applied to certain land uses to combat DLDD and contribute to climate change mitigation and adaptation. "The selection of appropriate SLM practices and approaches is an important step in ensuring the effectiveness of land management and restoration." (FAO). Based on WOCAT tools and methods, various knowledge products have been produced in cooperation with various partners. These knowledge products help people involved in sustainable land management (SLM) identify suitable technologies and approaches, determine priority areas for intervention, and make informed decisions at the local/ landscape/ watershed, (sub-)national, and global level. The current project offer an opportunity to learn and work on specific Ouadis ecosystem, therefore possibility of generating knowledge products with due consideration of women, men and vulnerable groups specific needs, and which will be scaled up in other Ouadis in Chad and other parts of the world notably in neighbouring Niger , northern Nigeria and north Africa countries.

2) Baseline scenario or any associated baseline programme/projects

Both the Government of the Chad and the international donor community acknowledge that the lack of a modern energy solution in rural areas favors the use of excessive wood fuel, and that the lack of investments in the region to address land degradation will lead to continued degradation, fragmentation and loss of oadis ecosystems, exacerbate social conflict and land disputes, reduced agricultural productivity and consequent impact on food security. Thus, the baseline include several projects (ongoing and planned) on renewable energy and land degradation in the country. These projects could become source of co-financing fo this project. The level of potential co financing to this project will be discussed and agreed upon during PPG with respective partners and cofinancing letters for confirmed ones will be provided at CEO Endorsement. In addition, projects which have gender-related information that could be useful for this project and/or be an opportunity for collaboration will be assed and the gender entry points identified and consider in the final project design, these will include learning from the EmPower project implemented by UNEP ROAP. The baseline projects include:

- **The Chad National Development Plans (PND 2017 – 2021; 2022-2026 and 2027-2030)** are the reference document for the government and its partners interventions and has the objective of launching the Chad emergence in a stability. More specifically, it aims at: i) ensure a peaceful Chad country respected and implicated in regional and international arena; ii) give the opportunity to any citizen to access water and health, to habitat, to energy and mobility; and iii) build a dynamic Chad, economically strong and respectful of the environment.
- **The government established the National Land Observatory in 2001** to build a foundation for development of a land policy. The observatory is built around a cluster of institutions presided over by the Prime Minister and the principal operator, the University of N'djamena. The objective is to improve knowledge and understanding of land-related problems to support the development of relevant land policies and legislation. No results achieved by the Observatory have been reported yet.
- **A phased National Electricity Emergency Plan implementation 2021-2023** was developed. The Phase 2 include eleven projects, among which three solar projects: the 32 MW Djermaya Solar project in Ndjamen Total Budget: XAF 34, 607 040 000 from Private partner; the IRINA solar project covering six (6) cities: Kelo, Moussoro, Guegou, Amdjarass, Massenya et Baktchoro; Total Budget: XAF 18 billion (Abu Dhabi Fund), , and the BID / SNE (Solar) project covering the following cities: Mongo, Ati, Am-timan, Oum-Hadger, GOZ BEIDA: Total Budget: XAF 14, 976 000 000 from a private partner.; iii) Phase 3 include the execution of 3 projects during the period 2022-2023, among which the following renewables energy projects: the project of a 200 MW Photovoltaic Solar Power Plant, in the suburbs of the city of N'Djaména: Total Budget XAF 139, 000 000 000 ; the establishment of a Solar Equipment Production Unit (UPES) around Ndjamen: Total budget XAF 15,930 000 000 ; The construction project of a 100 MW wind power plant in East of Ennedi at Amdjarass: Total budget: XAF 98.400.000.000 from private partner.

- **Energy Policy Letter 2018:** The Letter indicates the Government Chad Republic objectives for the energy sector for the period of 2018- 2030. It highlights the different government strategies oriented toward an energy mix and a policy based on the efficient energy management. The Letter also defines the approaches and the actions to be conducted to achieve the vision of the High Authorities on energy sector. At the international level, the Letter includes the objectives of the Central Africa Region Strategie of Rural Renewable Energy for All (CEEAC/CEMAC SE4ALL) and the Sustainable Development Goals. The objectives of the Letter which the project will directly contribute will include: (a) energy mix which will increase the contribution of renewable energy in the current production; (b) development of rural rural and peri-urban electrification; (c) promotion of utilization of solar and bioenergy thermal energy; (b) amelioration of the Governance of the energy sector.

- **The Desert to Power initiative:** The Desert-to-Power initiative is an ambitious and innovative partnership of 11 Sahel region countries: Senegal, Nigeria, Mauritania, Mali, Burkina Faso, Niger, Chad, Sudan, Ethiopia, Djibouti and Eritrea. It is a huge desert solar initiative to make Africa a renewable power-house. This solar project is set to stretch across the Sahel region and expected to connect 250 million people with electricity by tapping into the region's abundant solar resource. It aims to develop and provide 10 GW of solar energy by 2025 and supply 250 million people with green electricity. At least 90 million people will be connected to electricity for the first time, lifting them out of energy poverty. Construction of the project will also create jobs and help attract private sector involvement in renewable energy in the region. The African Development Bank Bank has committed to mobilize \$25 billion for climate finance by 2025.

- **The Regional Project for the GEF Africa Minigrids Program (AMP):** its objective is to support various African countries that are part of AMP ('national child projects') – and other national stakeholders in the Africa minigrid market more generally – increase energy access through increased deployment of renewable energy minigrids via a customized suite of knowledge tools; technical and operational expertise; convening platforms (communities of practice); communications; and mainstreaming of data and digital tools and solutions.

- **The World Bank Regional Off-Grid Electricity Access Project to Promote Solar Products in Western and Central Africa** which covers 19 countries in Western and Central Africa, 15 of which are members of ECOWAS (Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo), as well as Cameroon, the Central African Republic, Chad, and Mauritania. . The project objective is to support activities to accelerate the deployment of stand-alone solar products. It seeks to harmonize policies and standards as well as business procedures to develop a regional market of stand-alone solar products, support entrepreneurs in business acceleration activities, and provide credits and grants for the deployment of stand-alone solar home systems. The project is expected to contribute to human capital development by electrifying public health centers and schools which are needed to improve health and education outcomes. It will support job creation, for instance in the farming communities which can use solar water pumps for irrigation, solar milling equipment for product transformation, and solar refrigerators to bring products to market. The project will support the small and innovative business enterprises through solar home systems and will make an impact in economic recovery following the COVID-19 pandemic.

- **The Sahel Women’s Empowerment and Demographic Dividend (SWEDD) Project funded by the WB/IDA:** It is a regional project covering 7 countries: Benin, Burkina Faso, Chad, Ivory Coast, Mauritania and Niger. It aims at empowering women and young girls and improve their access to quality education and reproductive, child and maternal health services. The parent project was approved in 2014 and became effective (in Chad) on May 22, 2015. The project was restructured in January 2019 to extend the closing date for 48 months from December 31st, 2019 to December 31st, 2023. Additional financing for this project in the amount of US\$9 million equivalent to the Republic of Chad was approved for this period. This project will provide important baseline on capacity-building programs development for women for the proposed project, and a partnership will be developed with SWEDD to improve women's access to Ouadis for market gardening, etc. as well as on various Renewable Energy capacity building trainings that are planned as part of this project.

- **The Project: ‘Development of drinking water supply, sanitation and pastoral hydraulic works in the Kanem region’ (2021-2024).** Total Budget: €6 million. It aims to improve the living conditions of border populations in the Kanem region through better access to drinking water, sanitation and pastoral water services. The project is implemented by the Consortium Action Contre la Faim (ACF) as lead partner and a local NGO called: Sahelian Alliance for Applied Research and Sustainable Development. This project will provide important baseline to the present project Component 2 by providing co financing of €6 million to the proposed project.

- **The Joint Programme for the Sahel in Response to the Challenges of COVID-19, Conflict and Climate Change - SD3C:** This program is designed in response to the challenges of COVID-19, conflicts and climate change (SD3C) and is implemented in the Sahel (including the Chad Kanem region) and Senegal. It aim to assist smallholders, particularly women and young smallholders living in border areas, to consolidate their livelihoods. It is expected to bring about a reduction in poverty of approximately 10 per cent in the programme area and to boost social, economic and trading activity in areas plagued by lawlessness and subject to climate variability and impacts that put smallholders’ resilience to the test. The program is implemented in partnership with IFAD, FAO and the World Food Program (WFP) - and the G5 Sahel. It will ran for six years and in two phases (phase 1: 2021-2023 and phase 2: 2024-2026). The program will provide the G5 Sahel countries and Senegal with total financing of US\$180.4 million from IFAD and the Green Climate Fund to implement SD3C. The programme for Chad covering the following Departments: (i) Departments of Wayi and Mamdi in the Province of Lake; (ii) Department of North Kanem in the Province of Kanem and (iii) Department of Haraze Albiar in the Province of Hadjer Lamis, have an estimated cost of US\$25 million, and will be operationalized by FAO and WFP under the coordination of IFAD’ Strengthening Productivity and Resilience of Agropastoral Family Farms Project – REPER

- **Programme to Build Resilience to Food and Nutrition Insecurity in the Sahel (P2RS) funded by AfDB (2015-2035):** Its specific objective is to increase, on a sustainable basis, agro-sylvo-pastoral and fishery productivity and production in the Sahel. The programme has so far been implemented through four projects each implemented over a five-year period (2015-2020: Phase 1) in three components, namely: (i) Rural Infrastructure Development; (ii) Value Chains and Regional Markets Development; and (iii) Project Management. Phase 2 (2021-2025) of this project is at final stage of formulation, and could become an additional source of co-financing fo this project.

- **The World Bank \$295 million grant from the International Development Association (IDA) to help Chad expand its access to energy.** The Chad Energy Access Scale Up Project (PAAET) is approved in May 2022 and it aims to increase access to electricity and clean cooking solutions via expansion of the main power grid and mini-grids, standalone solar systems, deployment of improved stoves, and natural resource management. It will expand electricity access in

the capital city of N'Djamena and in 12 secondary cities in which the national power company, Société Nationale d'Electricité (SNE), operates mini-grids, and provide access to electricity services in additional secondary cities and villages, including those located near refugee camps. Public and private investments will strengthen the country's electricity generation, storage, and distribution capacity.

- **Djermaya Solar** : Located 30km north of the country's capital, N'Djamena, the Djermaya Solar project has been developed by InfraCo Africa, through Anergi Africa Developments Ltd (AADL), with its partner Smart Energies. Denham Capital recently entered the project as long-term investors through Neo Themis. Djermaya Solar will be developed in two phases totalling 60MW and is the first solar project to be designed, financed, built and operated by an independent power producer (IPP) in Chad. The project will also pioneer utility-scale energy storage in the country, incorporating a 4MWh Battery Energy Storage System (BESS), 18km transmission line and a substation funded with €6.35 million of concessional debt from the EU-Africa Infrastructure Trust Fund (EU-AITF). InfraCo Africa has also leveraged US\$854,000 of grant funding from PIDG Technical Assistance (PIDG TA) to support legal and environmental advisory services and an additional US\$1.5million capital grant. Djermaya Solar also benefits from strong support from the Government of Chad and the project company, Djermaya CDEN Energy (DCE), has signed a 20-year Power Purchase Agreement with SNE to supply Chad's national electricity utility. The Government of Chad and DCE have also signed a Put and Call Option Agreement and a Fiscal and Customs Agreement as part of the project financing approach required to commence construction in early 2022. Djermaya Solar is expected to begin delivering power to Chad's national grid in 2023

Sustainable Management of Water Resources: The objective is to improve the management of surface water resources in the Ouadis and increase the population's access rate to drinking water. Key activities will include: (i) Fight against droughts, (ii) Fight against silting up and siltation of points and rivers, (iii) Promotion of local water governance, (v) Integrated water and ecosystem management.

Development and Sustainable Management of Ouadis. The objective is to promote non-timber forest products and fight against the degradation of Ouadis. The project will carried out Promotion of forest species of economic interest (date palm etc.), (b) Development and implementation of a development and management program for the Ouadis,, (c) Promotion of reforestation and other forest plantations, (d) Fight against bush fires and, (e) Fight against deforestation, occupations and anarchic exploitation of Ouadis.

Clean energy development (GDT). The project aims at Promoting clean energy sources as a source of domestic energy. The project will increase in the supply of clean energies and popularization of the related technology; promotion of incentives for the adoption of clean energies; promotion of private investments in the production of clean energies, strengthening of national technical capacities in the field of clean energies.

- **Strengthening the resilience capacities of populations in the face of risks and natural disasters.** The project aims at strengthening the adaptation capacities of populations in the face of risks and natural disasters. The project will support formulation, implementation and monitoring-evaluation of a national capacity building program for resilience in the face of natural disasters.

3) Proposed alternative scenario with a brief description of expected outcomes and components of the project

Access to water in the Kanem area is very limited. 40% of hydraulic water pumps are in poor conditions and 20% out of use. When they are available, ground water is extracted through electric water pumps, which use diesel to fuel their systems. However, these systems not only require costly, regular servicing and the purchasing of fuel, they emit carbon dioxide polluting the atmosphere. Mini grids based on renewable sources of energy, as an alternative scenario, will contribute to the government of Chad objective to providing electricity and energy services to rural areas, and improving their standard of living through income generation activities.

The proposed alternative project will be complementary to the baseline initiatives as it addresses barriers that are specifically related to the investment in decentralized Solar Water pumpings plants fo productive uses. It will not be a duplication of the UNDP Mini grid project , but it will benefit from the tools and knowledge developed by the regional project. The Proposed alternative scenario has a goal to advance the implementation of LDN measures and the National Electricity Emergency Plan, notably in the Kanem Region, taking this area into phase 2 and 3 of this Plan. It will specifically accelerate investment in renewable energy, for increasing energy access; restoration and productions systems in this region, addressing issues such as: barriers removal for promotion of good SLM practices for Ouadis restoration, the GHG emissions coming from diesel electric water pumps, the utilization of Solar Water pumpings as energy source for productive uses and post harvest conservation schemes for Agriculture products. The project will bring about an alternative scenario that combines both pilot and investment projects that will realise SLM using proven technologies, additional renewable energy capacity and targeted capacity building training, resulting in transformational change in the electricity supply situation in the Kanem region.

The project objective is to protect the integrity and productivity of Ouadis ecosystems and ameliorate access to renewable energy through the use of the benefits of Solar Pumping systems in 3 Municipalities of Kanem region of Chad. This objective will be delivered through the following project components:

Component 1: Promotion of best SLM practices to protect Oadis ecosystems

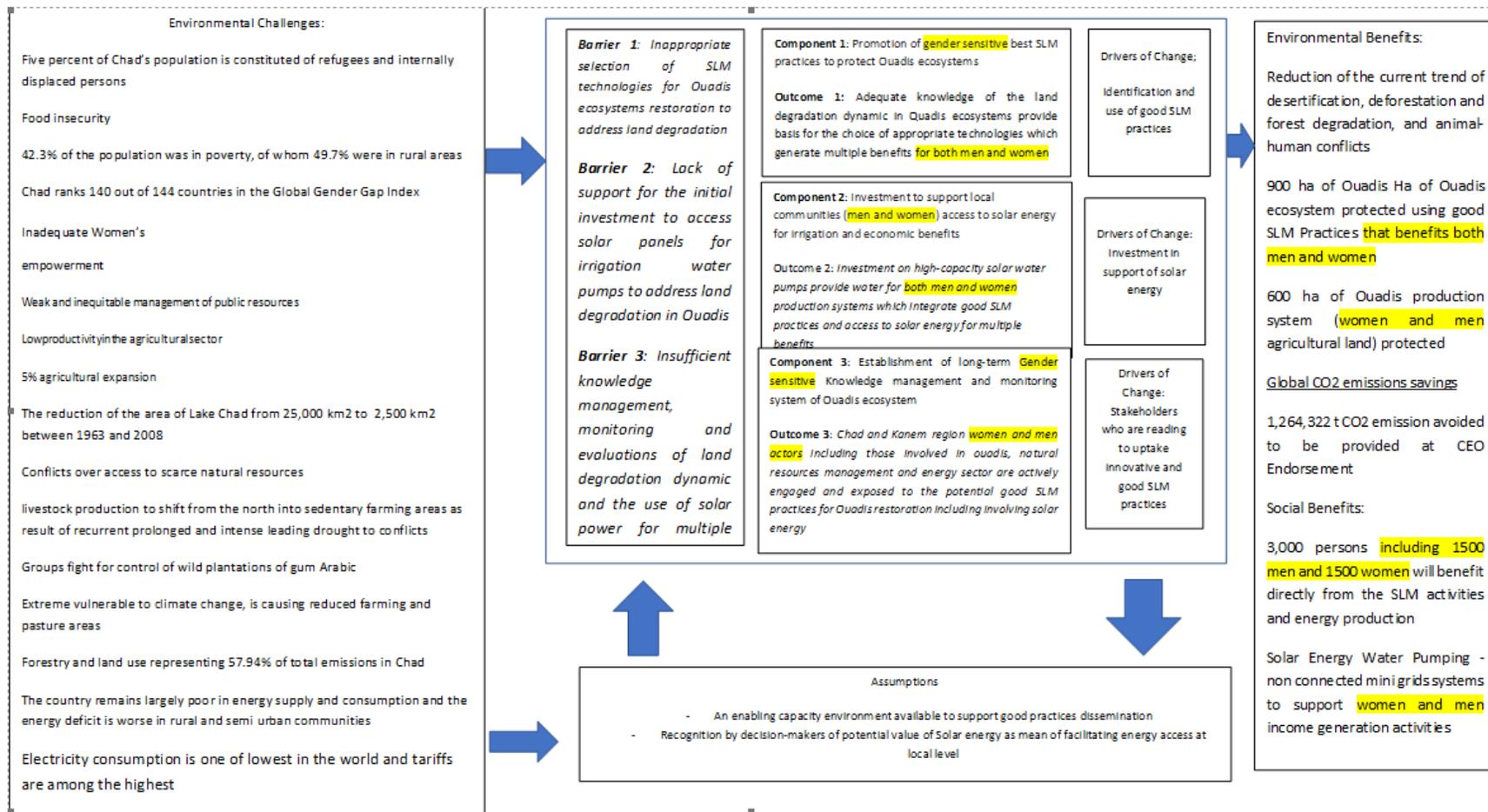
The Ouadis and polders mainly dedicated to farming (cereals and vegetables) are threatened by siltation from sand dunes when the latter are no longer stabilized by vegetation, and by salinization. This is due to overexploitation of resources in the surrounding agro-pastoral area. Siltation causes loss of arable land and lowering of water tables making water pumping more expensive. A mapping of this resources is therefore essential if the objective to control the water table for agricultural purposes. Chad's NDC highlights that the country's main economic activities are those associated with the primary sector, such as subsistence agriculture, livestock rearing and fishing. It describes that the impacts of climate change are significant on the large hydrographic systems of the basins of Lakes Chad and Niger. The impacts include changes to the agricultural seasons, disturbances in the biological cycles of crops and a reduction in cereal crop production. The NDC identifies water, agriculture/agroforestry, livestock and fishing as priority sectors for adaptation. It also identifies the following priority target zones as especially vulnerable to the effects of climate change: Kanem, Barh El Ghazal, Batha, Guéra, Hadjer Lamis, Wadi Fira, Ouaddai, Dar Sila, Lac, Moyen-Chari, Borkou, Tibesti, Ennedi Est, and Ennedi Oues. Main drivers of land degradation in the project areas are linked to unsustainable practices of agriculture and land use in general. An important approach to reverse this trend is to ensure that the local communities including men and women, and decision makers at local level understand the process and perceive their role in contributing to the phenomenon and adoption of alternative approaches. The participation of the stakeholders is therefore important in understanding the land degradation drivers and development of

alternative. The component will be an opportunity to understand the root causes of land degradation and fertility lost in Ouadis ecosystems. Having such scientific and rigorous information of the root causes will be useful in the intervention of the baseline projects in order to ensure that there is a logical linkage between solution proposed (intervention) and the root causes of the environmental degradation and fertility loss. As the project is targeting Ouadis ecological and production systems, the finding of this component will provide the Government and stakeholders a basis for a national approach to land use management in these particular ecosystems.

The component will generate the following outcome and outputs: Outcome 1.1: Adequate knowledge of the land degradation dynamic in Ouadis ecosystems provide basis for the choice of appropriate technologies which generate multiple benefits. To achieve such outcome, the project will help to generate: i) A comprehensive and documented land degradation dynamic and appropriate good restoration practices in Ouadis ecosystems in 3 Municipalities of Kanem Region and a peer reviewed article elaborated and published in some well known scientific journals; ii) Land use plans of 3 pilot Ouadis are developed and implemented using good SLM practices and solar water pumping system; iii) 3 Ouadis restored with use of at least 5 good gender sensitive SLM practices (mechanical control of sand dune, biological sand dunes fixation; drip irrigation techniques, mulching; herbaceous seeding) and fully participation of 1500 female and 1500 men belonging to cooperatives through cooperatives and local NGO under the leadership of the decentralised offices of the department of environment.

During the PPG the techniques will be retained for each site based on the ecological conditions and socio-benefits to be generated.

The Project Theory of Change is describe in the table below:



[1] World Bank Press release 24th March 2022.

Component 2: Investment to support local communities (men and women) access to solar energy for irrigation and economic benefits.

As indicated earlier, experience elsewhere established that solar pumps decidedly preferable to expensive-to-run diesel pumps used by farmers for irrigation so far, but also better than subsidized grid-power from power company. However, high capital investment in solar panels as major deterrent as farmers are not willing to take the risk at the beginning as they were neither sure whether solar pumps will deliver enough water nor whether Power Company will actually pay for the surplus power farmers evacuate to the mini-grid. Alexia Kelly, climate finance expert and co-chair of the Low Emission Development Strategies Global Partnership (LEDS GP) Finance Working Group, helped deliver several sessions at the workshop in Abuja. A participant to the workshop explained that: "It all comes down to money at the end of the day, so if the money and the finance isn't available it's going to be very difficult for us to achieve the multiple benefits

that mini-grids offer. Accomplishment of SDG 7 – universal access to electricity by 2030 – is fundamentally underpinned by the ability to unlock capital flows at scales into this sector. We aren't going to get there without solving the finance challenge". Renewable-powered mini-grids have high upfront infrastructure and installation costs and finding funding for mini-grids is challenging. With limited budgets for rural electrification, governments are attempting to bridge this investment gap with innovative public, private, and blended investment arrangements. The project will learn and use the experience of the World Food Programme (WFP) in Chaouir in Guera region of Chad. Chaouir is a village in the region of Guéra with 3,180 inhabitants, in the Sahelian belt of Chad – a region prone to droughts and food shortages. Moderate and severe food insecurity rates are estimated at 21.8 percent and 18.4 percent respectively, and micronutrient deficiencies such as anemia affect a large range of the population. Chaouir was selected to pilot the Jardins de Vie ('Garden of Life' for its French version) back in 2017. Participating families worked on their plots of land, while the World Food Programme provided all necessary materials to develop a vegetable garden with the plan to supply the local school. Since 2018, the World Food Programme is implementing an integrated package of activities, focusing on scaling up gardening capacity, area under production and on integration between garden production, the school and resilience activities at household level. In early 2019, water-management structures have been established in Chaouir, including a high capacity solar-water pump, and the community garden has been expanded to a total of 4 hectares. This is enabling a yearly production of at least 24 tons of fresh vegetables and more than 10 tons of staples (mostly sorghum and millet), increasing food availability for the community. The garden is currently producing nearly 30 varieties of vegetables, allowing to diversify households' and school children's diet and to tackle micro-nutrient deficiencies. The evaluation of the UNDP project in the project area, indicated that the most successful micro projects were those handled by women. Those actions which demonstrated very good success were those targeting women. The most important Economic Interest Groups (EIGs) both in terms of number and the functionality were those belonging to women. The women EIGs were the most important in terms of volume of the loan and they were the one which reimbursed very well. The women indicated that because of the project support they were able to gain their financial independence. The recommendation from the project evaluation included the need to link the EIGs with the markets and to create network of EIG for better capacity gain. The current project will learn from this experience to focus its work with women.

The project intervention will be innovative by focusing not only the livelihood aspects but also land restoration and access to clean energy in the 3 municipalities. The expected outcome from the component will be: Outcome 2.1: Investment on high capacity solar water pumps provide water for production systems which integrate good SLM practices and access to solar energy for multiple benefits. The outputs to be generated from the component will include: i) Solar water pumps infrastructures (boreholes, Solar panels, network of irrigation tapes; are established in 3 pilot Ouadis in 3 Municipalities of Kanem. Out the main 4 types (monocrystalline, polycrystalline, PERC, and thin-film) and the 2 standard sizes (60-cell and 72-cell) of the Salar Panels available on the markets the best type will be selected based on the experts guidance and stakeholders needs. ii) women and local communities cooperation are structured and capacitated to manage the Solar Water pumps infrastructures; iii) power purchase agreements are negotiated and agreed upon between the private sector (Societe Nationale d'Electricite), the National Agency for Domestic Energy and Environment) and local cooperatives. The proposed approach was based on the exchange and discussions with the National Agency of Domestic Energy and Environment; past experience of some partners in the project areas (e.g. World Food Program); some stakeholders from energy sectors and review of available literature on the topic. As explain above an in-depth analysis of options will be carried out and thorough stakeholders' consultation particularly with local communities will be conducted to agree during PPG on workable models

The proposed business model envisaged is for the utility mini-grid to be owned by local communities cooperatives. They will be responsible for their maintenance and operation. This business model is envisaged based on the past experiences of other interventions in the region of Kanem. However, this model and many others will be assessed and discussed with stakeholders to agree on the most promising and viable model. To ensure its sustainability, the business model will be flexible and allow for a gradual increase of private sector particularly the Societe Nationale d'Electricite participation in future mini-grid projects. The Power Purchase Agreement is expected to generate revenue stream for cooperatives. During the PPG, analysis will be conducted on the ability

and willingness of end user to pay but with segregation on the revenue/tariffs collection which will depend on the end user utilisation of energy generated. Potential uses of energy are key for the expansion of mini-grids. As such, identification of potential uses of energy in the selected communities is key in the model to be adopted. The role of the private sector which will be mainly the National Electricity Company will be to buy the excess energy produced which it may commercialise for household or for other commercial purpose like shops. A result of previous interventions in the project areas, some cooperatives are already established and some will be established based on community needs and criteria would be used for the creation of these new cooperatives on will be based on the consensus and experience from ongoing ones.

Component 3: Establishment of long-term monitoring system of Oadis ecosystem

Concerted efforts to standardise documentation and evaluation of SLM are certainly justified in light of the billions of dollars spent annually on implementation of SLM practices[1]. New efforts towards SLM should build on existing knowledge from within a location itself or from similar environments elsewhere. Identifying and assessing scattered knowledge about SLM and making it broadly available requires a standardised and harmonised methodology for comprehensive data collection, knowledge management, and dissemination – such as the one developed by WOCAT, LADA, and DESIRE. Standardised information provides important evidence for users at the local, national, and global levels. Successful use of a shared methodology and its joint adaptation to additional or changing needs requires a strong commitment of both men and women involved in SLM. SLM has multiple ecological, economic, and social benefits that reach far beyond its potential for reducing land degradation and desertification. SLM also addresses global concerns such as water scarcity, resource use efficiency, energy supply, food security, poverty alleviation, climate change, and biodiversity conservation. When taking into account these multiple benefits, investments in SLM are completely justified and may require funding schemes from private and public sectors, especially when involving small-scale land users and marginalised people.

Based on the above, the project, through the component 3 will help to capitalize on the available knowledge on good SLM practices applicable to Oadis ecosystem. The project will take the advantage of the peer-to-peer learning networks such as the [Africa Mini-Grids Community of Practice](#) to try and tackle the issue of identifying the best option. The outcome from the component 3 will be : *Chad and Kanem region men and women including those involved in Oadis, natural resources management and energy sector are actively engaged and exposed to the potential good SLM practices for Oadis restoration including involving solar energy.* The outputs to be generated will include: i) Policy brief to promote the use of good SLM practices and Solar water pumps developed and disseminated; ii) Guideline for upscaling the use of Solar water pumps for Oadis restoration and Solar power mini-grid are developed and disseminated; iii) Communication and knowledge products are generated by the project uploaded in a dedicated Portal on the project host website and disseminated at local, national and regional levels through different channels; iii) Indicators for monitoring impact of SLM practices and use of Solar pumps to restore Oadis ecosystems and generate energy for mini-Grid are developed and necessary data for monitoring are regularly collected through a long term monitoring system; iv) Project is adequately monitored through a well established monitoring system.

1) Alignment with GEF focal area and/or Impact Program strategies

This proposed project is fully consistent with the GEF 7 Land Degradation and Climate Change Focal Areas. It is aligned to LD-1-4: Reduce pressures on natural resources from competing land uses and increase resilience in the wider landscape and CC1: promote innovation and technology transfer for sustainable energy breakthroughs, through its development of decentralized renewable power with energy storage. The project will contribute to the country LDN targets and to the transformation of the energy sector, taking the Kanem region into phase 2 and 3 of the National Electricity Emergency Plan. Since this project will develop low-carbon minigrids supported by innovative business models that can be scaled-up, it also aligns with the objective to focus “on the demonstration and early deployment of innovative technologies to deliver sustainable energy solutions that control, reduce or prevent GHG emissions” (117).

2) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

The Ouadis landscape in Kanem region is characterized by the degradation physically visible through the sand dunes surrounding the Ouadis and constitute a continuous treats to the humids depression areas of the Ouadis where all the productive activities took place. There is increasing land pressure from agriculture, burgeoning population growth, loss of biodiversity, overgrazing, inter-community conflicts for resources mostly exacerbated by migrants, and the continuous silting and pollution of the water bodies. These highlight the limitations of current management systems to harmonize resources, adequately exploit the irrigation potential and improve value chains, especially in the ouadis. Furthermore, the mismanagement of production lands exacerbate desertification and poverty. Without the GEF support, land use from agricultural production systems lead to land degradation, further compromising the productive capacity of the Ouadis to provide for the ecosystem services that are required. As it is established, energy access to support production systems and socioeconomic activities, is important to bring about local development even at micro level, the situation of energy access in project area is very low and without GEF investment, the barriers to access to initial investment for renewable energy will be a challenge. This complex set of socio-economic and climate change challenges are exacerbated by the fact that populations in the zone are growing.

Lack of investments in the region will therefore mean that the status quo as summarized above will continue in the 3 municipalities of Kanem region leading to i) continued degradation, fragmentation and loss of ouadis ecosystems; ii) exacerbation social conflict and land disputes as result the presence important migrant populations; iii) reduced agricultural productivity and consequent impact on food security that may worsen the vicious poverty-natural resource dependency cycle, among others.

The with *GEF* support scenario, *the project* will lead to the rehabilitation and restoration of the landscape that is at the core of socio-economic wellbeing of communities (both men and women), biodiversity conservation and limit the rate of carbon emissions from land use change and use energy production from GHG emission sources. The rehabilitation with of Ouadis as proposed in this project will improve the productive capacity of the landscape. The GEF support scenario will help to improve the management of resources in the Kanem to address environment challenges that the zone faces. The improvement of resource management in the Ouadis is premised restoring and rehabilitating the degraded land. Improved management will also help to address land degradation challenges in the Ouadis as well as contributing to carbon emission reduction from biomass and use of diesel fuel to produce energy for domestic use. It will also contribute to mitigate carbon emissions in the order of 1,264,322 tCO₂ (to be redetermine at PPG stage) as result the use of solar panels while securing food security through improved post-harvest handling and job creation. With the GEF funding, this project will therefore address key issues focusing on land degradation through deforestation, livelihood insecurity, social conflict, human-animal conflict and promotion of agricultural production system that pose minimal threat to biodiversity loss in Ouadis ecosystems. GEF-funded interventions will consolidate ongoing projects and government interventions. Therefore, the GEF strategic incremental cost for this project is rationalized on the basis that the GEF resources will conserve ouadis ecosystem and strengthen instutional and individual capacities to improve ouasis ecosystems management while empowering rural communities

(both women and men) with sensitization programs and put them at the centre of the protection efforts of resources of global environmental value as well as socio-economic benefits at local and national levels. The GEF support will allow identification and promotion of good sustainable land management practices including agroforestry and other agricultural value chains, which will help boost soil quality and land productivity, while conserving and enhancing carbon stocks. Without the GEF resources, the observed trends in Ouadis degradation lack of institutional capacities, unsustainable agricultural production systems, among others, will continue leading to the further loss of global environmental goods and loss of socio-economic opportunities for both women and men at local level.

3) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The proposed project will contribute to improved conservation of Ouadis ecosystems, improve ecosystem management and land-use practices, thereby reducing the current trend of desertification, deforestation and forest degradation, and animal-human conflicts. Increased productivity on existing farming and pastoral land will equally reduce the need for expanding farmlands, thus reducing Carbon emissions from land use change and agricultural production.

The baseline is that, without this proposed GEF intervention, the fossil fuel use will continue unabated in the Kanem area, resulting in significant amount of CO2 emissions in the atmosphere. By supporting the development renewable electricity –Solar Energy Water Pumping - non connected mini grids systems to support income generation activities, this project will contribute to reduction in the GHG emissions from the country's energy sector since most of the demand is currently met through fossil fuel use and biomass. If successfully implemented, the replication potential of this project is very high, so that further reductions in CO2 emissions can be expected. According to Charlie Zajicek, 2019 in "How solar mini-grids can bring cheap, green electricity to rural Africa" , Converting diesel-powered mini-grids to run on solar power – a process known as technology switching – could produce annual [global CO2 emissions savings of up to 470 million metric tons](#), roughly equivalent to Brazil's annual CO2 emissions. Solar-powered mini-grids could be the answer to rural access and dirty energy. Well-suited to small, remote communities women and men, renewable energy mini-grids can now be the cheaper, greener option for rural electrification. When combined with efficient and environmentally sustainable battery storage, solar mini-grids present a [compelling economic case](#) for rural communities in Africa. According to the [International Energy Agency](#) they are essential to future rural electrification in Africa. Exact quantification of the global environmental benefits derived from this intervention will be undertaken during the PPG phase.

More specifically, the project will generate the following environment and social benefit:

- Reduction of the current trend of desertification, deforestation and forest degradation, and animal-human conflicts
- 900 ha of Ouadis Ha of Ouadis ecosystem protected using good SLM Practices that benefits both men and women
- 600 ha of Ouadis production system (women and men agricultural land) protected
- 1,264,322 t CO2 emission avoided to be provided at CEO Endorsement
- 3,000 persons including 1500 men and 1500 women will benefit directly from the SLM activities and energy production
- Solar Energy Water Pumping - non connected mini grids systems to support women and men income generation activities

4) Innovation, sustainability and potential for scaling up

Innovation:

The Project innovation is its objective of combining the combating land degradation through promotion of SLM which will make use of Solar energy for pumping water for irrigation and use of the access in mini-grid system to support energy access for local communities men and women. The project will provide affordable renewable electricity to off-grid area for productive uses. The combined effects of decreasing electricity costs and improved economic conditions will be the increased affordability and capacity to pay for renewable electricity by end users. The increasing demand driven by low cost of electricity will catalyze further investments in renewable minigrids thereby creating a momentum for scaling up investments and contributing to higher levels of rural electrification.

Sustainability: Solar Water Pumping, or photovoltaic water pumping (PVP), provides a viable alternative from electric water pumps, which use diesel to fuel their systems. In recent years, the cost of solar technology has dropped tremendously. Prices for the solar panels used in these systems have dropped up to 80%. In addition, these panels last around 25 years, requiring little maintenance throughout this time. These factors have made Solar Water Pumping an extremely viable way to expand energy access across developing countries and communities women and men, while creating a strong resistance to shifts in rainfall caused by climate change or unreliable seasonable patterns, as evidenced in the Kanem area. The local organized groups namely the cooperative will be created or strengthened in order to empower them for the management of the water and electricity infrastructures to be created. This will create community led local enterprise which will be generating benefits which will be an important incentive for sustainability as it is demonstrated in similar case in India, as described above. The sustainability approach will include the disposal and or recycling of solar panels.

Scaling up: By adopting an approach that targets the productive sectors, this project will create critical mass of market activities that will support broader replication of the systems for basic rural electrification in the country. Lessons from this project could be used for promoting SLM practices which include the generation of renewable energy systems in other isolated areas throughout the country. Furthermore, the project is building on the experience of previous interventions including building on existing local cooperatives and also is planning to have an active partner in the Societe Nationale D'Electricity which has a national mandate on electricity access but also included renewable solar energy as one of its pillars for promoting energy access to all. The model to be developed will have a chance of being replicated and by being anchored in the existing institutions, the project sustainability will be ensured.

[1] Tools for Better SLM Knowledge Management and Informed Decision-Making in Addressing Land Degradation at Different Scales: The WOCAT-LADA-DESIRE Methodology. by Liniger Hanspeter, Schwilch Gudrun, Mekdaschi Studer Rima, Providoli Isabelle4, Bunning Sally, Biancalani

Riccardo, van Lynden Godert

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

Chad Map : Administrative districts map





Other maps are in Annex A of the PIF.

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities Yes

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement

The following partners are already supporting the Government of Chad in rural electrification: WB, AFD, UNDP, EU, GIZ. This project will engaged with these partners to ensure synergies and complementarities. In the process of the PIF development, under the leadership of the GEF Operational Focal Point, UNEP conducted some incountry consultations with some institutions including CSO. This consultation process will continue during the project preparation phase. Key partners consulted and or going to be further consulted during the PPG, are: The Ministry of Petroleum, Mines and Energy, The National Electricity Company, ADERM (Agence pour le Développement de l'Electrification Rurale et de la Maitrise de l'Energie), Ministry of the Environment, Water and Fisheries, the Ministry of Economy and Development Planning, the Ministry of Finance and Budget, the Ministry of Urban Planning and Housing, the Kanem regional and municipal authorities, etc.

Consultation during PPG phase and implementation will include a stakeholder assessment and engagement plan. This shall be prior to any substantive planning, decisions or to any infrastructure activities. This will lead to an updated stakeholder engagement plan. Key activities planned as part of the stakeholder engagement strategy include: Conduct a stakeholder analysis to identify and map key stakeholders (including local and international partners), their level of influence, stake in the project, and develop a communication strategy. The strategy will include, but not be limited to how information and knowledge will be shared and disseminated with both external and internal stakeholders.

The following stakeholders will take an active role in the project:

<i>Names</i>	<i>Mandates</i>	<i>Anticipated Roles in the Project</i>
Technical Departments of the ministries in charge of Environment, Forest, livestock, agriculture, mining, rural development, energy etc.	Advise on environment, agriculture, livestock production and management issues and in charge of policies development Sustainable Management of Water Resources	· Contribute to improving the management of surface water resources in the Ouadis and increase the population's access rate to drinking water

	<p>Development and Sustainable Management of Ouadis</p> <p>Clean energy development</p> <p>Strengthening the resilience capacities of populations in the face of risks and natural disasters</p>	
<p>Office (Directorate) of Planning, Studies, Monitoring and Evaluation</p> <p><i>Ministry of Environment, Fisheries, and Sustainable Development</i></p>	<p>Provide technical assistance and strategic oversight of environmental project management; ensure programme quality and delivering policy advice to the Minister of Environment, Fisheries and Sustainable Development on the project Management.</p> <p>Participate in and provide support to project design activities including development of project theories of change and strategic frameworks; Conducting program analysis or special studies, Supporting or leading evaluation teams.</p>	<ul style="list-style-type: none"> · Implement monitoring systems and designing monitoring tools · Develop data collection tools · Monitor project activities, outputs and progress towards anticipated results · Work with data platforms, databases and select technologies to capture and organize data · Member of the project Steering Committee · Program analysis and special studies to be done in a gender-sensitive manner as well as to ensure that there will be sex-disaggregated targets and gender-related indicators and results as part of the project monitoring and data collection etcet
<p>The Association for the Development of the Region of Baga-sola, ADERBA</p>	<p>Encourage and promote sustainable and profitable development by promoting local initiatives at local level</p> <p>Establishment of the spirit of community solidarity and self-promotion;</p> <p>Promote engagement of the population an</p>	<p>Awareness raising on sustainable development issues</p> <p>Participate as a partner in reforestation and desertification control activities</p>

	<p>d their involvement in the</p> <p>Socio-economic development process;</p> <p>Contribute to the fight against ethnic and inter-community conflicts.</p>	
The National Agency of the Great Green Wall of Chad	<p>Implement activities contributing to the implementation of the Great Green Wall at National level</p> <p>Support Institutional capacity building;</p> <p>Strengthening of the financial resource mobilization strategy;</p> <p>Development of the projects to be implemented by the Agency.</p>	<p>Participate in the implementation of the project activities to fight desertification, to restore and enhance the potential of arid and semi-arid zones</p> <p><i>Project steering committee</i></p> <p><i>Cofinancing mobilization</i></p>
- National Agency for Rural Development (ANADER):	<p>Support the intensification and diversification of agricultural, animal, fishery and forestry production;</p> <p>Promote the agro-sylvo-pastoral and fisheries sectors and popularize the products resulting from research;</p> <p>Ensure the production and dissemination of agro-sylvo-pastoral and fisheries statistics;</p> <p>Support the formation, emergence and structuring of organizations of rural producers;</p> <p>Provide advisory support to organizations of rural producers in the area of management, upkeep and maintenance of works and agro-sylvo-pastoral and fisheries equipment</p>	<p>Plays its role as its institutional mandate in support of the project</p>
Sakhal NGO	<p>Active in Rural Area and support communities in difficult situation</p>	<p>Project potential partners to execute activities on the ground</p> <p>Support awareness raising on Oadis protection</p>
Local Associations/CBOs	<p>Organization of local communities</p> <p>Take lead on the local development activities involving local communities</p>	<p>Contribute to the awareness raising campaign</p> <p>Execute some activities at local level with involvement of local people</p>

	es involving local communities	of local people
	<p>Sensitization</p> <p>Represent local communities</p>	
Opinion Leaders and Traditional leaders	<p>Representation</p> <p>Contribute to awareness raising</p> <p>Facilitate local communities engagement</p>	<p>Contribute to the awareness raising of the project activities</p> <p>Support involvement of local communities</p> <p>Contribute to Advocacy</p>
Decentralized Administration	<p>Represent Government at Local Level</p> <p>Support policies implementation</p> <p>Contribute to awareness campaign</p>	<p>Support project implementation at local level</p> <p>Represent Government interest in the project at local level</p>
Gender-related governmental agencies/CSO	<p>Define and guide gender related policies development and implementation</p>	<p>They will have a role in the Project Steering Committee to oversee the implementation of the gender-related interventions and the achievement of gender-related results</p>

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

Globally, some progress on women's rights has been achieved. However, work still needs to be done in Chad to achieve gender equality. Women's access to land is dependent on the agro-ecological zones which are regulated by customary rules, marital status and economic power. The main mode of access is the use of the family domain. In general, women have access to land but do not have control over it. They face challenges to access to polders and Ouadis that are owned by traditional chiefs and they have limited resources for off-season market gardening. They pay a fee to have the right to exploit spirulina. Women are very often users of degraded agro-pastoral zones around Ouadis, for grazing small ruminants or for growing rainfed crops such as pearl millet. Ouadis areas and pastoral lands are under the control of male heads of households and clan leaders. Although they are the primary users, women do not have control over water and are little involved in fishing. They also have poor access to inputs, equipment and innovations. Yet, women account for 75% of production. In addition to domestic chores, they devote a significant portion of their time to production, processing and marketing activities. They are poorly represented in decision-making circles in the farming sector. Women are also poorly represented in local governance bodies such as traditional, administrative and military authorities, according to the Country Strategy Paper 2010-2014. However, one positive sign is the support of gender equity at the High Level of Government which will help to reverse the contextual situation.

The collection of sex-disaggregated data will be conducted during the PPG and will be completed during the project implementation where data are not available. This process will help to provide a picture of gender aspects in Sustainable Land Management (SLM) and energy access. The project will consider government's efforts in reaching gender equality in Chad and will actively promote women's empowerment in the project implementation, SLM and energy access. The project will conduct a quick Assessment of the Gender Dimensions in SLM and energy access in Chad. The outcome of the assessment will be considered in considering gender aspect in the project document development. The missing data and indicators will be factored in as part of monitoring activities. The gender assessment will be conducted national consultants in close collaboration with the national gender mandated institutions and the environment and energy sectors departments. It will be developed by the project as result of the gender assessment a project gender strategy with SMART indicators and with due consideration of GEF and UNEP gender guidelines. Key elements of the strategy will include: (i) What could prevent woman's participation in project meetings and trainings? (ii) How will the project facilitate the equitable access of men and women to information and training? (iii) What could prevent women's participation in the project's national coordination mechanism? How will the project be encouraging the equitable participation of men and women? (iv) How to ensure equity between man and women in the project led activities? (v) How to prevent that SLM and energy access strategies promote a widened gap between man and women in Chad; e.g. will women be able to participate effectively in cooperatives or have access to newly introduced tools considering women has restricted access to productive and financial resources in Chad. The gender analysis will be the precursor of implementing gender-responsive land degradation interventions. This approach will identify and address differentiated roles, capacity gaps and opportunities that affect land management across gender categories.

The project will improve women's access to Ouadis for market gardening, etc. by negotiating with the traditional chiefs to release plots on new areas to be developed by women, so they can invest in and benefit from the yield of their own land. The project will support women participation on various Renewable Energy capacity building trainings that are planned as part of this project.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes

closing gender gaps in access to and control over natural resources; Yes

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women. Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

According to the Chad Ministry of Agriculture, By most estimates, 80 percent of Chad's population relies on agriculture, livestock, or fishing. The market is primarily domestic, and Chad imports a significant number of foodstuffs from Cameroon. There is little value-added production of agricultural products. Chad's primary agricultural exports include gum arabic, sesame, and cotton. The Government of Chad prioritized the industrialization of agriculture and boosting exports in its 2017 - 2021 national development plan to reduce dependence on oil exports and increase tax revenue. Chad exported USD 33.8 million of sesame seeds and USD 21.5 million of gum Arabic in 2019, according to the International Trade Centre. Other potential export crops include peanuts, shea butter, hibiscus, cashews, dates, moringa, and spirulina.

The Government of Chad and Chadian entrepreneurs seek to improve agricultural production in Chad through modernization, mechanization, better seeds, improved irrigation, and food processing and packaging. There is demand for agricultural equipment and inputs from both the government and private sector. Lack of access to capital is a constraint in this area. Chad is the second largest global producer of premium grade gum arabic. Chadian producers currently sell to intermediaries and wholesalers to export to the United States, China, and Europe. Producers are interested in exporting directly to the United States. Chadian partners seek relationships with U.S. importers to facilitate direct exports. Chad is one of the world's largest suppliers of sesame seed. White and black sesame seeds are grown in southern and central Chad. Other foods, e.g. mangos, cashews, peanuts, and dates, are widely grown in Chad but are not packaged, processed, or exported. This presents an opportunity for investment. There is a growing market for natural products from Chad. At least one U.S. company is exporting Chadian shea butter to the United States and China. There is small-scale production of moringa, spirulina, karaya gum, hibiscus, and other natural products. Chadian producers and intermediaries seek new markets for these goods, and there are opportunities for export and investment in value-added processing and packaging.

The involvement of private sector partners in the project will ensure the financial viability and therefore the rate of return of the projects. To date, the lack of involvement of the private sector in operated mini-grids in the country has been the high up-front cost for non-Capex investments such as licensing and design that are made higher with the remoteness of the sites, and the lack of adequate concessional terms from local financing. Local Bank lends at rates much higher than the expected returns. Achieving scale in a fragmented manner could be very challenging, as markets are relatively small and landlocked, with limited availability of capital in a post-COVID context.

Working within these constraints, the proposed project will engage with private sector through the following stakeholders:

- Agence pour le Développement de l'Électrification Rurale et de la Maîtrise de l'Énergie: It is not a private sector institution, but it helps to mobilize the private sector. It is an agency whose mission is to promote, and implement the National Emergency Access Plan to Electricity, and mobilize public-private initiatives in support of the plan.
- Technology providers and potential investors. The private sector will lead in the design of renewable energy systems to be established in the Kanem region as part of this project

- The Societe Nationale d'Electricite (SNE): The company has an ambitious objective of promoting mini-Grid Solar Energy in Remote areas of the country. Specific targets have been identified in the National Energies Policies. The project will engage with the company for the promotion of Solar Energy at the rural level but also for the purchase of energy access that will be generated from the mini-Grid.

The project will help to explore public-private partnerships with local cooperatives' local investors/informal sector actors. Traditionally, public-private partnerships are considered from the dimension of attracting foreign investments alone. However, there is an opportunity to leverage them to mop-up local investments using the same dynamic of partnerships that are being explored for the power-purchase agreements. The government invests in delivering the capital infrastructure, which they also own, and then they transfer to beneficiary communities through their cooperatives, and these local communities are then responsible for operating and maintaining this infrastructure.

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Some specific risks have been identified and together with mitigations measures are presented in the table below:

Component	Risks	Proposed Mitigation Measure	Risk level
Technical risks	The SLM practices adapted to the ecological situation of the project sites may not be well mastered by key stakeholders and The Solar water pumping based mini-grid technologies are not technically viable for electricity generation in rural areas	Detailed techno-economic feasibility studies to be carried out on identified sites in relation to the SLM and mini-grids established at proven sites. UNEP will use its portfolio experiences to mobilise expertise to build national capacities on SLM and Solar pumping system and renewable energy mini-Grid power distribution	Low
Economic and financial risks	The SLM technologies and Solar water pumping mini-grids are not financially viable in rural areas.	The project will support initial investment to support cooperative to establish the system. Focus on private and cooperative led nurseries; productive uses powered by the energy produced, so that the seedlings produced and energy generated are used to create value/service for the communities women and men by the organized cooperative and/or private sector, which can spread the benefits to the communities.	Moderate
Market risks	Increased investments on renewable energy based mini-grids do not provide high enough returns Lack of funding for replicating the pilot projects.	Favoring the emergence of cooperative and Involvement of private sector partners will ensure the financial viability and therefore rate of return of the projects. Also focus on providing energy for productive uses. Mobilize stakeholders' participation, especially IFIs and private sector, at an early	High

	The surplus of solar energy generate is not purchase by the Societe Nationale d'Electricite (SNE)	stage and in the project implementation process The project will develop the capacity of the cooperatives to manage energy surplus by finding local options to direct saling of power to local residents	Moderate
Policy, regulatory and institutional framework	Policy and regulatory as well as institutional framework not in place	An energy policy and a renewable energy master plan both exist in Chad, and the institutional mechanism such as the Ministry of Energy, l'Agence pour le Développement des Energies Renouvelables (ADER), l'Agence pour l'Energie Domestique et l'Environnement, l'Autorité de régulation du secteur de l'énergie électrique (ARSE) etc have been created.	Low
Safety disposal of/or recycling	Safely disposal and/or recycling of solar panels is important for the	The project will coordinate with the national child project in Chad of the Africa Mini-grid	Low

of solar panel	project sustainability	Project, which incorporates a provision for the safe disposal of solar panels. The two projects will work together to come up with a common approach for disposal/or recycling of Solar Panels. The two projects' IAs are already talking to each other on possible synergy and complementarity. This will be thoroughly assessed during PPG and an harmonized approach will be adopted within the framework of nationa regulations related to	
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		Environmental impact assessment.	
Sustainability	Mechanical and biological ecological insfratstructures and Solar water pumping mini-grids plants do not follow sustainability principles	Detailed techno-economic studies and provision for productive uses in the beneficiary communities men and women, will ensure sustainability of the project. Adequate local structures including cooperative will be created/supported and their capacity built on sustainability approach to project activities. This sustainability approach will include also the disposal and or recycling of solar panels.	Low
COVID -19 (See details below)	COVID-19 could also spread in the country and limit countries' ability to implement the project	Chad has been relatively affected by COVID-19. In addition the country put in place some specific measures to address the impacts of COVID-19.	Low to Medium
Government fulfilment of its commitment on cofinacing	Insufficient budget stability from Government cofinacing entities	While this is a possible Risk, it is good to Note that the targeted cofinacing entities have autonomous management mode which escape from the Government budget instability. These entities have predictable resources even though the somehow military government situation may impose another style of management . However, the commitment of the Government to this GEF project will likely favor a smooth budget reelease to cofinacing entities	Moderate
Internal political issues and fragility of communities	Chad is experiency political instability since the Boko Haram sporadic invasion in Lake Chad Area. This has been exacerbated by the passing away of President Idriss Deby Into. The situation has also created fragility of the communities as result of arm conflicts	The project will assess the political and security situation and comprehensive mitigation measures provided based on the assessment of the situation.	Medium

Climate change and Security risks:

According to the World Bank Chad Country Program Evaluation, March 20, 2020, the four fragility drivers in Chad have exposed three elevated risks to development progress in the country. First, the dynamics of ongoing regional conflicts continue to undermine people's ability to deal with the consequences of the increasingly variable climate. Displacement and restrictions on people's movement owing to potential and perceived conflict prevent communities from strategically relocating for agricultural purposes, and years of violence, both internal and external, have resulted in weaker social cohesion. Second, displacement has increased competition for resources such as pastoral lands and water. This diminishes the effectiveness of traditional approaches to restitution. Third, limited economic opportunities have exposed the population to potential recruitment by armed opposition groups. Although not yet widespread, the perceived lack of state legitimacy, increasingly vulnerable livelihoods, and the lure of financial incentives for recruits make this a viable option, particularly for young unemployed males.

In response to conflict, the government has financed a strong security presence to shore up its national boundaries. This has been partly successful in preventing an influx of extremists from neighboring countries, but it has also diverted resources away from other public goods and services.² In addition, the demands of supporting displaced populations have stretched the already limited capacity of government systems.

COVID 19 Risks: In Chad, from 3 January 2020 to 6 September 2021, there have been 4,997 confirmed cases of COVID-19 with 174 deaths, reported to WHO. As of 2 September 2021, a total of 68,267 vaccine doses have been administered (WHO, 2021). The Government of Chad conducted, in collaboration with its technical partners, a study on the impact of COVID-19 on social life and the economy of the country. According to the results of this study, the pandemic has greatly affected these two aspects of life. These impacts could be explained by the prevention and response measures that the Government took to control the pandemic, as other countries did around the world. These measures -closure of land and air borders, limited inter-city movements, closure of businesses and schools, curfew, ban on gatherings, to name a few - have severely impacted several sectors including basic social services such as health, food, education, WASH, and the economy.

The economic dimension includes agriculture, trade, tourism, transport and the private sector (small and medium-sized enterprises and industries), with an important loss in income and employment. The economic aspect has also led to the increase in food prices as a result of the supply chain disruption and indirect effects related to a weak fiscal state of the Government caused by high expenditures to counter the crisis, and a small mobilization of fiscal resources. The social consequences of COVID-19 affect the health, nutrition and education sectors, among others. As to food security, at the national level, the consensus analysis using the Harmonized Framework of March 2020 reported 15 departments in crisis phase and 38 departments in under pressure phase. For the period from June to August, more than 1 million people have been reported to be in crisis phase or worse. This represents a 59 percent increase compared to 2019. Moreover, around 82,000 daily workers in N'Djamena will see their income affected by the crisis and the severity of food insecurity will increase for approximately 320,000 people.

Measures taken by the Chadian Government led to the closure of markets and the interruption of most commercial activities. Only those involved in food and medicine sales were not affected by these measures. Revenue loss for the month of April 2020 is estimated at XAF 74.6 billion. The profit that should have been generated from these revenues is estimated at XAF 22.4 billion -30 percent of revenues. Monthly losses related to the closure of economic businesses such as hotels, restaurants and bars in the city of N'Djamena are estimated at XAF 6.2 billion. This loss is divided between different branches -restaurants, hotels, barbecue joints, bars, cafés and cabarets - for a total loss estimated at XAF 42.6 billion.

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Project activities to address the Covid-19 situation: To adhere to the principle of do no harm, the project team will not engage in any activity, or promote engagement in any activity that may place either a team member, a stakeholder or respondent, or a third party at risk of being infected by the virus. Practically, this means that data collection efforts, team meetings, and engagement with other stakeholders will be held virtually when possible, and with all the necessary precautions if face-to-face meeting are imperative. The team will capitalize on resources by relying on national and local consultants to support data collection through their early-on contact with local respondents. The national consultants will spend considerable time encouraging the participation of local counterparts, some of which may be less familiar with remote platforms.

Specifically, during the PPG, the following will be done to assess the situation of Covid-19 in the project location:

1. Identify and review planned activities under the project requiring stakeholder engagement and public consultations.
2. Assess the level of proposed direct engagement with stakeholders, including location and size of proposed gatherings, frequency of engagement, categories of stakeholders (international, national, local) etc.
3. Assess the level of risks of the virus transmission for these engagements, and how restrictions that are in effect in the country / project area would affect these engagements.
4. Identify project activities for which consultation/engagement is critical and cannot be postponed without having significant impact on project timelines. For example, selection of resettlement options by affected people during project implementation. Reflecting the specific activity, consider viable means of achieving the necessary input from stakeholders.

5. Assess the level of ICT penetration among key stakeholder groups, to identify the type of communication channels that can be effectively used in the project context to avoid unnecessary contacts where possible.
6. Based on the above, the project implementing body will identify the specific channels of communication that should be used while conducting stakeholder consultation and engagement activities.

Climate Change Risks :

- Climate Change Risks on water resources: Current projections of water availability in Chad display high uncertainty under both GHG emissions scenarios. Assuming a constant population level, multi-model median projections suggest almost no change in per capita water availability over Chad by the end of the century under either RCPs (Figure 8A). Yet, when accounting for population growth according to SSP2 projections 5 , per capita water availability for Chad is projected to decline by 75 % by 2080 relative to the year 2000 under both scenarios (Figure 8B). While this decline is primarily driven by population growth rather than climate change, it highlights the urgency to invest in water saving measures and technologies for future water consumption
- Climate change risks on Ecosystems: Climate change is expected to have a significant influence on the ecology and distribution of tropical ecosystems, though the magnitude, rate and direction of these changes are uncertain. With rising temperatures and increased frequency and intensity of droughts, wetlands and riverine systems are increasingly at risk of being converted to other ecosystems with plants being succeeded and animals losing habitats. Increased temperatures and droughts can also influence succession in forest systems while concurrently increasing the risk of invasive species, all of which affect ecosystems. The models applied for climate analysis show models increases in the number of species of up to 40 % for north-eastern Chad and decreases of up to 20 % for the western and southern parts of the country by 2080. With regards to tree cover, model projections vary depending on the scenario. Under some models a decrease in tree cover of 2 % for the very south of Chad, while under other models, tree cover is projected to increase by 2 % in the south of the country by 2080. Although these results paint a rather positive picture for climate change impacts on tree cover, it is important to keep in mind that the model projections exclude any impacts on biodiversity loss from human activities such as land use, which have been responsible for significant losses of global biodiversity in the past, and are expected to remain its main driver in the future . For example, population influxes in affected areas, need for pasture and agricultural land and logging have resulted in high rates of deforestation: Chad has lost 1.54 million ha of forest cover in the period from 2001 to 2016, which is equivalent to a 25 % decrease.
- Climate Risk on Agriculture: Smallholder farmers (both men and women) in Chad are increasingly challenged by the uncertainty and variability of weather that climate change causes. Since crops are predominantly rainfed, they depend on water availability from precipitation. However, the length and intensity of the rainy season is becoming increasingly unpredictable, and the use of irrigation facilities remains limited due to high costs of initial investment, inefficient use of water resources and a lack of water storage and delivery techniques. In 2002, less than 8 % of the estimated irrigation potential of 335 000 ha (0.7 % of the total national crop land) was irrigated. Especially in central and northern Chad, soils are poor in nutrients, sandy and shallow, which has a negative effect on water retention, making soils vulnerable to drying and erosion. Currently, the high uncertainty of projections regarding water availability translates into high uncertainty of drought projections (Figure 10). According to the median over all models employed for this analysis, the national crop land area exposed to at least one drought per year will hardly change in response to global warming. However, there are models that project a strong increase in drought exposure.

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

The proposed project will coordinate with the AfDB and the WB-funded program described in the Baseline. Adequate complementarity and synergy with these projects will be identified and negotiated during the PPG phase. In any case, the project will coordinate with:

- The World Bank/GEF project “Improved Natural Resource Management and Livelihoods for the Ouadi Rime and Ouadi Achim Communities”: The \$54.5 million project from the International Development Association (IDA) and the Global Environment Facility (GEF) project objective is to improve natural resource management and the livelihoods of the populations in climate-vulnerable areas in the Ouadi Rime and Ouadi Achim (OROA) Reserve in the central-north region of the Chadian Sahelo-Saharan zone. The project aims at improving the livelihoods of the communities while conserving biodiversity and mitigating the impact of climate change. The project will also address the following constraints and issues: the lack of good practices on the sustainable use of natural resources, limited livelihood options for the most vulnerable communities, the vulnerability of communities to climate shocks, inadequate management of protected areas, and poor-quality access to water and sanitation. The UNEP/GEF project will coordinate with this project to learn from the natural resources good practices use, livelihood options, and access to water.
- The UNDP/GEF Africa Mini Grid project, notably by facilitating communication, generation, and dissemination of lessons learned, building on strengths, and avoiding duplication. The two project will also work closely to develop a common approach for the disposal/recycling of solar panels.
- The AfDB/GEF project Strengthening rural and urban resilience to climate change and variability by the provision of water supply and sanitation in Chad. The project aims at Developing climate change resilience in the Chadian water sector by providing sustainable infrastructure and management tools to rural populations, and mainstreaming climate change risk and data at the national level;
- The AfDB/GEF Chad child project LCB-NREE Integrated management of natural resources in the Chadian part of the Lake Chad basin. The GEF project will address the underlying drivers of resource degradation, the functional integrity of ecosystems, and span the full array of natural assets needed in a Sahelian context
- The World Bank \$295 million grant from the International Development Association (IDA)* to help Chad expand its access to energy. The Chad Energy Access Scale Up Project (PAAET) approved in May 2022.
- the Djermaya Solar project
- Sahel Solaire Compagny

During the PPG phase following engagement with all stakeholders and discussion with different GEF and non-GEF initiative, a comprehensive coordination mechanism will be developed and submitted at CEO Endorsement.

The project will be implemented by the Ministry of Environment, Fisheries, and Sustainable Development. A project Management Unit will be established with limited staff as to encourage local capacity building subcontracting with CSO and CBO for on-the-ground activities will be strongly considered. The PMU will include relevant staff with capacity on Ouadis management, Solar power management, gender and stakeholders engagement issues and monitoring and evaluation. A steering committee will be established by the Ministry with members coming from various sectors including, agriculture, livestock production and management, fisheries, gender, CSO, local development, UNEP among other. A comprehensive project Institutional arrangement will be discussed and presented in CEO endorsement request during the PPG.

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions?

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

The issue of environment protection is enshrined in articles 47 and 52 of the Constitution of Chad, and Act N°014/PR/1998 defines the general principles for protecting the environment. In 1992, Chad signed the United Nations Framework Convention on Climate Change (UNFCCC), which was ratified on 30 April 1993. Since then, the country has produced the Initial and Second National Communications relating to climate change, in accordance with the relevant UNFCCC provisions. This demonstrates Chad's desire to make an effective contribution to the global effort to combat global warming, to which the country is highly vulnerable given the fragility of its ecosystems and its economy, which is highly dependent on sectors that are sensitive to climate change. The Project is supportive of the objectives of the UNFCCC, and with the commitments that Chad made for national GHG reductions. Chad has submitted its second Second National Communication (SNC) to the UNFCCC, and have made significant pledges to reduce GHG emissions in their Nationally Determined Contributions (NDC). Chad has identified the energy sector, including off-grid electrification, as one of their key priorities for achieving their emissions reduction targets set in their NDC. The project also support Land degradation Neutrality as outlined by Chad in its LDN targets, specifically: By 2040, restoring 1 738.8 km² of forest, and 29 000 km² of degraded zones.

The Government's main development priorities are embedded in "Vision 2030: The Chad we want", a strategic framework to be implemented through consecutive National development plans (NDP): beginning with the 2017–2021 NDP, and to be followed with two future NPD over the periods 2022-2026 and 2027-2030. The GEF Project is aligned with this Vision and is directly contributing to one of the four strategic axes of the Vision, which focuses on improving the Quality of Life of the Chad People, and include two (2) sub-axes: (i) a healthy environment with preserved natural resources; and (ii) an environment conducive to the flourishing and well-being of the Chad people. This project is also in alignment with the 2017-2021' NDP. Its aims to ensure the sustainable management of natural resources and implement policies to adapt to climate change. The main objective of the NDP that are in alignment with this project is that of achieving food security through investments in the rural agro-pastoral sectors. The main sectors relevant to this project are those of agriculture, livestock, water and the environment.

At the sectoral level, the project will contribute towards the implementation of national laws and degrees of Chad as follows:

- Decree n° 904 / pr / pm / merh / 2009 regulating pollution and nuisances to the environment. This Decree defines the rules relating to pollution and environmental nuisances, in accordance with Title V of Law No. 014 / PR / 98 of August 17, 1998. It aims to protect the environment against any form of degradation, alteration and its sustainable management, as well as the improvement of the framework and the living conditions of the population;
- Law n° 016 / PR / 99 for the Water Code: The Law covers inter alia special conditions for the collection, treatment, storage, supply of drinking water and sanitation; conditions surrounding the use of water; the approval mechanism for hydraulic works; and offenses and penalties for non-compliance. All water resources are a collective asset forming part of the public domain of the State and their exploitation is subject to declaration or authorization by the Ministry of Water.
- Law n° 014 / PR / 98 defining the general principles of environmental protection. This law establishes the fundamental principles for the sustainable management of the environment and its protection against all forms of degradation, in order to safeguard and develop natural resources and improve the

living conditions of the population. This project is designed to respond to those challenges and help deliver on the Law's objectives for Chad's environmental well-being.

- The 2015 Environmental Education National strategy and its four Strategic Axis: Axis 1: Capacity building of institutional structures and stakeholders involved in Environmental Education (EE); Axis 2: Establishment of a coordination and collaboration framework for stakeholders involved in EE; Axis 3: Establishment of communication mechanisms in EE at all levels; and Axis 4: Promotion of scientific research in the field of the environment.
- The Chad's National Strategy to Combat Climate Change– NSCCCC, (2017). This NSCCCC aims for the sustainable and coherent integration of the challenges in Climate Change Adaptation and mitigation into national development policies as well as improving effective coordination of initiatives aimed at the fight against climate change. This project will support and promote good sustainable land management practices including agroforestry and other agricultural value chains, which will help boost soil quality and land productivity, while conserving and enhancing carbon stocks.
- The Chad's commitments under the UNFCCC, as detailed in the national communications to the UNFCCC (2001 and 2012), the National Adaptation Program of Action – NAPA, (2009), its nationally determined contributions – NDC (2015), and its National Adaptation Plan (NAP). Chad has identified the energy sector, including off-grid electrification, as one of their key priorities for achieving their emissions reduction targets set in their NDC. This alignment is therefore done through the focus on combating land degradation through promotion of SLM which will make use of Solar energy for pumping water for irrigation and use of the access in mini-grid system to support energy access for local communities. Concerning NAP: There at present no NAP for Chad and its development will be supported as part the UNDP/GEF project Chad National Adaptation Plan Project. This project will aim to also contribute to the NAP development process through increasing access to the socioeconomic and climate information concerning Ouadis ecosystems. It will provide knowledge of the land degradation dynamic in Ouadis ecosystems, and appropriate good restoration practices in Ouadis ecosystems, which may inform planning and policy making in climate-sensitive sectors as well as working to integrate medium and long-term climate considerations into planning and budgeting processes.
- .The National Strategy on Water, Sanitation and Hygiene in the School Environment (2018-2030), which is to promote the adoption of good hygiene practices by students and their families. While the project will not specifically target sanitation improvements in schools, it will be closely relevant to the national strategy to improve sanitation to vulnerable youth, women and elderly as well as men. The project will aim to improve access to and efficiency in the use of water for multiple purposes. Improved access to water for multiple uses will be accessible to all without favoritism including school pupils
- The Chad's commitments under the United Nations Convention to Combat Desertification (UNCCD). Through the Land Degradation Neutrality (LDN) Target Setting Programme, Chad has set its LDN targets and the Government is committed to achieving LDN by 2040. This GEF project will directly contribute towards achieving the LDN targets, both at national level and sub national areas where project interventions are planned through promotion of good SLM practices applicable to Ouadis restoration/protection, Investment on high capacity solar water pumps to provide water for production systems which integrate good SLM practices and access to solar energy for multiple benefits, land Use Plans development and implementation in selected pilot Ouadis, and capacity strengthening of local communities cooperative legally created for management of infrastructure and community resources.
- The National Biodiversity Strategy and Action Plan (NBSAP) for Chad. The overall objective targeted through the Action Plan is to slow down in the short term the trend of loss of biological diversity and the degradation of its biotopes through sustainable participatory management strengthening current achievements. The specific objectives of the Action Plan include to: strengthen the conservation of ecosystems and endangered species and / or of marked importance; promote the sustainable use of biological resources of known or potential value; ensure a fair and equitable sharing of the benefits arising from the exploitation of biological resources (especially genetic). The project is aligned with the Strategy and Action Plan through the promotion of SLM techniques and approaches that will help reduce soil degradation and improve soil fertility, and preserve the integrity of Ouadis and its biodiversity.

The above-mentioned framework and many other ones will be assessed during the PPG phase and their linkage to gender mainstreaming and gender equity and how it can support the project will be conducted.

8. Knowledge Management

Outline the knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

The knowledge management approach will include developing synergies and networking with similar projects in the country and the region, and also sharing important lessons generated by the project itself with the participating institutions and associated projects. UNEP as implementing agency will play a key role by promoting interaction between the project and similar initiatives in the region. The Knowledge Management (KM) of this project will build on, and learn from, the UNDP Africa Mini-Grid Project as well as on other projects outlines in the baseline. The Knowledge management of this project will also provide targeted technical assistance to potential entrepreneurs in Renewables energy to increase stakeholder knowledge on the design and operations of mini grid projects. Finally, it will establish mechanisms for assimilating, documenting, and sharing knowledge gained through project experiences. KM instruments such as knowledge products, Community of Practice, KM Platform, exchanges and field visits, online learning events, and learning and training workshops will promote and strengthen sharing of lessons learned and best practices to support stakeholders in their efforts to operate mini-grid projects. In order to enable the development of future replication and scaling-up plans, this project will promote a systematic approach in order to: (i) identify knowledge deemed to be relevant and valuable; (ii) capture and retain that knowledge; (iii) share that knowledge with key audiences; and (iv) design guidelines for future replication and upscaling. Furthermore, in the development and designing of knowledge products, it will be included a gender-sensitive approach in which the following principles will be considered:

- Use male and female knowledge product, communication, and public education material developers for the diversity of perspectives and approaches, as well as male and female reviewers of these products.
- Use gender-sensitive language and gender-balanced images (women are not presented as victims but as agents of change).
- Check context and content (use gender analysis; use convincing gender arguments based on reliable sources and qualitative and quantitative data including sex-disaggregated data).
- Refer to (inter-)national policy framework, policies, strategies, and plans, as applicable and appropriate.

9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF

CEO Endorsement/Approval MTR

TE

Medium/Moderate

Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

This is likely a moderate-risk project. Some potential risks are identified. They should be further assessed during the project development phase through consultation with local and indigenous people, site visits, and expert monitoring of the project. Having a person to respond to the community concerns and grievance matters via prompt and close communication will also be critical. Furthermore, the risk related to security, and community fragility will be part of the PPG assessment activities and the Risk table will be updated to include the mitigation measures identified.

Supporting Documents

Upload available ESS supporting documents.

Title

Submitted

SRIF CHAD FSP Document

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Oumar Gadji Soumaila	GEF Operational Focal Point	MINISTRY OF ENVIRONMENT, FISHERIES AND SUSTAINABLE DEVELOPMENT	7/5/2021

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

