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Annex 2- FEASIBILITY STUDY FOR THE FORMULATION OF THE FUNDING PROPOSAL

“Improving Climate Resilience in the Steppe and Dry Forest Areas of the Algerian Green Dam”

To be submitted to the Green Climate Fund (GCF)

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Abbreviations

AEP: Drinking Water Supply
ACL: Main Town Agglomeration
ACC: Adaptation to climate change
ADEP: Associations for the Development of Pastoral Livestock Farming
AEI: Industrial Water Supply
AFOLU: agriculture, forestry and other land use
AFR100: African Forest Landscape Restoration Initiative
AGD: Algerian Green Dam
ANAT: National Agency for Territorial Development
ANBT: National Agency for Dams and Water Transfers
ANCC: National Climate Change Agency
ANGEM: National Agency for Microcredit Management
ANN: National Nature Conservation Agency
ANRH: National Water Resources Agency
APC: Communal People's Assembly (commune: smallest administrative unit)
APFA: Access to Agricultural Land Ownership
ARV: Risk and Vulnerability Analysis
ARC-BVA: Improving climate resilience at the Algerian Green Dam
AS: Secondary Agglomerations
ASAL: Algerian Space Agency
BNEDER: National Bureau of Studies for Rural Development
BAE: Branches of Economic Activities
BTPH: Building, Public Works and Housing
CBD: Convention on Biological Diversity
CC: Climate Change
CCLS: Cereal and Legumes Cooperatives
CDARS: Commission for the Development of Agriculture in the Saharan Regions
CDER: Centre for the Development of Renewable Energies
NDC: Nationally Determined Contribution
VDC: Value Chain
CFPA: Vocational Training and Apprenticeship Center
CES: Water and Soil Conservation
CFW: Wilaya Forest Conservation
CH₄: methane
CMIP: Coupled Model Intercomparison Project
CNAC: National Unemployment Insurance Fund
CNAS: National Health Insurance Fund
CRAPast: Research Centre for Agropastoralism
CASNOS: National Social Security Fund for the Self-Employed
CNTS: National Centre for Space Technologies
CO₂: Carbon Dioxide
CSU: Universal Health Coverage
CPDN: Nationally Determined Contribution
CEPRA: Pastoral Livestock Cooperatives of the Agrarian Revolution
UNFCCC: United Nations Conference on Climate Change
CRSTRA: Scientific and Technical Research Centre on Arid Regions
DFCI: Forest Fire Prevention Service
DGE: Directorate General of Environment
DGF: Directorate General of Forests
DHW: Wilaya Hydraulic Directorates
DDZASA: Directorate for the Development of Arid and Semi-Arid Zones (MADRP)
DRE: Directorate of Water Resources

DE: Education Directorate
 DRS: Soil Defence and Restoration
 DSA: Directorate of Agricultural Services (MADRP)
 DPSB: Directorate of Planning and Budget Monitoring
 EEP: Permanent Employment Equivalent
 EPA: Drinking Water and Sanitation
 EPA: Public Administrative Establishment
 EPST: Public Scientific and Technological Establishment
 EPIC: Public Industrial and Commercial Establishment
 ESS: Environmental and Social Standards
 ETP: Evapotranspiration
 FAO: Food and Agriculture Organization
 FNRA: National Fund for the Agrarian Revolution
 FGC: Green Climate Fund
 GAG: Drip Irrigation (Localized Irrigation Network)
 GCA: General Agricultural Concessions
 GCF: Green Climate Fund
 GES: Greenhouse Gases
 GGR: Rural engineering group
 GIS: Geographic Information Systems
 IPCC: Intergovernmental Panel on Climate Change
 GWM: Great Green Wall
 GTST: Thematic, Scientific and Technical Working Groups
 ha: hectare
 Inhabitant: resident
 HCDS: High Commission for the Development of the Steppe
 HLPE: High Level Panel of Experts on Food Security and Nutrition
 TFR: Total Fertility Rate
 ILO: International Labour Organization
 INRAA: National Institute of Agronomic Research of Algeria
 INRF: National Institute of Forestry Research
 IPCC: Intergovernmental Panel on Climate Change
 ISD: Desertification Sensitivity Index
 MADRP: Ministry of Agriculture, Rural Development and Fisheries
 MDDR: Minister Delegate for Rural Development
 MATE: Ministry of Territorial Development and the Environment
 MAE: Ministry of Foreign Affairs
 MoE: Ministry of the Environment
 MENA: Middle East and North Africa
 MODIS: Moderate-Resolution Imaging Spectroradiometer
 MRE: Ministry of Water Resources
 NASDA: National Agency for Entrepreneurship Support and Development
 NC: Concept Note
 NDVI: Normalized Difference Vegetation Index
 NDA: National Implementing Agency
 NDC: Nationally Determined Contribution
 NEXT: Nationally Determined Contribution Expert Tool
 N2O: Nitrous Oxide
 NGARA: Network for natural gums and resins in Africa;
 NWFP: Non-Wood Forest Product
 OAIC: Algerian Interprofessional Cereals Office
 ONS: National Statistics Office
 OSS: Sahara and Sahel Observatory
 P: Rainfall
 PAM: Aromatic and Medicinal Plant

PAPC: President APC
 PNB: Belezma National Park
 PNC: National Climate Plan
 PNE: National Water Plan
 PNDAR: National Agricultural and Rural Development Plan
 PDRI: Integrated Rural Development Local Projects
 PPG: Seed Planting
 PRAR: Agricultural and Rural Renewal Program
 PRCHAT: Capacity Building and Technical Assistance Program
 RCP: Representative Concentration Pathway
 RFP: Not subject to a call for applications
 RGPB: General Population and Housing Census
 RNV: National Voluntary Review
 SAP: Early Warning System
 SDGs: Sustainable Development Goals
 SGAE: Global Wind Energy Action System
 SASS: Northern Sahara Aquifer System
 SAU: Utilised Agricultural Area
 SIPSRI: Project Monitoring Information System
 SNMG: National Guaranteed Minimum Wage
 SMART: Project Monitoring Indicator
 SMAS: Maghreb Drought Alert System
 SNAT: National Spatial Planning Scheme
 SPANB: National Biodiversity Strategy and Action Plan
 SSP: Shared Socioeconomic Pathways
 t: tonne
 tCO₂: tonne CO₂
 T: Temperature
 TAAM: Average Annual Growth Rate
 TE: Supervision Ratio
 ToC: Theory of Change
 TDS: School Dropout Rate;
 TS: School Enrollment Rate
 TOL: Occupancy Rate per Dwelling
 TPF: Firebreak Trench
 UDES: Solar Equipment Development Unit
 UF: Forage Unit
 UN: United Nations
 UNCCD: United Nations Convention to Combat Desertification
 UNCBD: United Nations Convention on Biological Diversity
 UNFCCC: United Nations Framework Convention on Climate Change
 UNESCO: United Nations Educational, Scientific and Cultural Organization
 URAER: Applied Research Unit in Renewable Energies
 URERMS: Renewable Energy Research Unit in the Saharan Environment
 USD: United States Dollars
 VC: Value chain
 VCI: Vegetation Climate Index
 WCRP: World Climate Research Programme
 WHO: World Health Organization
 Wilaya: Highest administrative level
 ZE: Scattered Zone

1. PROJECT PRESENTATION

1.1. Genesis of the project

April 2017: A multidisciplinary mission of the United Nations Food and Agriculture Organization (FAO) took place within the framework of strengthening cooperation between Algeria and FAO in the areas of climate change, strategic water resource planning, and combating land degradation. During this mission, the General Directorate of Forests (DGF), under the Ministry of Agriculture, Rural Development and Fisheries (MADRP), organized a workshop and a field visit to the wilaya of Djelfa in the Green Dam area. Following the mission, discussions were initiated between FAO and the Algerian government to support the development of a Green Climate Fund (GCF) project in the Green Dam area.

Between April and December 2017: The DGF conducted consultations with the Directorate General for Economic Relations and International Cooperation of the Ministry of Foreign Affairs (MAE) and with the Ministry of Environment (MOE), acting as the National Designated Authority (NDA), to discuss the feasibility of the GCF project. On December 10, 2017, MOE as the GCF focal point in Algeria, submitted a letter of interest to FAO requesting support to assist DGF/MADRP in developing a GCF concept note (CN) for the Green Dam area. On December 19, 2017, an initial meeting was held between FAO and local counterparts, including MAE, the Great Green Wall project focal point at the DGF, and the Directorate for Combating Desertification (serving as focal point of the United Nations Convention to Combat Desertification – UNCCD).

March 2018: A joint mission was organized to present and discuss the evaluation report of previous programs in the Green Dam area with all relevant stakeholders. The mission included field visits to the wilayas of Bouira and M'Sila to discuss the project with local authorities and potential beneficiaries, including representatives of the private sector. During the mission, a national workshop was held on March 6, 2018, with the participation of DGF (General Directorate of Forests), the National Institute of Forestry Research (INRF), the National Bureau of Studies for Rural Development (BNEDER), the Directorate for the Development of Arid and Semi-Arid Zones (DDZASA) at MADRP, and MOE (as NDA), for the validation of the concept note.

May 2018: MOE organized a working meeting with the environmental commission, which reviewed and approved the draft concept note. Further consultations took place throughout 2018 to refine the concept note, and on January 8, 2019, the DGF submitted the co-financing letter for the project, including actions financed from the state budget and in-kind contributions.

2019: Additional consultations were conducted. A meeting was held on April 24, 2019, at the Ministry of Foreign Affairs to examine the concept note. On October 1, 2019, an information day was organized on the progress of the Green Dam program. This event enabled participants to exchange views and validate the action plan developed by the DGF for the rehabilitation and expansion of the Green Dam, in accordance with the sector's strategy for 2035 and the recommendations of the BNEDER study. More than 300 participants attended this event, including ministers, governors, ambassadors, decision-makers from various sectors, partners, UN organizations, scientists, retired professionals, social partners, representatives of civil society, and members of the press.

In accordance with the resolutions of the Interministerial Council of September 21, 2019, which regulate agricultural programs, the creation of a new "Green Dam and Combating Desertification" directorate was recommended. This permanent national mechanism and consultative structure will include all relevant ministries and coordinate the activities of the Green Dam initiative.

Once the project enters the full preparation phase, additional missions will be organized to initiate detailed preparation activities, including the economic feasibility study, detailed needs assessments, analysis of population adaptation capacities, environmental and social risk assessments, and stakeholder engagement within the project area, among others. Given the cross-sectoral nature of the project—covering agro-sylvo-pastoral production, marketing, and enabling policies—it will be essential

to ensure the active participation of all relevant institutions across sectors (forestry, livestock, agriculture, water resource management, trade, tourism, crafts, etc.) and along the respective value chains (primarily livestock products, fodder production, and non-timber forest products – NWFPs).

1.2. Project Executive Summary

The project “Improving climate resilience in the steppe and dry forest areas of the Algerian Green Dam,” relating to the public sector and of a confidential nature, was the subject of a concept note (CN) not subject to a request for proposals (RFP), in compliance with accreditation standards, shared with the focal point, signed, and included in the DGF work program (executing agency).

The project will operate in the sectors of soil and natural ecosystem protection, desertification control, water management, agriculture, environment, and land-use planning. As such, the project will generate both climate change (CC) mitigation and adaptation impacts. The project’s expected results in terms of mitigation and adaptation consist of increased resilience of: (i) forest, pre-forest, and steppe ecosystems; and (ii) the most vulnerable populations and groups, particularly in relation to health, well-being, and access to water.

The project reaches a total of 1,084,103 beneficiaries, including 142,433 direct beneficiaries and 941,670 indirect beneficiaries. Women account for 489,064 beneficiaries, representing approximately 45% of the total population reached.

The Algerian Green Dam (Barrage Vert, AGD), launched in 1971, is one of Algeria’s most ambitious environmental programs, creating a forested ecological belt approximately 1,500 km long and 20 km wide, from the Moroccan to the Tunisian border, bounded by the Saharan Atlas Mountains to the south. Situated in Algeria's pre-Saharan arid and semi-arid zones. AGD covers approximately 4.7 million ha across 13 wilayas and 187 communes. The broader Steppe Agro-ecological Domain (AGD) in which it lies extends over 32 million ha (9% of Algeria's total area), comprising 20 million ha of steppe, and 12 million ha of pre-Saharan rangeland, with land use dominated by pastoral activities (70%), followed by agriculture (12%) and forest/plantation exploitation (10%)

Diachronic climate studies (1913–1938 / 1971–2001) have highlighted a trend toward chronic drought, characterized by increasing frequency and longer cycles. This increasing aridity is further exacerbated by rising temperatures (+0.33°C in Tébessa, +1.35°C in Djelfa, +1.41°C in M’Sila, +2.39°C in Naâma, and +2.53°C in El Bayadh). Rainfall has also decreased, with reductions of 7% in Tébessa, 19% in M’Sila, and 20.5% in El Bayadh over the same period.

Climatic and bioclimatic data indicate an increase in dry periods, ranging from 15 days to two months, as well as a shift in bioclimatic zones toward more arid conditions. This trend is reflected in the extension of drought periods, which affected 68% of the AGD area in 2021, with more severe impacts in the central and western zones. Cyclical droughts were recorded in 1983, 1993, 1994, 1998, 2000, 2001, 2002, and 2020. Two-year drought cycles are the most frequent (42.42%), while five-year drought cycles occur mainly in the western wilayas (Naâma and El Bayadh).

The biotic environment is structured around three main ecosystems (forest, pre-forest, and steppe), in addition to temporary wetland systems, including saline chotts and freshwater daïas. These ecosystems are undergoing structural degradation due to increasingly unfavourable environmental conditions and intensive land use practices that disregard ecological balance. Land use is dominated by pastoralism (63% of the total area), reflecting the region’s primary function. Forestry accounts for 18%, while agriculture represents 16%, often involving illegal clearing and ploughing, which have increased significantly in recent years.

The Green Dam area faces significant challenges due to climate change, affecting water and soil resources as well as forest, pre-forest, and pastoral ecosystems. These risks also impact the livelihoods and living conditions of local populations, particularly vulnerable groups such as smallholder farmers, livestock herders, landless pastoralists, rural women, and youth.

According to the desertification sensitivity map (CNTS, 1989), 52.23% of the area is moderately sensitive, 32.6% sensitive, and 2.53% highly sensitive, meaning that nearly 87.36% of the AGD territory is affected. Furthermore, national-level risk and vulnerability analyses (BNEDER, 2016) indicate significant increases in temperature, decreases in rainfall, and higher evapotranspiration rates. The climate vulnerability index for water availability for livestock shows medium vulnerability, which is expected to increase under future climate scenarios.

Analysis of the SSP2-4.5 multi-model scenario (World Bank Climate Knowledge Portal, 2023) for the six targeted wilayas indicates a consistent increase in all temperature parameters. Maximum temperatures are projected to increase by 1.14°C to 1.18°C (2021–2040) and by 2.9°C to 3.05°C (2080–2100). Minimum temperatures will increase by 0.95°C to 0.98°C (2020–2040) and by 2.55°C to 2.64°C (2080–2100). Average temperatures are expected to rise by 0.96°C to 1.05°C (2021–2040) and by 1.86°C to 2.85°C (2081–2100). These increases will exceed the 1.5°C threshold set by the Paris Agreement by 2041–2060 and surpass 2°C in subsequent periods.

Water resources are projected to decline across all regions of the Green Dam. Average annual rainfall is expected to decrease by 2.61% to 6.3% (2020–2040) and by 12.31% to 16.03% (2080–2100). M'Sila is projected to be the most affected wilaya, while Naâma will be the least affected.

Main risks caused by climate change include:

Risks to water resources:

- Decreased water flow
- Overexploitation of groundwater
- Reduced storage capacity
- Irregular spatial and temporal distribution of water resources
- Deterioration of water quality
- Increased water demand and potential conflicts

Risks to soil resources:

- High susceptibility to water and wind erosion
- Loss of organic matter and soil nutrients
- Reduced soil water retention capacity
- Sand encroachment and dune formation
- Declining agricultural productivity

Risks to steppe ecosystems:

- Reduced vegetation cover and loss of palatable species
- Decreased productivity
- Degradation of alfa grasslands
- Expansion of sand encroachment
- Disruptions in livestock management

Risks to forest ecosystems:

- Degradation of forest cover and biodiversity loss
- Increased soil erosion
- Disruption of water cycles
- Increased vulnerability to pests and diseases

Risks to livelihoods:

- Reduced access to land and water
- Declining agro-sylvo-pastoral resources
- Loss of income and ecosystem services
- Increased poverty and rural migration

1.3. Project Benefits

1.3.1. Benefits in terms of adaptation

For adaptation, the estimated number of direct and indirect beneficiaries under the three components of the project corresponds to the population of the 101 municipalities across the six wilayas included in the Green Dam (El Bayadh, Naâma, M'Sila, Djelfa, Tébessa, and Khenchela).

Total beneficiaries of the project are 1,084,103 people (approx. 2.1% of Algeria's total population, ≈ 25.6% of the 6 target wilayas (595,039 men; 489,064 women)). Direct beneficiaries are 142,433 (87,432 men; 55,001 women) representing 0.31% of Algeria's total population and approx. 3.4% of population of the 6 target wilayas (~4.24 M).

Indirect beneficiaries are 941,670 (507,607 men; 434,063 women) 2% of Algeria's total population- approx. 22.2% of population of the 6 target wilayas (≈ 4.24 M),.8 2% of Algeria's total population- approx. 22.2% of population of the 6 target wilayas (~4.24 M).

From an economic perspective, the project will contribute to the diversification and increase of household incomes by prioritizing activities that reduce climate sensitivity. This will be achieved through improved productivity of agricultural and livestock systems, enhanced quality and quantity of non-wood forest products (NWFPs), increased availability of steppe products, and improved access to markets.

The project also demonstrates strong investment efficiency in terms of outreach. With a GCF grant of USD 43 million reaching 1,084,103 beneficiaries, the grant investment amounts to approximately USD 40 per beneficiary over the project lifetime. This relatively low investment per beneficiary reflects the project's landscape-scale design, whereby investments in ecosystem restoration, climate-resilient infrastructure, institutional strengthening, climate information services, and resilient value chains generate benefits that extend across entire communities and production systems, creating substantial economies of scale.

In terms of social benefits, the project will enhance promote women's empowerment and gender equality, through improved access to productive resources and income-generating opportunities, enhance social equity through improved access to resources, and strengthen the technical and organizational capacities of beneficiaries. It will also foster synergies between traditional knowledge of local populations and innovative approaches.

1.3.2. Mitigation Benefits

The mitigation impact (expressed in tCO₂eq over the project lifetime) will be achieved through several key interventions, including the **rehabilitation of forest cover over 6,266 ha** (through reforestation, replanting, row planting, greenbelt establishment, maintenance of plantations, silvicultural operations, pest control, and forest management).

In addition, the project will support the **rehabilitation of 28,491 hectares of steppe ecosystems** (through rangeland restoration: pastoral planting 3,780 ha, and Opuntia (1,092 ha, deferred grazing/enclosure (23,619 ha).

Furthermore, perennial crops will be established over 16,903 hectares (including rustic fruit cultivation (5,974 ha and agroforestry (6,000 ha), olive plantations (3,600 ha), opuntia/cactus plantations (1,200 ha), and windbreak (128.8), contributing both to carbon sequestration and to improved livelihoods.

1.3.3. Other Benefits

The project will contribute to rural development in line with the economic growth model announced by the Algerian government in 2016, which aims to promote a more diversified, competitive, and employment-generating economy.

It will also support a shift in Algeria's approach to natural resource management, moving from a centralized, state-led model to a participatory approach involving all relevant stakeholders.

A key transformation will be the transition from a conservation model based on a single species (primarily Aleppo pine in intensive reforestation) with limited community involvement, to a diversified, multi-species system (including endemic species such as Aleppo pine, holm oak, pistachio trees, junipers, etc.), implemented through a participatory approach that enhances long-term climate resilience.

The project will also promote the development of tax incentives for improved natural resource management, as well as commercial and financial arrangements between small producers and market actors (processors, traders, etc.) across value chains. This will facilitate collaboration with private sector institutions and ensure the sustainability of market-based solutions.

The project offers strong potential for scaling up and replication, both within the Green Dam area and across the wider Algerian steppe. Lessons learned—both technical/ecological and socio-economic—can be extended to other regions, including applications such as eco-construction using local materials adapted to climate conditions.

It will also contribute to the creation of an enabling environment through capacity building, regulatory improvements, and the development of market linkages connecting small producers with private sector actors.

The project will strengthen the regulatory framework by supporting reforms related to tax incentives, environmental cost accounting, and land access and use. It will also promote policy dialogue and institutional reforms aimed at improving natural resource management in the context of climate change.

In addition, the project will contribute to climate-resilient development pathways aligned with national strategies and adaptation plans, and its experiences can be shared with other countries involved in the Great Green Wall initiative through regional and international networks.

Environmental benefits include improved soil and vegetation management, increased water availability, adoption of sustainable livestock practices, and reduced pressure on forest and alfa grass resources. The project will promote ecological processes such as nutrient cycling and carbon sequestration.

The project delivers enhanced gender equality and enhanced social inclusion as co-benefits for vulnerable pastoral and agro-pastoral households across the six target wilayas follows:

- **Enhanced gender equality:**
- The project integrates a gender-responsive approach across all components. Given the limited benefits that women producers currently derive from livestock, crafts, and NWFPs, special measures will ensure a more balanced sharing of project benefits. The gender-responsive approach is operationalized through seven concrete, activity-anchored mechanisms that translate the project's commitment to gender equality into measurable outcomes for women across the six target wilayas (Tébessa, Khenchela, M'sila, Djelfa, El Bayadh, Naâma).
- Quota-based representation in climate governance. The multi-stakeholder climate governance platform (Activity 1.1.4) embeds ≥30% women's representation as a binding institutional rule; Water Users Associations under Activity 2.2.3 require at least 30% female membership with conditional permit-renewal incentives; and the Climate Wise Women network builds peer-to-peer leadership across the six wilayas. These quotas convert formal participation into measurable voice in adaptive-management decisions.
- Women's tenure rights through collective concessions. Women's collective concessions on the six NWFP value chains — opuntia, olive, rosemary, wool, alfa, peppermint — resolve women's

structural exclusion from rangeland and forest tenure under the 1975 Pastoral Code. For the first time, women's cooperatives hold legally recognised user rights over the resource base of their primary income-generating activities, registered in the modernised pastoral concession registry (Activity 2.1.2).

- Climate-adapted financial inclusion. Lending products under Activity 3.1.4, channelled through BADR, FGAR, CNMA and ANCC, are explicitly designed for women's cooperatives and youth-led micro-enterprises — overcoming the collateral and seasonal-income mismatches that exclude women from standard agricultural credit. Climate-indexed repayment schedules align with NWFP and livestock production cycles, and group-guarantee mechanisms substitute for the formal collateral women rarely hold.
- Priority allocation of productive assets to women-headed households. The 5,334 women-led households identified across the six wilayas receive priority allocation of: (i) 190 solar energy kits (Activity 3.2.5) for off-grid agricultural and household use; (ii) small-scale livestock modules (Activity 3.2.2) sized for women-managed flocks; and (iii) registration and certification support for the 80 supported micro-enterprises (Activity 3.1.3), with a target of at least 50% women-led.
- Equitable carbon-revenue sharing. Benefit Sharing Agreements under the AFOLU offset mechanism (Activity 1.1.2) and voluntary carbon-finance architecture (Activity 1.1.3) embed gender-equitable distribution rules — guaranteeing that women's cooperatives share directly in any future carbon revenue from the lands they restore and manage, including through dedicated women's-cooperative escrow accounts at the community level.
- Capacity-building targeted at women's leadership. Training cascades under Activities 1.2.7 (technical training), 3.1.3 (entrepreneurship support) and the Climate Wise Women network deliver dedicated modules on agribusiness management, certification standards (organic, Global G.A.P., Fair Trade), digital climate advisory tools, hydroponic-forage management (Activity 3.2.3), and water-user governance — building the technical and leadership capabilities required for women to capture project opportunities at scale.
- Gender-disaggregated M&E and accountability. All project indicators are disaggregated by sex, age and wilaya; the MRV foundation (Activity 1.1.3) integrates gender-disaggregated reporting against the GCF IRMF Gender Action Plan and FAO's Policy on Gender Equality. Quarterly progress reports flag any deviation from the 30 % female-participation thresholds and trigger corrective action through the Project Steering Committee.
- **Enhanced social inclusion:** The project's social-inclusion mechanisms target the four groups whose food-security is most precarious under climate stress — women, youth, transhumant herders, and landless agro-pastoralists. Because these groups also bear the largest share of household nutrition responsibility, their formal inclusion translates directly into household-level food-security outcomes. Access is secured through (i) the formalized pastoral concession system (Activity 2.1.2), which converts open-access Arch lands into negotiated user rights and provides landless agro-pastoralists and transhumant herders a legally recognized tenure entry point for the first time — stabilizing rangeland-based food and feed production; (ii) women's collective concessions on the six NWFP value chains, resolving women's long-standing exclusion from rangeland and forest tenure and giving them ownership over food-producing landscapes; and (iii) access to microcredit via BADR/FGAR/CNMA/ANCC (Activity 3.1.4) with group-based lending products tailored to women's cooperatives and youth-led micro-enterprises, lifting the financial-access barrier that standard agricultural credit imposes on these groups. Participation is anchored in the multi-stakeholder climate governance platform (Activity 1.1.4) with ≥30% women's representation, Water Users Associations with at least 30% female membership, the Climate Wise Women network, and the formal integration of traditional ecological knowledge with the digital climate advisory services (Activity 1.2.6) — giving local and indigenous knowledge formal standing in adaptive-management decisions over food-producing systems. Youth and transhumant representatives sit on commune-level concession committees. Benefits are distributed through transparent priority-allocation rules that prioritize food-security-vulnerable households: the 190 solar energy kits (Activity 3.2.5) and the small-scale livestock

modules (Activity 3.2.2) prioritise women-headed households (5,334 HH) — both directly increasing on-farm food-production capacity; the 80 supported micro-enterprises (Activity 3.1.3) prioritize women's and youth-led registration; and Benefit Sharing Agreements under the AFOLU offset mechanism (Activity 1.1.2) guarantee community-level returns from any future carbon revenue. The collaborative concession-and-governance model strengthens social cohesion across pastoral, agro-pastoral and forest-edge communities and reduces conflicts over natural-resource use — including conflicts over rangeland feed and water access that drive food-stress dynamics.

Finally, the project is expected to stimulate local economic development through the involvement of the private sector in implementation activities. The scale and diversity of planned interventions (plantations, water infrastructure, road works, irrigation systems, etc.) will generate employment opportunities and income for local populations, thereby strengthening their capacity to adapt to climate change.

1.4. Project Development Approach and Methodology

1.4.1. Problem statement of the study

The project is justified by the multiple threats affecting the Green Dam intervention areas, which negatively impact the living conditions and livelihoods of the populations that depend on these ecosystems. The desertification sensitivity map highlights the predominance of moderately sensitive (52%) and sensitive (33%) areas across the region.

Desertification, as defined by the United Nations Convention to Combat Desertification (UNCCD), refers to land degradation in arid, semi-arid, and dry sub-humid areas resulting from climatic variations and human activities.

1.4.2. Study Objectives

The main objective of this feasibility study is to support the preparation and submission of a full funding proposal to the GCF Secretariat. This includes:

- i) Preparing the full proposal (FP), including control and validation mechanisms in collaboration with FAO and approval by the Government;
- ii) Supporting the submission process through the preparation of additional documentation to address any comments or reservations raised during the review process;
- iii) Conducting impact analyses to ensure compliance with GCF standards and requirements.

1.4.3. Study Results

The project will identify and propose appropriate solutions to constraints that may hinder implementation, with the following expected results:

- Improved enabling environment and governance involving all stakeholders, with harmonized legislative and regulatory frameworks for climate-resilient land management;
- Enhanced resilience of agro-sylvo-pastoral systems, improved biodiversity, and increased carbon sequestration;
- Strengthened resilience of livelihoods to climate change and drought, particularly through improved land management and value chains for NWFPs and climate-resilient livestock products.

1.4.4. Methodological approach

The feasibility study adopts an integrated, multi-disciplinary methodology grounded in the principles of sustainable development, climate resilience, and inclusive stakeholder engagement. The approach combines quantitative climate and environmental analysis with participatory assessment methods, ensuring that project design is informed by both scientific evidence and the knowledge, priorities, and capacities of local communities — particularly women and vulnerable groups.

The methodology is structured around five sequential and interconnected steps, each building on the findings of the preceding stage to progressively refine the project's intervention logic, from baseline characterization through to the detailed definition of project activities, as follows (see figure 1 below):

Step 1: Characterization of Intervention Areas

This step establishes a comprehensive baseline understanding of the project's intervention zones through a multi-dimensional analysis spanning socio-economic conditions, climatic trends, environmental assets, and agro-ecological systems. By examining these interconnected dimensions, the characterization provides the evidence base necessary to identify climate vulnerabilities, prioritize interventions, and tailor project activities to the specific conditions of each target wilaya. The analysis draws on national statistics, field surveys, remote sensing data, and stakeholder consultations to ensure accuracy and local relevance.

- **Socio-economic profile:** A detailed assessment of the human development context across the six target wilayas, examining demographic structure and population trends, employment patterns and income sources — with particular attention to the dominance of climate-sensitive livelihoods — access to basic services and infrastructure including health, education, transport, and water supply, poverty levels and household vulnerability indicators, and the status of women and marginalized groups in terms of access to productive resources, participation in decision-making, and exposure to climate risks. This profile identifies the socio-economic determinants of adaptive capacity and highlights the populations most vulnerable to climate shocks.

- **Climatic profile:** A rigorous analysis of observed and projected climate conditions, establishing the climate baseline and future trajectory for the Green Dam landscape. The assessment examines historical climate data across two reference periods (1913–1938 and 1971–2001) to identify long-term trends in temperature, precipitation, aridity, and drought frequency. Future projections are analysed across three-time horizons — near-term (2021–2040), mid-century (2041–2060), and late-century (2061–2080) — focusing on the magnitude and pace of temperature increases, the spatial and temporal distribution of declining rainfall, shifts in bioclimatic zones toward greater aridity, and the projected intensification of extreme weather events including heatwaves, droughts, and flash floods. This profile provides the quantitative climate evidence that underpins the project's climate rationale.

- **Environmental profile:** A comprehensive evaluation of the natural resource base and ecosystem assets within the Green Dam landscape, covering water resources — including surface water availability, groundwater reserves, storage infrastructure capacity, allocation patterns, and current and projected demand-supply balances — soil resources, assessing degradation status, erosion susceptibility, organic matter content, and land suitability classifications — and the condition and functionality of pastoral and forest ecosystems, including vegetation cover trends, biodiversity status, desertification sensitivity, and the range of ecosystem services provided — from carbon sequestration and soil stabilization to watershed protection and non-timber forest product supply. This profile quantifies the extent of environmental degradation and identifies the ecosystems most in need of restoration and protection.

- **Agro-ecological profile:** An in-depth analysis of the dominant production systems operating across the intervention areas, examining rainfed cereal cultivation — predominantly barley and durum wheat — and its vulnerability to precipitation variability and soil degradation, pastoral livestock management practices including transhumance patterns, stocking rates, and the relationship between grazing pressure and rangeland carrying capacity, irrigated agriculture where it exists — assessing water use efficiency, infrastructure condition, and expansion potential — and the collection and use of non-wood forest products including alfa grass, rosemary, and prickly pear. The analysis evaluates the resilience of each production system to current and projected climate conditions, identifies maladaptive practices that are accelerating resource degradation, and highlights opportunities for climate-smart interventions that build on existing local knowledge and traditional practices.

Together, these four profiles provide an integrated characterization of the Green Dam landscape that informs every subsequent step of the project design — from climate risk identification through to activity selection, targeting, and institutional arrangements.

Step 2: Climate Change Justification — Climate Rationale

This step establishes the scientific foundation underpinning the project's climate rationale by examining historical climate trends, current climate variability, and future climate projections across the Green Dam landscape. It provides the quantitative and qualitative evidence base that demonstrates why climate action is urgent, why adaptation and mitigation interventions are necessary, and why the proposed project activities are directly responsive to observed and projected climate impacts.

The climate rationale is built through a structured analytical process:

- Selection of climate parameters: Key climate variables are identified for analysis, including temperature (mean, maximum, and minimum), precipitation (annual and seasonal), evapotranspiration, water balance, drought indices (SPEI), and extreme weather event frequency. These parameters are selected based on their direct relevance to the agro-sylvo-pastoral systems and ecosystems of the Green Dam zone, and their influence on the livelihoods, and natural resource base of target communities.
- Historical climate evolution: Observed climate data over the reference period (1991–2020) is analysed to establish baseline conditions and identify statistically significant trends. This analysis draws on data from the Climate Research Unit (CRU) of the University of East Anglia, national meteorological records, and the World Bank Climate Knowledge Portal. Historical analysis reveals a clear trajectory of rising temperatures, declining precipitation, increasing aridity, and growing frequency of drought episodes across the six target wilayas — confirming that the Green Dam landscape is already experiencing the impacts of climate change.
- Synthesis of climate trends across scenarios: Future climate projections are examined under multiple Shared Socioeconomic Pathways — SSP1-2.6 (low emissions), SSP2-4.5 (intermediate), SSP3-7.0 (high), and SSP5-8.5 (very high) — using CMIP6 multi-model ensembles. This multi-scenario approach allows the project to assess the range of possible climate futures and design interventions that are robust across different emission trajectories. The SSP2-4.5 scenario is used as the primary planning reference, consistent with GCF guidance and Algeria's NDC framework.
- Future climate projections: Projections are analysed across three-time horizons — near-term (2021–2040), mid-century (2041–2060), and end-of-century (2061–2080) — to understand the trajectory and magnitude of anticipated changes.

Analysis indicates that temperatures across the Green Dam wilayas are projected to increase by 1.5°C to 2.7°C by mid-century, precipitation is expected to decline by 6% to 16%, and the frequency and duration of drought episodes will intensify significantly. These projections confirm that without intervention, the degradation of steppe and forest ecosystems will accelerate, rangeland productivity will collapse, water resources will diminish further, and the livelihoods of over one million people will face escalating climate risk.

The climate rationale directly informs the identification and prioritisation of climate risks in the subsequent step, ensuring that every project activity is grounded in evidence and responsive to the specific climate threats facing the Green Dam landscape. It demonstrates to the Green Climate Fund that the project addresses genuine, measurable climate change impacts — not development needs alone — and that the proposed interventions represent the most effective response to the identified climate vulnerabilities.

Step 3: Climate risk assessment:

This step provides a systematic assessment of the biophysical and socio-economic risks arising from climate change across the Green Dam landscape. Building on the climate projections established in Step 2, it analyses how climate hazards — including rising temperatures, declining precipitation, prolonged droughts, and increased frequency of extreme weather events — interact with existing vulnerabilities to threaten natural resources, ecosystems, and the livelihoods of rural communities. The assessment follows a risk-based approach consistent with IPCC methodology, evaluating exposure, sensitivity, and adaptive capacity across five interconnected domains:

- **Risks to water resources:** Climate change is projected to reduce surface and groundwater availability across the Green Dam zone through declining rainfall, increased evapotranspiration, and reduced aquifer recharge. Key risks include diminished river flows and reservoir storage capacity due to accelerated siltation, declining soil moisture critical for rainfed agriculture, rising water demand from both human populations and livestock, deterioration of water quality through increased salinity and sediment loads, and progressive depletion of groundwater stocks upon which isolated communities depend. These hydrological impacts compound existing water stress in a region where demand already exceeds sustainable supply.

- **Risks to soil resources:** Increasing aridity and the intensification of extreme rainfall events accelerate soil degradation through both water and wind erosion. Key risks include the loss of productive arable land to gully formation and sheet erosion, progressive decline in soil organic matter and nutrient content, reduced water retention capacity of degraded soils, expansion of sand encroachment and dune formation threatening settlements and infrastructure, and irreversible desertification of marginal lands. These processes undermine the productive foundation of agro-pastoral systems and diminish the capacity of soils to function as carbon sinks.

- **Risks to steppe ecosystems:** Steppe rangelands — the primary resource base for pastoral livelihoods — face compounding climate pressures that reduce vegetation cover, alter species composition, and diminish ecosystem functionality. Key risks include the loss of palatable and high-value forage species, decline in rangeland carrying capacity and overall productivity, degradation of alfa grasslands and medicinal plant populations, disruption of seasonal vegetation cycles critical for livestock management, and erosion of the ecosystem services — including carbon sequestration, soil stabilization, and water regulation — upon which community resilience depends.

- **Risks to forest ecosystems:** Forest and pre-forest formations across the Green Dam are increasingly vulnerable to climate-induced stress, with cascading effects on biodiversity and ecosystem integrity. Key risks include progressive degradation of forest cover and loss of native biodiversity, heightened susceptibility to pest outbreaks — notably the pine processionary caterpillar and the pine mealybug (*Matsucoccus feytaudi*) — whose incidence increases with rising temperatures, escalating frequency and severity of wildfires driven by hotter, drier conditions, disruption of hydrological cycles and watershed functions, and decline in the productivity of both timber and non-timber forest products that support rural economies.

- **Risks to livelihoods and living conditions:** The convergence of climate impacts on water, soil, and ecosystems translates directly into threats to the well-being and economic security of rural populations. Key risks include growing food insecurity as crop yields and livestock productivity decline, reduced access to safe drinking water in communities dependent on climate-sensitive sources, deepening poverty as household incomes from agriculture and pastoralism erode, loss of traditional livelihood strategies as ecosystem degradation eliminates resource options, and accelerating rural out-migration — particularly among youth — as communities can no longer sustain viable livelihoods. Women are disproportionately affected due to their higher dependence on natural resources, limited access to adaptive assets, and exclusion from decision-making processes.

This risk assessment provides the analytical basis for the design of targeted project activities under each outcome, ensuring that interventions are directly responsive to the most pressing climate threats and calibrated to the specific vulnerabilities of the Green Dam.

Step 4: Stakeholder Consultation and Participatory Assessment

This step ensures that the project design is grounded in the lived experience, priorities, and knowledge of the communities it seeks to serve. A structured participatory consultation process is conducted at two complementary levels — wilaya and municipal — to validate the findings of the climate and environmental analysis, identify community-specific vulnerabilities and adaptation priorities, and build the ownership and collaborative commitment necessary for effective project implementation.

- **Wilaya-level consultations:** Six multi-stakeholder workshops — one in each target wilaya — brought together representatives from government institutions, technical agencies, local authorities, civil society organizations, community associations, vulnerable groups, and private sector actors. These

workshops served as platforms for collaborative project design, enabling stakeholders to examine and validate the proposed intervention logic, identify institutional coordination gaps and opportunities, and contribute sector-specific expertise to the formulation of project activities. Thematic discussions address gender dynamics and women's inclusion in natural resource governance, social and environmental safeguard requirements, sustainable management of natural resources and value chain development opportunities, organizational and institutional capacity assessment, and the adequacy of the legislative and regulatory framework for climate-resilient land management. The workshops were designed to foster broad-based buy-in and establish the collaborative relationships that will underpin project implementation.

- **Municipal-level field surveys:** Detailed household and community surveys were conducted across the 12 pilot municipalities to capture the perspectives, needs, and expectations of local populations at the grassroots level. The surveys were designed to assess how communities perceive the changes in their environment and the specific challenges posed by climate variability and land degradation, identify priority needs and expectations regarding project interventions, understand the differentiated impacts of climate change across social groups — with particular attention to women, youth, agro-pastoralists, and landless herders — evaluate existing adaptive strategies, local knowledge, and coping mechanisms, and gauge the willingness and capacity of community members to participate in the implementation of climate-resilient practices. Survey design incorporated gender-disaggregated data collection and culturally appropriate engagement methods to ensure that the voices of the most marginalized groups are represented in the project design.

The findings from both levels of consultation are synthesized to inform the final selection and design of project activities, ensuring that interventions respond to demonstrated community needs, leverage existing local capacities, and are anchored in genuine stakeholder commitment.

Step 5: Definition of project activities

Building on the climate risk assessment and the findings from stakeholder consultations, this step defines and justifies the project's intervention logic. Activities were selected through a systematic process that integrates identified climate risks, lessons learned from comparable initiatives in the region, local and traditional knowledge, and the governance and institutional landscape.

Each activity was designed to directly address one or more of the identified climate vulnerabilities, ensuring clear alignment with both adaptation and mitigation objectives.

This step delivers four key outputs:

- Definition and justification of activities in terms of adaptation and mitigation: Each proposed activity is mapped against the specific climate risks it addresses, with a clear rationale demonstrating how it reduces vulnerability, builds adaptive capacity, or contributes to GHG emission reductions. Activities are grouped under three project outcomes, ensuring coherence with the Funding Proposal's results architecture and the GCF investment criteria.

- Theory of Change: A comprehensive theory of change is developed, articulating the causal pathways from project inputs and activities through to expected outcomes and long-term impact. It identifies the key assumptions, barriers to be overcome, and the enabling conditions required for the project to achieve a paradigm shift toward climate-resilient, low-emission land management across the Green Dam landscape.

- Detailed description and feasibility of the project: Each activity is described in full technical detail, including scope, scale, target areas, implementation approach, responsible institutions, timeline, cost estimates, and expected results. Technical feasibility is assessed against biophysical conditions, institutional capacity, and lessons from prior interventions, ensuring that proposed solutions are practical, cost-effective, and suited to the agro-ecological and socio-economic context of the target wilayas.

- Institutional context for project implementation: The institutional arrangements for project execution are defined, including the roles and responsibilities of all service providers — DGF, HCDS, MADRP, ANCC, FAO, and local governance structures. Coordination mechanisms, reporting lines, and oversight structures are specified to ensure effective delivery, accountability, and alignment with national climate and development priorities.

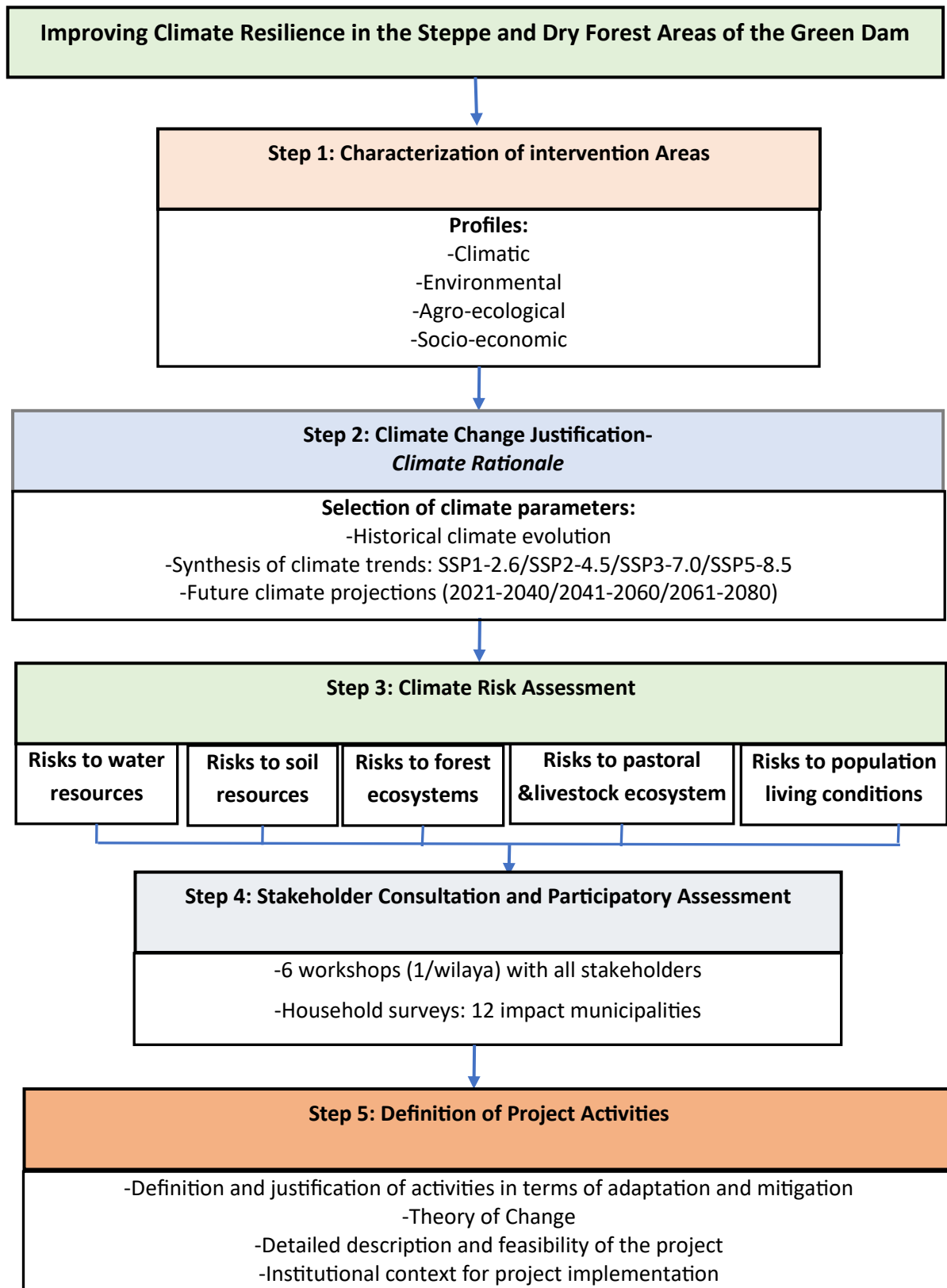


Fig. 1 – Methodological Approach

2. AREAS OF INTERVENTION

Project Area Selection Methodology

The six target wilayas - El Bayadh, Naama, Djelfa, M'sila, Tebessa, and Khenchela - and the 12 pilot municipalities were selected through a multi-criteria assessment combining climate vulnerability, ecosystem degradation severity, restoration potential, population vulnerability, and institutional readiness.

Climate Exposure and Vulnerability (30% weighting): Wilayas were ranked according to projected temperature increase, precipitation decline, drought frequency (SPEI analysis), and historical climate trend severity under SSP2-4.5 scenarios. M'sila and El Bayadh ranked highest due to the most severe projected rainfall decline (12-16% by 2080-2100) and temperature increase.

Ecosystem Degradation Severity (25% weighting): Based on NDVI trend analysis, desertification sensitivity mapping (CNTS, 1989), rangeland productivity assessments, and forest cover change detection. Priority was given to areas where vegetation recovery has fallen below 15% and where 87% or more of the territory is classified as moderately to highly sensitive to desertification.

Restoration Potential and Cost-Effectiveness (20% weighting): Areas were assessed for biophysical suitability of proposed interventions (reforestation survival rates, rangeland regeneration potential, water infrastructure rehabilitation feasibility) and cost per hectare of restored land.

Population Vulnerability and Gender (15% weighting): Poverty rates, dependence on rainfed agriculture (>90%), livestock density per household, women's exclusion from land governance, and migration rates were assessed through household surveys across all candidate municipalities.

Institutional Readiness and Synergies (10% weighting): Presence of active DGF and HCDS field offices, existing community associations, ongoing or recently completed development projects, and local government co-financing capacity.

2.1. Project Context

This summary presents the key elements of the project aimed at enhancing climate resilience in the Algerian Green Dam (AGD) region. **All detailed analyses, data, and supporting information are provided in a separate document titled “Appendix 2 – Areas of Intervention.”**

Algeria, the largest country in Africa, is characterized by strong climatic contrasts ranging from a Mediterranean north to a vast Saharan desert in the south. The country faces increasing water scarcity with availability well below international standards, and is highly vulnerable to climate change, which is driving rising temperatures, declining rainfall, and more frequent droughts.

The AGD is a major ecological initiative designed to combat desertification. It covers approximately 4.7 million hectares across 13 provinces and consists mainly of steppe and pastoral ecosystems. These areas are under severe pressure due to overgrazing, soil degradation, and unsustainable land use practices, combined with the effects of climate change. Biodiversity is limited, and ecosystems are increasingly fragile.

The population in the AGD region is relatively young and growing, but socio-economic conditions remain challenging. Employment is largely concentrated in agriculture and services, with limited industrial activity. Unemployment rates are high, and rural populations, especially women and youth, are particularly vulnerable. Although access to infrastructure (housing, electricity, water) has improved, significant disparities persist, especially in remote areas. Water resources remain insufficient, and access to healthcare services is below recommended standards.¹

Climate change poses serious risks to the region, including reduced agricultural productivity, increased soil erosion, water shortages, and loss of biodiversity. These impacts threaten the livelihoods, potentially leading to increased socio-economic instability. Recurring and intensifying droughts have accelerated desertification across more than 50 million hectares, with nearly 17 million hectares of steppe classified as “sensitive” to “very sensitive,” including 55% of the project area in the Algerian

Green Dam (AGD) zone. The six targeted wilayas — El Bayadh, Naâma, M'Sila, Djelfa, Tébessa, and Khenchela — are home to 57% of Algeria's nomadic population, whose livelihoods depend almost entirely on climate-sensitive natural resources. These wilayas have arid to semi-arid environments with below-average poverty, health, and education indicators.

The unemployment rate across the six wilayas stands at 15.4%, significantly above the national average of 11.4%, leaving communities with fewer resources to cope with climate shocks. Access to water in the AGD (16,1 m³/inhabitant/year) is critically below the national average (55 m³/inhabitant/year) and far beneath the World Bank's water scarcity threshold of 1,000 m³/inhabitant/year, making these communities particularly vulnerable to water stress. Rural women face compounded vulnerability due to limited access to agricultural land, employment, and productive assets. Negative rainfall trends continue to reduce agricultural production, and biodiversity, with associated impacts on human health across agro-silvo-pastoral landscapes.

This project aims to break that vicious cycle by scaling the adoption of climate-resilient practices across 454,138 hectares in 12 pilot municipalities spanning six wilayas (project coverage area), delivering both adaptation and mitigation benefits with a total investment of USD 99.5 million.

These areas were selected based on their high vulnerability to climate change and desertification, as well as their socio-economic importance.

The project's objective is to strengthen resilience through an integrated approach based on three pillars:

1. Improving governance and policies for climate-resilient land management
2. Restoring degraded ecosystems, including forests and rangelands, and enhancing carbon sequestration
3. Supporting local populations by improving livelihoods, promoting sustainable agriculture and livestock systems, and developing value chains

Overall, the project aims to mitigate environmental degradation while improving the living conditions and adaptive capacity of vulnerable communities, ensuring more sustainable and resilient development in the AGD region.

3. JUSTIFICATION WITH RESPECT TO CLIMATE CHANGE

3.1. The Project context

This chapter provides an overview of climate change scenarios and their impacts, with a focus on the Algerian Green Dam (AGD) region. All detailed analyses, data, tables, and figures are presented in a separate document entitled Appendix 3.

The study compares older RCP (Representative Concentration Pathways) with the newer SSP (Shared Socioeconomic Pathways) developed by the IPCC. While RCPs focus on greenhouse gas concentrations, SSPs incorporate socio-economic development pathways, offering a more comprehensive understanding of future climate conditions. Among the five SSP scenarios, the SSP2-4.5 scenario is used as the reference, representing a moderate trajectory.

Climate Trends and Projections

The analysis of temperature and rainfall projections for the period 2021–2100 (compared to 1995–2014) shows clear trends:

- Temperature increase: Maximum temperatures are expected to rise by about +1.1°C by 2040 and up to +3°C by 2100. Minimum temperatures will increase by +1°C to +2.6°C, while average temperatures may rise by +1°C to +2.5°C, exceeding the targets of the Paris Agreement.
- Rainfall decreases: Precipitation is projected to decline progressively, reaching reductions of up to –20% by 2100, leading to increased drought conditions.

Main Climate Risks

These climatic changes will generate significant risks, including:

- Increased water scarcity due to reduced rainfall and higher evaporation
- More frequent extreme events such as droughts, heatwaves, and floods
- Accelerated desertification and soil degradation
- Higher risk of forest fires and ecosystem instability.

Impacts on Ecosystems and Livelihoods

Steppe ecosystems are highly vulnerable, especially when combined with human pressures such as overgrazing and land misuse. The main impacts include:

- Degradation of vegetation and loss of biodiversity
- Reduced agricultural and pastoral productivity
- Decline in ecosystem services (e.g., carbon sequestration, soil protection)
- Increased vulnerability of rural populations dependent on natural resources
- Water resources are also at risk, with reduced surface water availability and groundwater recharge.

Adaptation and Mitigation Measures

The report highlights the importance of combining adaptation and mitigation strategies:

- Sustainable land and pasture management
- Ecosystem restoration and reforestation
- Improved water resource management
- Strengthening resilience of local communities

Adaptation can be proactive or reactive but must be complemented by mitigation efforts to reduce greenhouse gas emissions and limit long-term impacts.

In Conclusion, climate change in the AGD region is expected to result in higher temperatures, reduced rainfall, and increased environmental stress, significantly affecting ecosystems and livelihoods. Effective adaptation strategies and sustainable resource management are essential to reduce vulnerability and enhance resilience.

For full details, including methodologies, data analysis, figures, and comprehensive risk assessments, refer to the separate document: **Appendix 3**.

4. DEFINITION AND JUSTIFICATION OF PROJECT ACTIVITIES IN TERMS OF ADAPTATION

Land Use Context and Rural Production Systems

The Green Dam landscape is characterized by three dominant agricultural production systems operating under increasing climate stress:

Rainfed Cereal Production: Predominantly barley and durum wheat cultivated on communal (Arch) and private lands, representing over 90% of farming in the target wilayas. Yields have declined by an estimated 30-40% over the past two decades due to declining rainfall, shortened growing seasons, and soil degradation. Farmers have limited access to improved seed varieties, climate-adapted agronomic practices, and crop insurance.

Agro-Pastoral Livestock Systems: Sheep and goat rearing constitutes the primary livelihood for an estimated 60-70% of households in the AGD zone. Livestock mobility has been progressively constrained by land fragmentation, administrative restrictions, and the expansion of rainfed cultivation into rangelands. Average stocking rates exceed carrying capacity by a factor of 2-3 in most communes, driving overgrazing, soil compaction, and loss of palatable species.

Non-Wood Forest Product (NWFP) Collection: Alfa grass harvesting, rosemary distillation, and prickly pear collection provide supplementary income, particularly for women. However, these activities remain informal, lacking market linkages, quality certification, and organized value chains.

Climate vulnerability varies across production systems: rainfed cereals are most sensitive to precipitation variability and drought (exposure: high; adaptive capacity: very low); livestock systems face compound risks from rangeland degradation, water scarcity, and heat stress; and NWFP-based livelihoods are vulnerable to ecosystem degradation and market volatility.

4.1. Lessons learned and good practices considered in the design of the project

4.1.1. Forest plantations with low resilience potential

The first weakness concerns the entire upstream part of the planting process, which should begin with a judicious choice of plant protection products (PPG), seed harvesting, and processing. The quality of the planted seedlings depends largely on nursery cultivation practices, which should follow very rigorous guidelines (shade, reduced watering, quality and shape of containers, proximity to planting sites, etc.), and on soil preparation, since current pots with their modest dimensions (0.4 m deep), especially in semi-arid zones, do not offer optimal conditions for the adaptation and development of young plants.

The second weakness of the forest plantations carried out in the AGD is the omnipresence of Aleppo pine, to the point of being described as a monoculture, does not necessarily guarantee the sustainability of reforestation efforts. Aleppo pine is indeed weakened by recurring attacks from the processionary caterpillar, which jeopardize its survival. Therefore, sustained efforts in phytosanitary treatments are necessary to ensure a suitable state of vegetation for young plantations.

The other shortcoming identified, which greatly undermines the sustainability of reforestation efforts, is the very short period of care provided to the new plantations was a significant issue. Upon delivery by the construction companies, and after two years of protection, they generally showed fairly high success rates ($\geq 80\%$). However, a few years later, the damage sustained, primarily due to grazing, jeopardized the future of these plantations. The same applies to the quality and longevity of post-planting maintenance.

The occurrence of prolonged cycles of intense summer heat, exacerbated by chronic drought, has been noted, placing the young plants in extreme living conditions. Numerous failures are recorded in this regard. The compensation that proper maintenance should have provided in the face of harsh climates is lacking. Here too, the weakened state of the young plants diminishes their resistance to pest attacks.

Thus, a vicious cycle takes hold, and inevitably, the reforestation efforts gradually decline until total disappearance.

Furthermore, the lack of management (primarily silvicultural) in successful and well-established reforestation projects, which have reached advanced stages of development (saplings, poles, young stands), hinders the proper growth of the trees. It is important to remember that the planting densities of these plantations, established over a quarter of a century ago, have remained unchanged (between 1200 and 2000 trees/ha).

This status quo is detrimental to the stands (limited space, competition for water, etc.), causing them to stagnate in terms of growth, with the added risk of rapid fire spread, especially in the presence of unmanaged natural pruning (removal and clearing of dead branches).

This “*forestry inaction*” risks proving harmful in the future, for these new forest stands, even in their most basic role, which is the protection of soils against erosive phenomena.

4.1.2. Climate resilience potential offered by traditional pastoral know-how

Overall, livestock farming practices on natural pastures are rooted in ancestral traditions. In the AGD (steppe territory), this way of life is deeply embedded in the transhumance or nomadic culture practiced by local tribes. Furthermore, shifting herding provides the rural communities involved with the means of subsistence that allow them to survive in a particularly challenging bioclimatic environment.

Even though livestock farmers have acquired and developed over time a great capacity for adaptation, through the spatiotemporal mobility of their herds which is rhythmic according to a well-established seasonal cycle (*In summer, sheep farming takes place, with the large traditional transhumance to the Tell. "ACHABA" and in winter towards the Sahara "AZZABA"*). This capacity is severely undermined by various vulnerability factors whose interaction profoundly disrupts pastoralism as a way of life and production system. These factors are both natural in origin (*weather hazards*) and anthropogenic (*non-climatic vulnerability parameters*).

While biophysical aspects concern climate variability, manifested in particular by a decrease in irregular and unevenly distributed rainfall in space and time, and by rising temperatures, human factors are linked, among other things, to the overexploitation of natural resources (*overgrazing, deforestation, etc.*) which increases the pressure on ecosystems (*forest and steppe*).

Also, the limitation of the space for the routes (*due to human and animal pressure, and illegal plowing, which have degraded the land and reduced palatable areas*) and the reduction of traditional transhumance movements have not allowed for the sustainable management of the seasonal shortage of forage resources. This has resulted in excessive and devastating overgrazing of the same areas over time. Thus, the increase in herd size within the framework of pastoralism forced into immobility has led to overgrazing on increasingly depleted rangelands. Livestock farming is carried out extensively (*The number of farmers who practice intensive livestock farming is insignificant*).

Faced with dwindling forage resources due to environmental degradation and periods of drought, the purchase of cereals and concentrated livestock feed has become necessary. During prolonged droughts, small-scale farmers with limited cash flow sell livestock to feed those remaining, ultimately (*for some of them*) by abandoning this ancestral activity and fleeing to the cities in search of an unlikely job.

The combined effects of all these factors contribute to further weakening these ecosystems, particularly steppe ecosystems, thus jeopardizing the very survival of the communities that live and depend on them. By persisting with this extensive, traditional pastoral production system, these communities will have increasingly less control over their destiny.

Hence the extreme need to think about and implement targeted adaptation strategies capable of increasing the resilience of communities in general, and more specifically livestock farmers.

4.1.3. Agricultural know-how and recent initiatives

Alongside this predominant livestock farming activity, rural communities practiced agriculture, although this was limited to floodplains. While the cleared, plowed, cultivated, or fallow steppe lands

have expanded, irrigated agricultural areas have also grown in recent years. However, most of these lands are located on fragile soils outside the favorable areas of wadi bottoms or Dayas (HCDS, 2010).

Indeed, plowing in the steppe world is ancient, but marginal, intended to supplement external grain supplies, as the recurring famines of the past could affect both people and livestock. It was essentially a survival practice, because below 400 mm of rainfall, yields are meager, and cultivation is often compromised by a dry season that can extend from April to September, or even longer with the intensification of climate change.

Generally, land intended for cereal cultivation is farmed every other year or even more frequently (using fallow periods). However, with the transformation of livestock farming in the steppe, becoming increasingly sedentary, herders are tempted by supplementary, non-haphazard agriculture. They want to produce their own cereals, graze their stubble in the summer, and build up their own straw reserves. This survival practice, in most cases limited to floodplains, has not had a negative impact on the preservation of natural resources (vegetation cover, soil, water). However, over the last 30 years, mechanization and the use of multi-disc plows have led to the clearing of large areas of pastureland, as the rental of mechanical production equipment is widespread.

Consequently, the grazing land used by these implements reverts to a state of wasteland, losing its permanent steppe vegetation and all its grazing qualities. Soils are becoming increasingly thin and low in organic matter, while their denudation exacerbates wind erosion. Thus, clearing land for cultivation destroys perennial plants and often eliminates the best pastures (*decline in plant biodiversity*) and promote erosion.

Furthermore, the expansion and diversification of crops (*vegetable crops and fruit tree cultivation*) have transformed the landscape: The implementation by public authorities of agricultural land development through concessions has indeed made it possible to allocate 150,000 ha to agro-pastoralists, often taken from rangeland (without *taking the necessary precautions*).

Because rainfall is low and irregular, irrigation becomes essential for vegetable and fruit crops. Traditional irrigation techniques (*by runoff or submersion*). These methods coexist with modern techniques (sprinkler or drip irrigation). Drip irrigation is still a marginal method, although it offers the advantage of water conservation, among others. As for irrigation with drainage, it is uncommon and not yet fully mastered.

On the other hand, monographic studies carried out in irrigated fields in steppe environments show increasing soil salinization (*Soil analysis of the Réchaïga perimeter, located southeast of the city of Tiaret, shows that salinization and alkalization affect the soils after several years of irrigation*).

Furthermore, cultivated land managed with irrigation without proper precautions is threatened by a certain loss of fertility. As for the farmers and livestock breeders who are allocated these lands, they are unaware of the dangers of irrigation; only the decline in yields attracts their attention, often belatedly. The low yields obtained are far from compensating for the resulting soil loss and the associated problems.

The programs implemented by the Ministry of Agriculture, Rural Development and Fisheries (MADRP) in steppe regions, particularly land development through concessions, aimed to replace cereal farming and fallow land with higher-value crops. While there was indeed an increase in irrigated areas, this did not prevent numerous technical and economic errors. Concession beneficiaries were often forced to invest in market gardening and fruit tree cultivation, whereas that no incentive was given for them to produce fodder (less water-intensive) which could have limited the pressure on grazing land.

4.1.4. Strategies and Governance

4.1.4.1. Prerequisites

Among the requirements of good governance is the deployment of tools and the adoption of methods that promote awareness, popularization, information dissemination, and the participation of civil society in decision-making. This is one of the fundamental principles of sustainable development,

capable of lending a degree of socioeconomic rationality to decisions. To achieve this, the first prerequisite is abandoning centralized governance based on the application of methods advocated at the national level, following a top-down approach.

Therefore, it is becoming increasingly necessary to foster new consultation and mediation procedures between the State and local authorities (wilayas, municipalities), between institutions, between the private and public sectors (PPPs), and various associations. The emergence of local public spaces allows different stakeholders to highlight the diversity of problems and solutions to often complex and sometimes controversial issues. It is this citizen engagement that could make the implementation of environmental directives more effective.

In terms of strategy, and for an objective analysis of the situation as a whole, The logic of the actors and the behaviour of individuals will be addressed briefly, with particular attention paid to the role of the State, especially in its management of common lands (ARCH).

4.1.4.2. Actors' Logic

In the case of AGD, the actors are identified with individuals and groups (livestock farmers and agriculturalists) as well as with state institutions, which have a primary role to play in the protection, preservation and sustainable exploitation of natural resources.

These actors, interacting within a pre-defined institutional context, express their position (according to the existing power dynamics) in relation to a common heritage (the case of grazing lands with a collective "legal status" – Arch (literally 'tribe')-This situation is characterized by free access to natural resources, and therefore a very weak market influence as a regulator of all economic activity.

Indeed, the actions of the actors, socio-historically constructed, are not guided by supply and demand (market prices). Thus, when the supply of natural forage decreases on communal grazing lands, the herders do not adjust their harvests as a result of an economic mechanism, because the forage resource is freely and openly accessible, and therefore non-marketable.

Adjustment is only possible if the rules of the market economy are reformulated and shaped by all actors; respect for the application of these rules requires a global consensus.

4.1.4.3. Individual Behaviour

Rangelands, which are often collectively exploited by family and tribal communities, are increasingly exposed to user rivalry, making the following logic operational: *The removal of common forage units by one individual de facto reduces the volume available to others.*

In light of population growth and the upward trend in livestock numbers, the near-universal application of this informal rule of free and unrestricted access to the common forage resource, and of unlimited harvesting, is synonymous with degradation due to long-term overexploitation. Under such conditions, each individual has an incentive to continuously increase their livestock without regard for the resulting ecological cost, with personal interest often prevailing over the collective interest.

What is not currently exploited by his livestock can be exploited by other people's animals. The use of these common resources by individuals pursuing their own interests will undoubtedly lead to their irreversible degradation in the long term.

This lack of environmental and ecological awareness stems from a clear communication deficit, particularly the unavailability of information. It should be noted, however, that the field of environmental information is very limited because it is still relatively new: The results of workshops organized in the six affected wilayas (provinces) showed that whenever the question of the origin of desertification is raised, stakeholders emphasize recurring drought and sand encroachment, rarely addressing the contribution of human activity to the degradation of rangelands and alfa grass.

The solution might lie in i) Self-governance of common grazing lands ii) privatization or iii) their management by the State. In the 1st case, the costly investments required for the development and rehabilitation of degraded spaces, along with high organizational costs, constitute a major constraint. The 2nd case is difficult to apply to tribal grazing lands because the allocation of private property rights

in no way guarantees their ecologically sustainable use (This is the case of the farmer who pollutes the soil or degrades the land through inappropriate irrigation).

Similarly, in the 3rd case, the state option is difficult to implement due to the associated costs, information asymmetry, and the resulting opportunistic behaviour. Unless the prerogatives of a public body, in this instance the HCDS, are reviewed, which could be responsible for the use and regulation of this pastoral resource. Even then, the lack of synergy and citizen consultation is likely to resurface and lead to definite inefficiency.

4.1.4.4. State logic regarding communal lands (Arch)

It should be noted from the outset that the policies for the protection and preservation of steppe areas developed by public authorities since independence have comprised various components, each representing a different stage. Overall, the State has not prescribed formal rules that take into account ecological and environmental obligations in this environment.

Starting with a pastoral code aimed at creating livestock cooperatives and to protect grazing lands, which was enacted in the mid-1970s (*in a context of centralized management where regulation was the responsibility of the plan and not the market*), but having had no application.

The creation in 1983 of the HCDS, whose actions focus primarily on limiting harvesting of pastoral resources and rehabilitation of degraded areas. Its achievements are generally well below the expected results (Nedjraoui & Bédrani, 2008) rightly point out that "*Except in its early stages, the HCDS has never developed a comprehensive and coherent strategy for the sustainable development of steppe areas, contenting itself with ad hoc projects not integrated into an overall vision.*"

In 2003, the public authorities adopted a national action plan to combat the desertification which predicts (*for the first time*) active participation of citizen communities. This has not prevented the persistence of unsustainable agricultural practices (*land clearing and plowing in areas with low resilience*).

The fight against land degradation through a public body under current conditions has limitations insofar as it does not garner the support of the affected populations, without which the expected results will inevitably be restricted. Livestock farmers, in fact, perceive the interventions of the HCDS as arbitrary, in that they deprive them of some of the grazing land they use (*protection or planting*).

There remains the middle way, which consists of the "co-management" which remains the best way to ensure responsible public involvement in protecting this shared natural resource and using it sustainably. This is why the "pastoral concession" shall be considered in updating the pastoral code (activity 1.1.1). This aligns perfectly with the participatory approach adopted.

Therefore, the role of the State, in addition to regulation (as is the case for all economic activity), will be to ensure the preservation of the pastoral character of these areas, as is currently done for agricultural land.

Another significant advantage is the territorial responsibility that falls to the concession holder or concessionaire. In return, the latter will be freer and more autonomous in organizing themselves (investments, innovation, bank loans, etc.) to modernize their livestock farming operations and ensure their long-term viability.

Lessons Learned from Value Chain Interventions in Comparable Contexts

Prickly Pear (Opuntia): Previous value chain initiatives in Algeria, Tunisia and Morocco have demonstrated strong market potential for prickly pear oil, cosmetics, and food products. Key lessons include the necessity of quality certification and geographical indications for market access, the importance of women-led cooperatives in production and processing, and the requirement for cold chain infrastructure to reduce post-harvest losses.

Olive: Lessons from IFAD-supported projects in North Africa indicate that successful olive value chains require integrated support covering improved varieties, irrigation efficiency, processing technology, and market linkages. Community oil presses with quality testing capacity are essential for accessing premium markets.

Rosemary: GEF-funded projects in the Maghreb have shown that formalization through cooperative structures, improved distillation equipment, and organic certification can increase producer returns by 200-300%. Sustainable harvesting protocols are essential to prevent resource depletion.

Wool: Linking pastoral wool to eco-tourism and artisanal markets through quality branding and cooperative marketing increases household incomes while preserving cultural heritage.

Alfa grass: Algeria possesses the world's largest alfa grass resources. Industrial experience demonstrates demand for pulp, paper, and composite materials. Sustainable management protocols with rotational harvesting and community-based monitoring are prerequisites for long-term viability.

Peppermint: Essential oil markets are growing globally. Small-scale cultivation trials in steppe wilayas have shown viability under drip irrigation. Success requires organized collection networks, quality control, and connections to pharmaceutical and cosmetic buyers.

4.2. Contributions of project activities to identified adaptation needs

4.2.1. Identification and selection of activities

The identification and selection of activities capable of addressing the risks posed by climate change were based on the following criteria:

- Efficiency: The project's activities will be integrated as much as possible into existing sector structures to avoid new burdens (organization, human and material resources, etc.). This also applies to the implementation methods, with the PPDR approach being adapted to the project's context and objectives.
- Efficiency: achieving the set objectives at the lowest cost in order to minimize the impacts on the Algerian economy and ensuring strong cross-sectors through the proposal of intersectoral activities encompassing numerous actions.
- Transparency: implementation of appropriate procedures so that actions are measurable, reportable and verifiable (MRV system).
- Social cohesion: taking into account, in particular, economic disparities and local and regional specificities and vocations.
- The application good technical and institutional practices, and risk aversion tools and strategies.
- Facilitation and encouragement regarding the achievement of productive and resilient production systems.
- Encouragement regarding the involvement of the civil society (especially women) and private economic agents.
- International cooperation: respect for Algeria's objectives and commitments in the field of climate.
- Sustainability: Defining priorities, assessing feasibility in terms of human and material resources, establishing the required timeline and sustainability of actions, and achieving environmental and social co-benefits are all essential. Achieving low-carbon economic growth is crucial for sustainable development.

Based on

- I) diagnostic analysis of the current situation at the AGD level (socio-economic profile, climatic profile, environmental profile, agro-ecological profile)
- II) the analysis of the main risks induced by climate change and
- III) the exploitation of the results of the consultation workshops organized at the level of the 6 wilayas concerned, it was identified and retained *24 activities grouping 74 shares* addressing the key objective of the feasibility study:

1. Development of a draft regulation on land access and incentives tax.
2. Development and deployment of a local IT platform.
3. Implementation of a GIS for effective management of agricultural droughts.

4. Establishment of a network of automatic weather stations
5. Establishment of an observatory for ecological, climatic and socioeconomic monitoring
6. Completion of a portfolio of development, inventory, impact and feasibility studies.
7. Improved coordination, synergy, exchange and communication.
8. Development and implementation of a training and outreach plan.
9. Rehabilitation of existing nurseries and creation of new ones.
10. Reforestation, repopulation, planting in rows and creation of green strips.
11. Carrying out forestry work, maintenance and pest control.
12. Strengthening of access within the forest area and the DFCI.
13. Pastoral plantings, fencing, windbreaks, maintenance and regeneration of alfa grass beds.
14. Establishment of a hardy fruit tree cultivation system.
15. Improved access through the development and opening of agricultural tracks and rural.
16. Bank stabilization, torrent control, soil and water conservation works, adoption of localized irrigation methods.
17. Dune stabilization by mechanical and biological means
18. Improving the mobilization, collection and use of conventional water.
19. Development of value chains (opuntia, olive, rosemary, wool, esparto/alfa grass).
20. Development of partnerships between associations of NWFP livestock farmers, including women.
21. Provision of legal and technical support services for the creation of micro enterprises.
22. Development of small poultry farms and small livestock units beekeeping.
23. Development of hydroponic fodder.
24. Development of solar energy.

4.2.2. Gender approach

The results of the latest General Population and Housing Census (RGPH) show that the ADG area is home to 4,998,825 people and/or 539,115 households, with an average of 6.6 people per household. Despite increasing rural exodus, due in particular to a high unemployment rate and the context of climate change, the agricultural sector remains the main source of employment in rural areas.

The gender distribution of the inhabitants of the Algerian Green Dam (AGD) as of December 31, 2020, reveals a slight predominance of males, with females representing only 49.2% of the total population. The female population is directly affected by the consequences of the economic crises. Indeed, the closure of small and medium-sized enterprises, which, due to their proximity, provided employment for many rural households, thus helping to absorb the already significant unemployment in rural areas, particularly among women.

More generally, women's work in the Green Dam area is often unpaid and remains considered family support on farms. When women do receive financial compensation, it is usually done at home, and the products brought to market are marketed by their husband or brother, as the case may be. This situation is symptomatic of social environments deeply imbued with patriarchal traditions and customs.

Thus, these various constraints have a significant impact on women's incomes. These women are workers. In this sense, they are severely penalized because they do not receive the full proceeds from the sale of their products, as the "seller" takes a more or less significant portion of the transaction for their own use and profit.

Ultimately, this situation severely limits the financial empowerment and economic inclusion of rural women, while conversely, the rate of young women graduating from vocational training and higher education is the highest, thus only exacerbating unemployment among young graduates.

Alongside these qualified and educated women, there are other categories of women with little literacy and limited knowledge of their rights and incentive schemes, which often confines them to the family environment, sometimes very socially compartmentalized and often isolated, like that of women living from pastoral activity in the grazing areas of the Green Dam.

Regarding the institutional aspect of gender equality, it is addressed at both the national and international levels. At the international level, this aspect is addressed through Algeria's accession to and ratification of fundamental treaties on women's rights.

At the national level, it is worth mentioning the existence, since 1992 of the Ministry Delegate for Solidarity and the Family, followed in 2002 by the creation of the Ministry Delegate for the Family and the Status of Women. In 2021, the status of women became a key focus within the ministerial portfolio of the Ministry of Solidarity, the Family, and the Status of Women.

This is further reinforced by the constitutional revisions of 2016 and 2020, which reaffirmed equal pay and promoted women's advancement to positions of responsibility in institutions, public administrations, and businesses, without discrimination. Rural women are targeted by specific measures, as evidenced by the establishment of units dedicated to improving the status of rural women in each wilaya (province).

Furthermore, agricultural and rural development policies and agricultural aid and support mechanisms in Algeria do not discriminate based on gender in terms of access. It is therefore the ideological and cultural sphere, heavily influenced by a patriarchal model, that tends to hinder and slow the socioeconomic empowerment of rural women.

Based on the project's climate scenario, assess how the project will benefit climate-vulnerable groups and vulnerable communities in general, with particular emphasis on gender involvement and needs.

In this context, the project for Improving climate resilience in the steppes and dry forest areas of the Algerian green dam proposes activities specifically dedicated to the employment of rural women through specific surveys (arguments and figures).

The population of the twelve (12) pilot municipalities totals 276,758 inhabitants, distributed among 41,904 households. This represents 6% of the total population of the six (6) wilayas (provinces) included in the project. The population is young, with almost half under 19 years old; 11.5% are under 5 years old, and 32.7% are between 5 and 19 years old.

The gender assessment for the Green Dam rehabilitation project in Algeria was conducted using a participatory approach that actively involved local communities. Workshops were organized in the six wilayas covered by the project (El Bayadh, Naama, Tébessa, Khenchela, Djelfa, and M'Sila) to identify the specific needs of women. These workshops were followed by household surveys of 530 individuals, which provided a deeper understanding of the constraints faced by rural households. The consultations revealed women's interest in handicrafts and the processing of non-timber forest products.

An action plan will be developed based on this information to strengthen climate resilience in the steppe and dry forest areas of the Algerian Green Dam, with a particular emphasis on integrating a gender perspective. This plan aims to empower rural women, who are often marginalized, while addressing the challenges posed by climate change. The main components of this plan to benefit gender equality are as follows:

a) Strengthening the economic role of women:

- Support for women-led agricultural and pastoral operations: The project targets small and medium-sized farms managed by women, offering them access to climate-smart

agricultural techniques, inputs, and financing. This aims to improve their productivity and resilience to climate risks.

- Development of value chains: Women are integrated into the value chains value for products such as rosemary, prickly pear, esparto/alfa grass, and livestock products (poultry, beekeeping). These initiatives allow farmers to diversify their income and better adapt to climate impacts.
- Promotion of the circular economy: The project valorises agricultural by-products and forestry (olive residues, dates, forestry) to produce compost or charcoal, thus reducing waste while creating economic opportunities.

b) Increased participation in decision-making processes:

- Inclusion in local structures: Women are encouraged to actively participate in agricultural cooperatives, local associations and natural resource management committees. Quotas are established to guarantee balanced representation in decision-making bodies.
- Leadership training: Specific programs train women in the sustainable management of natural resources and climate planning, strengthening their capacity to influence local decisions.

c) Capacity building:

- Technical training: Women receive training in agriculture Climate-smart technology, sustainable land management, and product marketing. These training programs aim to enhance their technical skills and market access.
- Entrepreneurial support: Legal and technical assistance is provided to help women to create and manage micro-enterprises. This includes access to microcredit through institutions such as ANGEM and the Algerian Bank for Rural Development (BADR).

d) Improvement of living conditions:

- Introduction of clean technologies: The project distributes 190 solar kits to alleviate domestic work (lighting, cooking) and reducing dependence on polluting energy sources.
- Development of hydroponic fodder: This initiative reduces dependence on degraded pastures, facilitating animal feeding while easing the workload of women.

e) Gender-sensitive monitoring and evaluation:

- Collection of sex-disaggregated data: The project tracks the impact on women by measuring their participation, income, and enhanced capabilities.
- Readjusting strategies: Interventions are adapted according to the obstacles identified to ensure that women benefit equitably from the project.

f) Community awareness:

- Campaigns aimed at changing perceptions about the role of women in management natural resources and adaptation to climate change. Men are also involved as allies to promote equality.

Finally, it is worth noting that the gender action plan ensures that rural women are not merely passive beneficiaries but key actors in the fight against climate change. By fully integrating a gender-sensitive approach, it contributes to sustainable and inclusive resilience in the affected areas.

A comprehensive Gender Assessment was conducted through household surveys across all six wilayas, community workshops with dedicated women's sessions, and analysis of national gender statistics. The project's Gender Action Plan mainstreams gender equality across all three outcomes, led by a full-time Gender Specialist supported by 13 Climate Wise Women (CWW) agents.

- Under Outcome 1: binding 30% women's representation in Wilaya Climate Adaptation Committees; gender assessment of climate information delivery; quotas for women extension agents; deployment of CWW network.
- Under Outcome 2: women integrated into community nursery management (Activity 2.1.1), reforestation and agroforestry (Activity 2.1.3) linked to livelihood incentives, and irrigation decision-making (Activity 2.2.3).
- Under Outcome 3: women as primary beneficiaries of value chain development (Activity 3.1.1), women-led micro-enterprise creation (Activity 3.1.3), gender-responsive microcredit with flexible repayment (Activity 3.1.4), women targeted for livestock modules (Activity 3.2.2) and solar energy (Activity 3.2.5).

4.2.3. Correspondence between the components and the identified climate risks

It will be differentiated between, *internal risks* linked to the two ecosystems (forest and pastoral) that make up the AGD and to the two main components of rural development (water and soil resources) and *external risks* relating to an environment not conducive to the exploitation of climate-resilient land, to which the project will respond with three components comprising appropriate activities and actions.

Table1 Correspondence between hazards, exposure, vulnerability, and risk reduction through project activities (structured impact pathway per adaptation outcome (according to [GCF Decision B.33/12 Annex VI](#)))

The tables below operationalize the GCF impact-potential principles of identification and response (B.33/12 Annex VI, Section II(a)-(b)) by mapping, for each adaptation outcome, the principal climate-related hazards identified in this Step 3 climate risk assessment to the exposed systems and groups, the vulnerability factors that translate exposure into risk, and the project mechanisms — with explicit activity references — that reduce risk. The IPCC AR6 risk framework is applied (Risk = f(Hazard, Exposure, Vulnerability)). Together with the per-outcome counterfactual presented in Section D.1 of the FP, this anchor evidence base substantiates the project's adaptation impact-potential argument.

Table 1 Climate hazards, exposure, vulnerability and risk reduction

.Outcome 1 — Enabling Governance and Climate Information: structured impact pathway

Hazard	Exposure	Vulnerability	Risk reduction (project mechanism)
Drought — recurring; intensifying (2021 drought affected 68% of AGD); –16% rainfall by 2080-2100 (SSP2-4.5)	Pastoral communities across 12 pilot communes; 60-70% of HH livestock-dependent; six target wilayas	No real-time agro-climatic data; weak inter-ministerial coordination across 17 institutions / 7 ministries; absent decision-support tools; 1975 Pastoral Code not enforced	Climate and ecological observatory (Activity 1.2.1); Install an agrometeorological station network (1.2.2); integrated GIS for drought / land-degradation (1.2.4); digital climate advisory services + mobile app + AI forecasting (1.2.6); multi-stakeholder climate governance platform with ≥30% women's representation (1.1.4); modernised Pastoral Code (1.1.1)
Extreme heat — +2.9°C by 2080-2100; intensifying heatwaves and evapotranspiration	Rangelands (<i>Stipa tenacissima</i> , <i>Lygeum spartum</i>); livestock (thermal stress); soil organic matter	Absence of heat-adaptive management framework; no scientific stocking rates or seasonal grazing rotations; no decision support for adaptive management	Science-based stocking rates and rotational grazing under Pastoral Code reform (1.1.1); evidence-based decisions enabled by observatory + GIS (1.2.1, 1.2.4); targeted training (1.2.7)
Wildfire risk — climate-attributable increase in fire frequency and intensity	Forest cover (12,524 ha under management); pastoral settlements; infrastructure; livestock	No structured early warning; weak coordination with Direction de la Protection Civile; absence of dedicated wildfire alert protocols	Wildfire alert protocols from agrometeorological + GIS systems (1.2.3, 1.2.4); training of emergency responders and community fire teams (1.2.7); coordination platform (1.1.4)
Information barriers — fragmented climate data; no national MRV for AFOLU; no domestic carbon-pricing framework	Algeria's NDC AFOLU commitments; restoration investments lacking verification; restoration scaling deferred	No AFOLU MRV foundation; no Verra/Gold-Standard methodology validated for steppe context; no carbon-rights legal framework	Domestic AFOLU offset mechanism (1.1.2); voluntary carbon finance readiness with MRV foundation — EarthMap/OpenForis/SEPAL/FAO NEXT/TAPE/KoboToolBox (1.1.3); legal clarification of carbon rights and Benefit Sharing Agreements

Outcome 2 — Climate-Resilient, Low-Emission Restoration and Sustainable Land Management: structured impact pathway

Hazard	Exposure	Vulnerability	Risk reduction (project mechanism)
Drought + declining rainfall + rising evapotranspiration	Steppe rangelands (28,491 ha); forests (2,688 ha actively treated); pastoral plantings (Opuntia 1,092 ha)	Open-access pastoral regimes on Arch lands; overstocking (0.78 ha/sheep against sustainable 8 ha/sheep — 10× the carrying capacity); species mismatch from historical Aleppo pine monoculture; weak post-establishment maintenance	Pastoral concession system + science-based stocking rates + rotational grazing (Activities 1.1.1, 2.1.2); native species mix — Tamarix, Calligonum, Retama, Atriplex, Opuntia (2.1.2, 2.1.3); 5-year enclosure protection (2.1.3); g'del deferred grazing (2.1.2)

Wind erosion + flash floods (intensifying flash-flood frequency in wadi systems under SSP2-4.5 and SSP5-8.5)	Soil cover; settlements; agricultural land; wadi-bed users	Bare or thinly vegetated surfaces (>50% vegetation cover loss since 1970s); inadequate soil-water conservation structures; soil losses 150-300 t/ha/year in cleared steppes	Dune fixation 3,150 ha with mechanical and biological methods (2.1.4); soil and water conservation structures across 1,500 ha (2.2.2); windbreak strips and erosion-resistant alignment of rural tracks (2.2.1); native vegetation cover restoration
Wildfires — climate-attributable forest fires of increasing frequency and intensity	Forest stands (Tébessa, Khenchela, M'sila, Djelfa); 12,524 ha under silvicultural management; settlements; infrastructure	Inadequate DFCI infrastructure; unconsolidated forest land tenure; no firebreaks / water points / boundary markers; pine mealybug pressure intensifying under heat stress	Forest fire management and protection (2.1.6); DFCI infrastructure — firebreaks, water points, access routes; 9,760 km of boundary markers consolidating forest tenure; silvicultural management and IPM across 12,524 ha (2.1.5)
Water-supply emergencies — declining recharge; groundwater depletion; intensifying drought episodes	Pastoral and agro-pastoral households cut off during drought; livestock; restoration sites	No buffering against drought; over-abstraction from existing wells; unmonitored aquifer status; concentration risk on single supply type	Diversified water-infrastructure portfolio sized below ANRH safe-yield thresholds — 22 boreholes, 1 hill reservoir, 14 CEDs, 8 new ponds, 5 rehabilitated ponds, 2 pastoral wells (2.2.3); climate-stress testing under SSP2-4.5 and SSP5-8.5; metering + WUAs with 30% female membership + conditional permit renewals
Agricultural-track impassability under flash flood / intensifying rainfall variability	Emergency-response routes; restoration supply chains; market access; drought-relief logistics	Degraded track network; absence of climate-resilient design (drainage, all-weather surfacing, erosion-resistant alignment)	478 km of climate-resilient agricultural and rural tracks across five wilayas (2.2.1); designed for intensified rainfall and flash-flood events; priority on emergency-access segments

Outcome 3 — Climate-Resilient Livelihoods, Value Chains, and Sustainable Finance: structured impact pathway

Hazard	Exposure	Vulnerability	Risk reduction (project mechanism)
Drought-driven income shocks — recurring; 2021 drought affected 68% of Green Dam	60-70% of HH livestock-dependent; >90% rainfed cereal farmers; 5,334 women-led HH	Single-product income streams; cereal yields already down 30-40% over two decades; no climate-indexed credit; standard agricultural credit (BADR) incompatible with drought-driven income; women excluded from finance and tenure	Six diversified climate-resilient value chains — opuntia, olive, rosemary, wool, alfa, peppermint (3.1.1); climate-adapted microcredit via BADR/FGAR/CNMA/ANCC with seasonal-income-aligned repayment, climate-indexed products, and group-based lending for women's cooperatives (3.1.4); women's collective concessions on the six value chains; Climate Wise Women network
Fodder deficits during drought — dry-season fodder collapse	Livestock (especially small ruminants); household food security; transhumant communities	Dependence on degraded rangelands (already operating 10× carrying capacity); no off-rangeland fodder; no climate-adaptive feed sources	240 hydroponic forage chambers (8 m ² , 540 kg/day, solar-powered) across six wilayas — meeting 25,146 sheep-equivalent needs (3.2.3); rangeland restoration (2.1.2); small-scale livestock modules for 5,334 HH (3.2.2)
Climate-driven market volatility — NWFP local market disruption during droughts; distress sales	Smallholder NWFP producers and processors; women's collective income; transhumant herders	Informal / uncertified producers; no off-take agreements; no traceability; weak market linkages	Certification — organic, GlobalG.A.P., Fair Trade (3.1.1); producer-private sector MoUs with pre-agreed off-take and minimum prices (3.1.2); micro-enterprise legal/technical assistance for registration and certification (3.1.3); aggregation platforms and digital marketplaces

Energy / electricity unreliability — exacerbated by drought-driven supply disruptions	Isolated agro-pastoral households (priority for women-headed); rural subsistence operations	Fossil-fuel dependence; no resilient energy source; capital-cost barriers to solar adoption	190 solar energy kits across six wilayas with priority allocation to women-headed households (3.2.5); circular economy interventions valorising agricultural by-products (3.2.4)
Income concentration in climate-sensitive activities — rainfed cereals and livestock	5,334 women-led HH; smallholder cereal-and-livestock households across six wilayas	No alternative income; gender norms restricting women's access to tenure and finance; weak entrepreneurship infrastructure	Six certified value chains (3.1.1); 80 micro-enterprises supported (3.1.3); 5,974 ha rustic fruit orchards + 6,000 ha agroforestry (3.2.1); climate-adapted microcredit (3.1.4); women's collective concessions

4.2.4. Justification of the proposed components and activities

The Algerian Green Dam (AGD) faces challenges due to climate change, particularly the desertification of steppe and forest areas that support millions of small-scale farmers and herders. The components selected for this project are justified by non-climatic vulnerability parameters (primarily human activities) exacerbated by climate hazards (decreased rainfall, increased temperatures, and the intensity and frequency of extreme events such as droughts and floods). Healthy ecosystems are more resilient to climate change and provide vital services such as drinking water and food.

Table 2 Climate justification and contribution to adaptation and mitigation

Project Activities	Activity deliverables	Climate justification & contribution to adaptation
Component 1. Enabling Governance Framework and Climate Information		
Sub-result 1.1 - Improving the regulatory framework and incentives for natural resource management resilient to CC.	Activity 1.1.1. Reform the 1975 Pastoral Code and the Local Land Governance Framework	Free access to grazing land and alfa grass stands often leads to overgrazing, and therefore, degradation of the resource (pastoral code). However, the current and future pastoral code requires greater consideration in regulations (tax incentives and other benefits).
Sub-Result 1.2 - Improving land use management through the development of tools analytical and the development of various studies.	Activity 1.2.1. Establish a climate and ecological observation network at the AGD territory level Activity 1.2.2. Develop and deploy a digital monitoring and evaluation system Activity 1.2.3. Develop an integrated GIS for agricultural drought and land degradation management Activity 1.2.4. Develop a portfolio of baseline and feasibility studies for sustainable resource management - Formulate, design and carry out a portfolio of development studies (forest management, recreational forests), inventory (wildlife and flora), impact (sand encroachment) and feasibility studies (protected areas, groundwater recharge, reuse of treated wastewater) for a better understanding, with a view to rational exploitation, of the existing potential to be developed and regulated, adapting it to the current and future context of CC.	The failure to capitalize on past experiences, a clear deficit in communication and knowledge (current and predictable) of the potential of natural resources to be developed, a formulation that is at the limit of precision of projects whose implementation methods lack transparency in some cases, constitute indirect causes of land use that is not resilient to climate change (overgrazing and illegal ploughing on rangeland, forestry offenses, practice of unreasoned irrigated agriculture, etc.).
Sub-Result 1.3 - Strengthen the coordination and synergy of stakeholders and the technical capacity of the ACC.	Activity 1.1.4 Establish a multi-stakeholder climate governance platform dedicated to the Green Dam, creating an inclusive digital climate governance platform at wilaya and central levels to strengthen coordination, stakeholder participation, and evidence-based decision-making across the Green Dam landscape Activity 1.2.6. Design and deliver targeted training & knowledge transfer programs to project zones, focusing on support	The current low level of coordination and synergy between stakeholders, the limited technical capacities of actor groups and the marginal role of the private sector contribute to the persistence of an environment that is not conducive to climate change resilient land management.

	mechanisms for certain sectors (public-private) and crop and livestock farming practices that take into account the CC	
Component 2 - Ecosystem Restoration and Climate-Resilient Land Management		
Sub-Result 2.1 - Restore, protect and expand forest heritage for climate-resilient management and exploitation.	Activity 2.1.1. Rehabilitate and create nurseries for climate-adapted seedling production to produce approximately 12,741,900 climate-adapted seedlings over seven years, supporting ecosystem restoration across 22,658 hectares, with a selection of species adapted to current and future local climatic conditions. The nurseries will be managed long-term by community nursery groups (women) trained in planting and seed production. Activity 2.1.3. Reforest and revegetate forest heritage for climate-resilient management through a participatory approach, by conducting reforestation of 1,145 hectares using diverse native species adapted to climate conditions; replant underperforming forest stands across 1,333 hectares with three-to five-year enclosure protection, with a diverse choice of drought-resistant species for better protection of the soil, road infrastructure and dwellings, particularly against sand encroachment. Activity 2.1.5. Strengthen forest health through silvicultural management and pest control, improving the health, resilience, and productivity of forest stands through targeted silvicultural management, maintenance, and Integrated Pest Management measures across 12,524 hectares in six wilayas: El Bayadh (2,226 ha), Naâma (113 ha), Djelfa (1,500 ha), M'sila (4,285 ha), Tébessa (1,200 ha), and Khenchela (3,200 ha) Activity 2.2.1 Strengthening access through the opening and development of forest tracks (129 km) and DFCI (construction of 2 lookouts posts and development of 335 ha of TPF) to preserve forest cover through more effective firefighting.	The AGD area is home to pastoral activities as well as mixed agricultural systems, exposed and sensitive to desertification and soil degradation processes linked to climate change. This increasingly evident aridity dries out and degrades the soil, consequently leading to desertification. Climate change manifests itself in increasingly prolonged drought cycles across all provinces, while rainfall decreases and temperatures rise, negatively impacting surface and groundwater storage and soil fertility. Furthermore, forest and fodder plantations, reinforced by soil conservation and management structures, retain soil in place, reduce erosion, increase runoff infiltration, and minimize flooding in low-lying areas. The introduction of native species (forest, fodder, fruit) will ensure permanent plant cover essential for combating erosion (wind and water) and for carbon sequestration. Forage planting, assisted fencing and the introduction of hydroponic fodder will contribute to mitigating the adverse effects of overgrazing following climate change.
Sub-Result 2.2 - Protecting, rehabilitating and improving	Activity 2.1.2 Implement a program for climate-resilient rangeland management, delivering a comprehensive rangeland	The introduction of hardy fruit trees such as olive, fig, almond, and pistachio trees, as well as native pastoral

pastoral heritage for sustainable management.	management program across 12 communes covering 28,491 ha, integrating pastoral planting (3 780 ha), Opuntia plantations (1,092 ha), deferred grazing and enclosure (23,619 ha), and forage seed collection (30 ha). Activity 3.2.1 Provide rustic fruit cultivation for pastoral farms, across 5,974 hectares in six wilayas of the AGD: El Bayadh, Naâma, Djelfa, M'sila, Tébessa, and Khenchela, and promoting agroforestry with a target of 6,000 hectares in the pilot municipalities of the targeted wilayas. . Activity 2.2.1. Rehabilitate agricultural access tracks to improve rural connectivity, rover 478 km of agricultural and rural tracks across five wilayas to combat the isolation of certain places and to provide the households concerned with better access to facilities (health, education, etc.) and to the market (transport of crops and supply of inputs).	shrubs and prickly pear cactus, will also ensure permanent vegetation cover (combating erosion and sequestering carbon) and significantly improve the incomes of the households involved. These valuable and productive species will be cultivated and preserved with greater care by the beneficiaries. Combined with the cultural and varietal adaptation measures supported by the project, the olive tree remains a good way to better utilize available water, with very little negative impact on water scarcity, and a formidable means of combating the worsening of desertification in the AGD. Droughts are becoming longer and more frequent in all provinces, while temperatures are rising and rainfall is decreasing, negatively impacting surface and groundwater storage. The construction of infrastructure adapted to the area and the rehabilitation of those existing will allow a best Harvesting rainwater for drinking water and livestock watering could strengthen the resilience of small farmers/livestock breeders to climate change. Water availability could be a crucial factor in maintaining agricultural activity in this area, which is subject to significant water stress.
Sub-Result 2.3 - Maintain and improve soil health and conserve water for climate-resilient management.	Activity 2.2.2. Implement soil and water conservation structures and practices, and slow down the degradation of soil and the loss of water retention by building and repairing hydraulic and erosion-control infrastructure across 1500 Ha Activity 2.1.4 Implement a dune fixation program to control silting and wind erosion and reduce sand encroachment threatening agricultural lands, rangelands, settlements, and infrastructure across the AGD Activity 2.2.3 Mobilize and store water resources for climate-resilient agro-sylvo-pastoral systems.	Climate change, through decreased rainfall and increased temperatures, will reduce the productivity of rangelands, severely limiting their role as a natural barrier against desertification. Improving these communal rangelands, with assisted grazing, forms the basis for the resilience and adaptation of steppe ecosystems to climate change. Management through the establishment of a viable system of livestock rotation from one plot to another, with control of the grazing pressure and opening and closing dates to avoid permanently compromising plant resilience, will allow for the maintenance of unchanged plant communities,

	Activity 2.2.3. Mobilize and store water resources for climate-resilient agro-sylvo-pastoral systems.	sustained and sustainable productivity, and the improvement of poor soils. Mobilizing water resources addresses three intensifying climate stressors that threaten the viability of agro-sylvo-pastoral systems across the Algerian Green Dam: (i) declining and increasingly irregular precipitation — projected to decrease by up to 16% by 2080–2100 under SSP2-4.5 — that erodes the reliability of seasonal water availability; (ii) groundwater depletion driven by reduced aquifer recharge under drier conditions combined with rising abstraction pressure on shallow wells; and (iii) recurrent and intensifying drought episodes — 68% of the Green Dam was affected by the 2021 drought alone — producing acute water-supply emergencies for the most vulnerable pastoral and agro-pastoral communities.
Component 3. Climate-Resilient Livelihoods, Value Chains and Sustainable Finance		
Sub-Result 3.1 - To study and develop selected value chains (VCs) of NWFPs and livestock products to support the livelihoods of the populations concerned in the context of resilience to CC.	Activity 3.1.1. Develop six priority climate-resilient value chains (opuntia, olive, rosemary, wool, alfa grass and peppermint) for the direct beneficiaries (mostly women) to diversify and improve their incomes in addition to interested private investors to create a dynamic of local economic development (combination of the added values of the VC actors). Activity 3.1.2. Establish partnerships between producers and private sector. Develop partnerships between NWFP associations and livestock farmers, including women's organizations and private companies (contracting, collective action, trade and financial agreements) to guarantee more favourable conditions. Activity 3.1.3. Provide legal and technical assistance for creation of micro-enterprises, to support the creation of micro-enterprise (production and marketing of non-timber forest products and livestock products, certification and standards)	The project aims to increase and strengthen the resilience of livelihoods by supporting promising sectors (opuntia, olive, rosemary, wool, esparto/alfa grass) and creating conditions conducive to better exploitation of agro-sylvo-pastoral potential. To foster better links between the various stakeholders in the development of local communities, the project proposes the provision of legal and technical assistance services and the development of partnerships to guarantee more favourable conditions through contractual agreements, trade agreements, and financial arrangements. Training programs are planned (particularly for women) to implement improved production methods for rosemary and prickly pear, for example. This will enable them to better adapt and their products to the needs of businesses, gain new customers, and increase their income through higher yields and better-quality products.

Sub-Result 3.2 - Supporting small and medium-sized farms pastoral, primarily rural women, through the development of small-scale livestock farming (beekeeping and poultry farming) and the exploitation of fodder crops hydroponics thanks to a better adaptation of these activities to the context of the CC and their significant contributions to households in terms of income.	Activity 3.2.2. Deploy small-scale livestock modules for rural households, (poultry, beekeeping) for the benefit of 5,334 rural households (mainly women) to preserve natural resources and contribute to improving biodiversity, diversifying incomes and increasing the ACC. Activity 3.2.3. Install hydroponic forage production systems for the benefit of 240 small and medium-sized farmers to contribute to income diversification, improved food balance (UF requirements/UF availability) and increased climate resilience of a significant number of farmers. Activity 3.2.5. Deploy solar energy kits for isolated rural households, to improve the living and subsistence conditions of rural households (the most isolated) by developing solar energy through the acquisition and installation of 190 solar kits to benefit from clean, non-GHG emitting electricity.	The increase and strengthening of the resilience of rural household livelihoods will be ensured by the development of intensive livestock farming (poultry and beekeeping), which will allow a clear improvement in biodiversity and incomes. The climate resilience of small and medium-sized farmers will also be strengthened by the introduction of hydroponic fodder technology which, while ensuring a certain autonomy for them, contributes to the preservation of rangelands and esparto grass beds which are suffering from deforestation and overgrazing which is exacerbated by climate change. The development and gradual generalization of solar energy for the benefit of households and farmers will significantly reduce GHG emissions.
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4.3. Other Co-benefits

4.3.1. Enhanced Gender Equality Co-benefit- Gender-sensitive development co-benefits (SDG 5):

The project integrates a gender-responsive approach across all components. Given the limited benefits that women producers currently derive from livestock, crafts, and NWFPs, special measures will ensure a more balanced sharing of project benefits. The gender-responsive approach is operationalized through seven concrete, activity-anchored mechanisms that translate the project's commitment to gender equality into measurable outcomes for women across the six target wilayas (Tébessa, Khenchela, M'sila, Djelfa, El Baydah, Naâma):

- Quota-based representation in climate governance. The multi-stakeholder climate governance platform (Activity 1.1.4) embeds $\geq 30\%$ women's representation as a binding institutional rule; Water Users Associations under Activity 2.2.3 require at least 30% female membership with conditional permit-renewal incentives; and the Climate Wise Women network builds peer-to-peer leadership across the six wilayas. These quotas convert formal participation into measurable voice in adaptive-management decisions.
- Women's tenure rights through collective concessions. Women's collective concessions on the six NWFP value chains — opuntia, olive, rosemary, wool, alfa grass, peppermint — resolve women's structural exclusion from rangeland and forest tenure under the 1975 Pastoral Code. For the first time, women's cooperatives hold legally recognised user rights over the resource base of their primary income-generating activities, registered in the modernised pastoral concession registry (Activity 2.1.2).
- Climate-adapted financial inclusion. Group-based lending products under Activity 3.1.4, channelled through BADR, FGAR, CNMA and ANCC, are explicitly designed for women's cooperatives and youth-led micro-enterprises — overcoming the collateral and seasonal-income mismatches that exclude women from standard agricultural credit. Climate-indexed repayment schedules align with NWFP and livestock production cycles, and group-guarantee mechanisms substitute for the formal collateral women rarely hold.
- Priority allocation of productive assets to women-headed households. The 5,334 women-led households identified across the six wilayas receive priority allocation of: (i) 190 solar energy kits (Activity 3.2.5) for off-grid agricultural and household use; (ii) small-scale livestock modules (Activity 3.2.2) sized for women-managed flocks; and (iii) registration and certification support for the 80 supported micro-enterprises (Activity 3.1.3), with a target of at least 50% women-led.
- Equitable carbon-revenue sharing. Benefit Sharing Agreements under the AFOLU offset mechanism (Activity 1.1.2) and voluntary carbon-finance architecture (Activity 1.1.3) embed gender-equitable distribution rules — guaranteeing that women's cooperatives share directly in any future carbon revenue from the lands they restore and manage, including through dedicated women's-cooperative escrow accounts at the community level.
- Capacity-building targeted at women's leadership. Training cascades under Activities 1.2.7 (technical training), 3.1.3 (entrepreneurship support) and the Climate Wise Women network deliver dedicated modules on agribusiness management, certification standards (organic, Global G.A.P., Fair Trade), digital climate advisory tools, hydroponic-forage management (Activity 3.2.3), and water-user governance — building the technical and leadership capabilities required for women to capture project opportunities at scale.
- Gender-disaggregated M&E and accountability. All project indicators are disaggregated by sex, age and wilaya; the MRV foundation (Activity 1.1.3) integrates gender-disaggregated reporting against the GCF IRMF Gender Action Plan and FAO's Policy on Gender Equality. Quarterly progress reports flag any deviation from the 30 % female-participation thresholds and trigger corrective action through the Project Steering Committee.

4.3.2 Enhanced Social-inclusion co-benefit — access, participation and benefits for vulnerable and marginalized groups (SDGs 5, 10): The project's social-inclusion mechanisms target the four groups whose food-security is most precarious under climate stress — women, youth, transhumant herders, and landless agro-pastoralists. Because these groups also bear the largest share of household nutrition responsibility, their formal inclusion translates directly into household-level food-security outcomes:

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- Access is secured through (i) the formalized pastoral concession system (Activity 2.1.2), which converts open-access Arch lands into negotiated user rights and provides landless agro-pastoralists and transhumant herders a legally recognized tenure entry point for the first time — stabilizing rangeland-based food and feed production; (ii) women's collective concessions on the six NWFP value chains, resolving women's long-standing exclusion from rangeland and forest tenure and giving them ownership over food-producing landscapes; and (iii) climate-adapted microcredit via BADR/FGAR/CNMA/ANCC (Activity 3.1.4) with group-based lending products tailored to women's cooperatives and youth-led micro-enterprises, lifting the financial-access barrier that standard agricultural credit imposes on these groups.
- Participation is anchored in the multi-stakeholder climate governance platform (Activity 1.1.4) with ≥30% women's representation, Water Users Associations with at least 30% female membership, the Climate Wise Women network, and the formal integration of traditional ecological knowledge with the digital climate advisory services (Activity 1.2.6) — giving local and indigenous knowledge formal standing in adaptive-management decisions over food-producing systems. Youth and transhumant representatives sit on commune-level concession committees.
- Benefits are distributed through transparent priority-allocation rules that prioritize food-security-vulnerable households: the 190 solar energy kits (Activity 3.2.5) and the small-scale livestock modules (Activity 3.2.2) prioritize women-headed households (5,334 HH) — both directly increasing on-farm food-production capacity; the 80 supported micro-enterprises (Activity 3.1.3) prioritize women's and youth-led registration; and Benefit Sharing Agreements under the AFOLU offset mechanism (Activity 1.1.2) guarantee community-level returns from any future carbon revenue. The collaborative concession-and-governance model strengthens social cohesion across pastoral, agro-pastoral and forest-edge communities and reduces conflicts over natural-resource use — including conflicts over rangeland feed and water access that drive food-stress dynamics.

5. THEORY OF CHANGE (TOC)

5.1. Statement of Objective

The project's theory of change responds to compounding climatic pressures —rising temperatures, increasing aridity, decreased precipitation, and more frequent extreme weather events, that are progressively degrading steppe ecosystems and undermining agro-pastoral livelihoods across the Green Dam landscape. These climatic stressors, exacerbated by unsustainable resource use and chronic overgrazing, trap pastoral communities in a cycle of maladaptation that erodes rangeland productivity, diminishes ecosystem resilience, and weakens adaptive capacity.

The project is premised on the conviction that this cycle could be broken through targeted ecosystem restoration, which recovers degraded landscapes, conserves biodiversity, reduces GHG emissions, and strengthens the resilience of natural systems. Restored ecosystems, in turn, create enabling conditions for diversified rural economies, improved livelihoods, and increased public and private investment—generating a self-reinforcing cycle of sustainability and inclusive growth.

At present, smallholder farmers and pastoralists rely on unsustainable rangeland practices that accelerate land degradation and increase vulnerability to climate change impacts. At the same time, prevailing policy approaches have tended to frame pastoral communities as drivers of degradation rather than partners in sustainable land management.

The project seeks to transform this paradigm by promoting behavioural change through incentives, scaling up climate adaptation practices, strengthening land tenure governance, and repositioning pastoralists and farmers as custodians of natural resources. It will support a transition from a predominantly state-led, single-species conservation model with limited community engagement toward an integrated, climate-resilient landscape management approach. This approach will foster a paradigm shift based on multi-stakeholder collaboration, including active engagement of the private sector and financial institutions, to catalyse long-term environmental sustainability, resilience, and inclusive economic development (See figure 2).

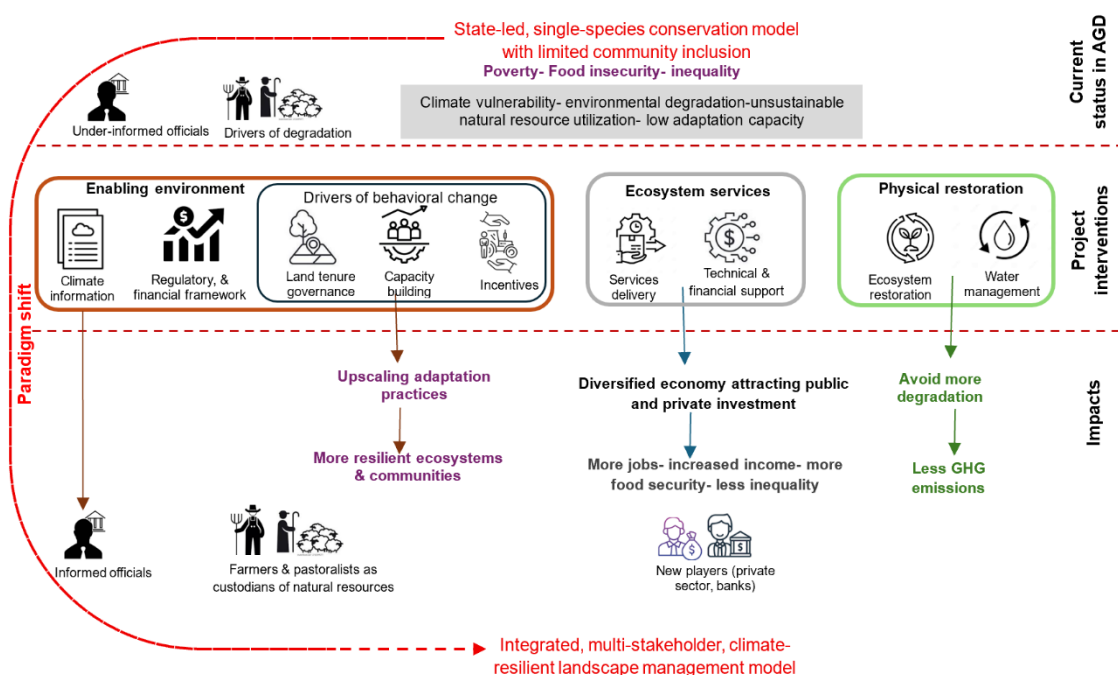


Fig. 2 – Stakeholders' behavioural change

Achieving this transformation requires coordinated and mutually reinforcing investments across three interdependent pillars: an enabling governance environment, ecosystem restoration at landscape scale, and climate-resilient livelihoods. Together, these interventions are designed to catalyse a systemic and paradigm-shifting transformation of agro-pastoral systems across the Green Dam steppe landscape. Through integrated ecosystem restoration, climate-resilient land management, and diversified livelihood opportunities, the project directly addresses escalating climate risks — including drought, land degradation, and desertification — while substantially strengthening the adaptive capacity of local communities. Concurrently, the restoration of degraded steppe and forest ecosystems will enhance their carbon sequestration potential and reduce GHG emissions, generating significant mitigation co-benefits.

By linking adaptation and mitigation objectives across steppe, forest, semi-arid grassland, and agro-pastoral systems, the project contributes to transformational climate resilience and ecosystem recovery at scale, while improving the livelihoods of farmers, pastoralists, and private sector actors across the Green Dam landscape.

The Theory of Change of the project is:

IF the policy and institutional framework is modernized, climate-vulnerable agro-sylvo-pastoral ecosystems are restored and sustainably managed, and climate-smart value chains are anchored in sustainable financing, supported by science-based climate information; **THEN** a paradigm shift toward climate-resilient, low-emission ecosystem development is achieved across the 1,500 km Algerian Green Dam, generating durable adaptation and mitigation impacts; **BECAUSE** three reinforcing drivers- Incentives, Capacity Development, and Tenure & Recognition- reposition pastoral and rural communities from drivers of degradation into custodians of natural capital: adopting climate-adaptive practices, holding legal rights to the land they manage, sharing fairly in the value their stewardship creates, accessing diversified climate-smart livelihoods, and leading ecosystem restoration — strengthening the long-term socio-economic resilience of vulnerable communities in the Green Dam landscape

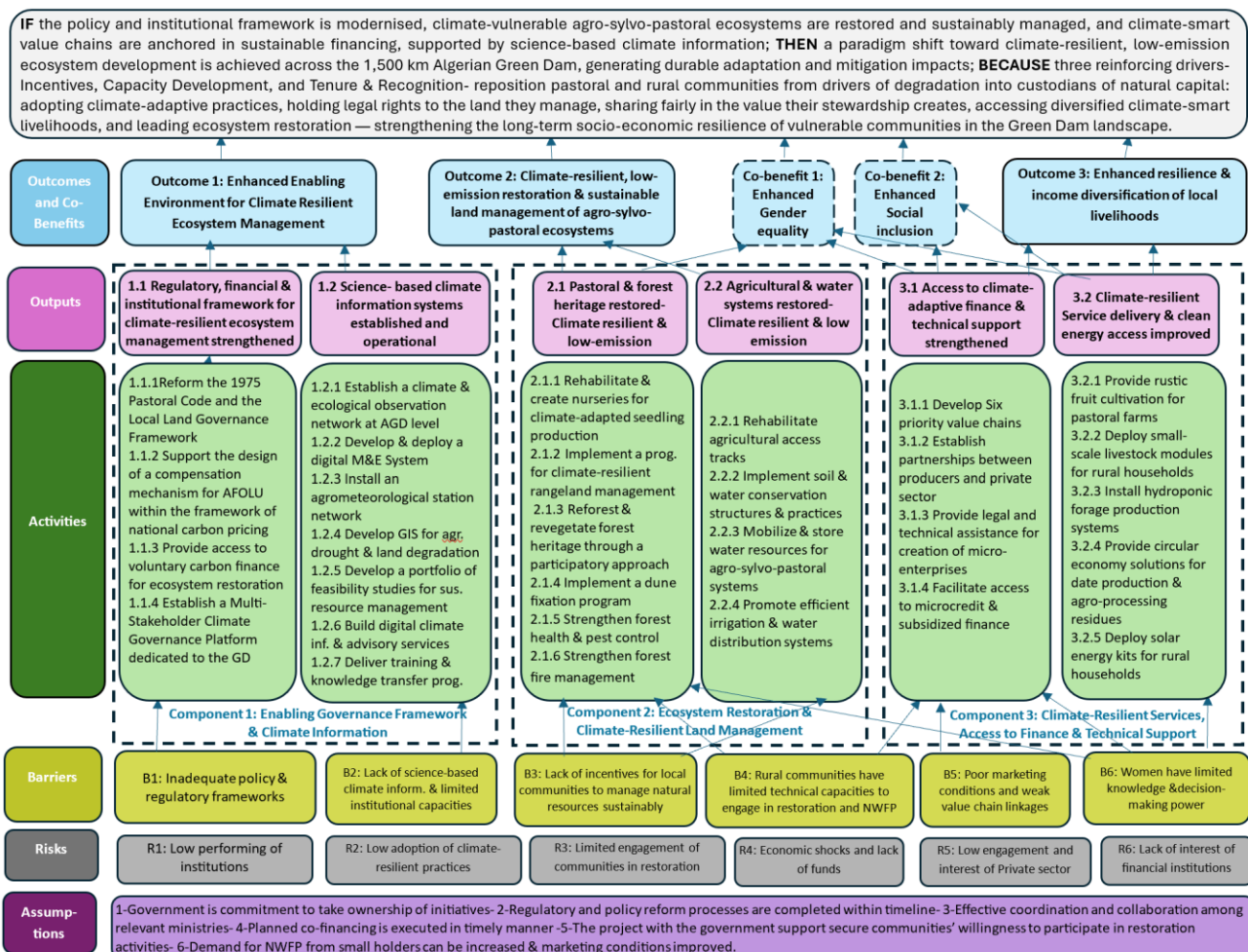


Figure 3: Theory of change and change of the project

5.2. Proposed adaptation solutions

In line with the 2015 Intended Nationally Determined Contributions (INDCs), adaptation priorities identified for the AGD wilayas within the AFOLU sector (Agriculture, Forestry, and Other Land Use) include:

- i) strengthening the regulatory framework and enabling environment for climate-resilient land-use management;
- ii) enhancing the climate resilience of degraded agro-sylvo-pastoral landscapes, land productivity, biodiversity, and carbon sequestration; and
- iii) bolstering the climate resilience of smallholder farmers through sustainable land management and the development of climate-resilient livestock and non-wood forest product (NWFP) value chains.

Table 3 Adaptation solutions

Result 1 Improvement of the regulatory framework and environment conducive to climate change resilient land management.

Sub-result 1.1 Improvement of the regulatory framework and incentives for climate change resilient natural resource management.	Activity 1.1.1 Reform the 1975 Pastoral Code and the Local Land Governance Framework
Sub-result 1.2 Improvement of land use management through the development of analytical tools and the development of various studies.	Activity 1.2.2 Support the design of the foundations of a compensation mechanism for AFOLU within a framework of national carbon pricing Activity 1.2.3 Develop an integrated GIS for agricultural drought and land degradation management Activity 1.2.1 Establish a climate and ecological observation network at the AGD territory level Activity 1.2.5 Build digital climate information and advisory services
Sub-result 1.3 Strengthening of stakeholder coordination and synergy and of the ACC's technical capacity.	Activity 1.2.5 Build digital climate information and advisory services Establish a multi-stakeholder climate governance platform Activity 1.2.6 Design and deliver targeted training & knowledge transfer programs to project zones

Result 2. Increased resilience of agro-sylvo-pastoral ecosystems

Sub-result 2.1. Restoration, protection and extension of forest heritage for management and climate-resilient farming.	Activity 2.1.1. Rehabilitate and create nurseries for climate-adapted seedlings Activity 2.1.3. Reforest and revegetate forest heritage for climate-resilient management through a participatory approach Activity 2.1.5. Strengthen forest health through silvicultural management and pest control Activity 2.2.1 Rehabilitate agricultural access tracks to improve rural connectivity
Sub-result 2.2. protection, rehabilitation and Improvement for sustainable management of pastoral heritage.	Activity 2.1.2 Implement a program for climate-resilient rangeland management Activity 3.2.1 Provide rustic fruit cultivation for pastoral farms Activity 2.2.1 Improvement of access through the development and opening of agricultural and rural tracks.
Sub-result 2.3. Maintaining and improving soil health and conserving water for management climate resilient.	Activity 2.2.4 Promote efficient irrigation and water distribution systems Activity 2.1.4 Implement a dune fixation program to control silting and wind erosion Activity 2.2.3. Mobilize and store water resources for climate-resilient agro-sylvo-pastoral systems

Result 3. Strengthening smallholder farmers through land management and value chains of non-timber forests and climate-resilient livestock

Sub-result 3.1 Study and development of value chains (VCs) of NWFPs and livestock products, development of partnerships and provision of legal and technical support services.	Activity 3.1.1. Develop six priority climate-resilient value chains (opuntia, olive, rosemary, wool, alfa grass and peppermint). Activity 3.1.2. Establish partnerships between producers and private sector. Activity 3.1.3. Provide legal and technical assistance for creation of micro-enterprises
Sub-result 3.2 Support for small and medium-sized farms pastoral, primarily rural women.	Activity 3.2.2. Deploy small-scale livestock modules for rural households Activity 3.2.3. Install hydroponic forage production systems Activity 3.2.5. Deploy solar energy kits for isolated rural households

5.3. Main Adaptation Barriers

The primary barriers to adaptation across the AGD are institutional, organizational, regulatory, and technical, as detailed below.

5.3.1. Strengthening Intersectoral Coordination

Stakeholder consultations across the six targeted wilayas identified an urgent need for enhanced coordination between core sectors (CFW, HCDS, DSA, DRE, DE, trade, infrastructure, etc.).

Effectively addressing these gaps requires the active engagement of a diverse range of actors directly or indirectly impacted by the project, including local elected officials, chambers of agriculture and commerce, universities, rural households, livestock and farmers' associations, women's groups, project developers, financial institutions, insurance providers, and private economic agents. This improved connectivity is essential to reducing the vulnerability of agro-silvopastoral ecosystems and rural communities.

Furthermore, the management of CCA programs must be bolstered through improved stakeholder synergy and multi-sectoral involvement in the design and implementation of project activities. Once addressed through the establishment of local bodies and committees, this institutional barrier will be mitigated. Specifically, Sub-result 1.3 will focus on strengthening coordination and technical CCA capacity, while Sub-result 1.2 will improve land-use management through the development of analytical tools and strategic studies.

Indeed, robust multi-stakeholder coordination will enable integrated, concerted action in formulating climate mitigation and adaptation measures. This alignment is critical for the successful development of resilient value chains. Finally, it is necessary to enhance stakeholder capacity to design projects that meet donor requirements, facilitate information exchange on climate opportunities, optimize resource leverage, and increase the visibility of successful interventions.

5.3.2. A Binding Regulatory Framework for Climate-Resilient Land Management

A fundamental pillar of natural resource governance, the regulatory framework must be analysed by distinguishing between legislation explicitly addressing Climate Change (CC) and frameworks with indirect climate implications.

The former includes: i) the Environmental Protection and Sustainable Development Law, which classifies GHGs as air pollutants (Art. 4) and enables fiscal and customs incentives for GHG-reduction technologies (Art. 76); and ii) the Renewable Energy Promotion Law, which identifies renewables as a primary mitigation tool (Arts. 2, 3, 6, 13, 17).

The second group covers agriculture, water, biodiversity, and land-use planning. Critically, the Pastoral Code (Ordinance 75-43, 1975) governing rangelands is now obsolete, while a new Forestry Code currently awaits interministerial validation. Since 1978, agricultural land has undergone extensive

liberalization—from the 1990 Land Policy Law (90-25) to Decree 108 (2011) and Circular 1839 (2017)—facilitating state land concessions for private investment.

This widespread liberalization has driven many herders and farmers to privatize grazing lands, intensify practices, and overexploit collective resources (water and pasture). It has also institutionalized inequalities in land access, increasing vulnerability and excluding segments of the population from traditionally recognized rangelands. This situation results from a socio-historical process summarized as follows:

- During the colonial period, customary pastoral land use was disrupted by land reforms (Senatus Consultum 1863, Warnier Law 1873) and administrative restructuring (creation of common douars), which replaced customary institutions with colonial state bodies and restricted pastoral mobility toward the cultivated Tell regions.
- Post-independence, the 1971 Agrarian Revolution (Ordinance 71-73) integrated collective tribal lands (Arch) into the National Fund (FNRA). In the steppe, Pastoral Development Associations (ADEP) were formed, later becoming Pastoral Livestock Cooperatives (CEPRA) under the 1975 Pastoral Code, which integrated steppe lands into the state domain. However, these faced hostility from large livestock owners and were eventually abandoned alongside the broader agrarian reform goals.
- In 1983, the APFA Law (83-18) authorized land ownership access in the South, effectively extending to steppe rangelands. The 1990 Land Orientation Law (90-25) required the return of nationalized lands and reclassified Arch lands as state private domain. By the mid-1990s, the General Agricultural Concessions Company (GCA) launched vast land development programs, delimiting extensive areas within steppe zones.
- Finally, the 2008 Agricultural Orientation Law (08-16) granted concession rights to state-owned or Arch lands to revive intensive development through the National Agricultural and Rural Development Plan (PNDAR) and the Rural Renewal Program (PRAR). These aimed to boost rural living standards through state-led socio-economic support.
- These policies were supplemented by Decree 108 (2011) and Circular 1839 (2017) regarding investment concessions. Furthermore, regulatory gaps persist in the production and marketing of livestock and Non-Timber Forest Products (NWFPs)—such as red meat, wool, handicrafts, and textiles. These products lack quality differentiation and labeling, hindering market access. This barrier will be addressed through Activities 1.1.1, 2.2.2, 3.2.1, and 1.3.2 to establish a climate-resilient management framework.

Historically destabilized by colonial restrictions and disorganized by post-independence administrative and land legislation, tribal governance of the steppe has been severely eroded. Consequently, agro-pastoralists have distanced themselves from collective heritage; individual interests now often outweigh tribal consensus. Today, steppe governance fluctuates between traditional/Muslim land law and modern state law. These rapid transformations have triggered an ecological crisis and landscape degradation.

Therefore, revising the Pastoral Code is imperative to: i) protect grazing lands and alfa grass; ii) implement collaborative management with local populations; iii) maintain balanced pastoral loads; and iv) ensure rigorous, priority-based access for local farmers in protected areas.

5.3.3. Limited Adoption of CC-Sensitive Land Use Practices

Current production systems and forest management practices significantly escalate the climate vulnerability of agro-silvo-pastoral landscapes. Within the AGD, steppe rangelands cover over 63% of the territory, while forests and agricultural zones account for nearly 18% and 16%, respectively; their degradation directly undermines the livelihoods and well-being of rural populations.

The production model is critically climate-sensitive, with 87% of the cultivated area dedicated to large-scale dryland farming (rainfed crops), primarily extensive cereal cultivation integrated with sheep farming. The latter is a dominant economic pillar, comprising 9.59 million head, or 34% of the national flock.

Two primary herd management methods prevail: i) sheep farming coupled with cereal production, and ii) free-range sheep farming independent of crops. In the first instance, the imbalance between forage availability and nutritional requirements worsens annually due to a lack of synergy between plant and animal systems, a gap further widened by climate change.

This erosion of self-sufficiency severely compromises the resilience of cereal farms. In the second instance, the livestock system is structurally fragile and precarious; it drives the severe degradation of natural resources because traditional territorial complementarities—specifically south-to-south (Azaba) and north-to-south (Achaba) transhumance—have been dismantled without viable alternatives.

In both scenarios, human dispersal and high livestock density exert unrelenting pressure on rangelands, increasing their sensitivity to climate risks and jeopardizing the regional pastoral economy. Current land-use systems lack climate-smart practices, such as drought-resistant seeds or controlled feedlots, threatening the sustainability of livestock and Non-Wood Forest Product (NWFP) value chains.

Without an integrated regulatory framework and an efficient land-use system that prioritizes climate-resilient practices—such as rational water mobilization and natural vegetation regeneration—the AGD will continue to suffer from soil degradation. The disappearance of palatable species and the loss of vegetative cover leave soils exposed to climatic hazards (extreme heat, drought, and wind), accelerating water and wind erosion and, ultimately, desertification.

To date, Climate-Smart Agriculture (CSA) measures have relied heavily on intensive monoculture reforestation with Aleppo pine. This approach poses long-term sustainability risks and can lead to maladaptation due to high parasite vulnerability; for example, during consultations in Djelfa, severe forest degradation caused by the pine processionary caterpillar was observed.

These barriers will be directly addressed by Sub-results 2.1 and 2.2, which support resilient agro-silvopastoral systems through the restoration and protection of pastoral and forest heritage. Additionally, Sub-result 1.1 will provide analytical tools for improved land management, while Sub-result 1.2 will enhance the regulatory framework and incentive structures to catalyze long-term investment in CCA-sensitive, low-carbon forestry and land-use practices.

5.3.4. Limited implementation of an early warning system in case of drought

While proactive in nature, the limited implementation of a drought early warning system (EWS) exacerbates the vulnerability of agro-silvo-pastoral ecosystems and constrains the adaptive capacity of rural populations. Drought remains a primary natural hazard undermining livelihoods and socio-economic development within the Algerian Green Dam (AGD), specifically for smallholders and pastoralists.

The Sahara and Sahel Observatory (OSS) established a network of 25 long-term ecological monitoring observatories across Algeria, Egypt, Morocco, Tunisia, and Mauritania. This led to the Maghreb Drought Alert System (SMAS), part of an integrated approach to environmental degradation monitoring. By improving crisis diagnosis and developing adaptation strategies, this EWS—known as SAP—enables regular tracking of environmental shifts across the Maghreb.

To this end, harmonized indicators and methodologies have been developed to better anticipate rainfall deficits. The system functions as a vital tool for generating and communicating data to diverse stakeholders, including local communities and managers of forest, pastoral, and agricultural lands. To maximize effectiveness, it must actively engage at-risk communities, facilitate public awareness, ensure the seamless dissemination of alerts, and maintain constant disaster preparedness and rapid response capabilities.

The project's specific objectives are: i) developing and promoting investments in the SAP; ii) strengthening the capacities of key stakeholders in drought risk management at regional (AGD) and local (wilaya) levels; and iii) enhancing knowledge management and information sharing regarding drought resilience.

The expected results include: i) reinforcing the effective utilization of the SAP; ii) improving the resilience of key actors and drought management partnerships; iii) promoting innovative adaptation tools; and iv) strengthening overall awareness of drought risk management.

However, significant limitations persist, including the insufficient density of monitoring stations for climate and water parameters and inadequate data sharing at the wilaya level. Furthermore, the information generated by the SAP is often overly technical, limiting its practical utility for local decision-makers, herders, and farmers.

These barriers will be addressed through Activity 1.2.2, Install an agrometeorological station network," and Activity 1.2.1, " Establish a climate & ecological observation network at AGD level " to improve understanding of desertification mechanisms and consequences.

5.3.5. Limited technical, organizational and commercial capacity of small producers to increase their climate resilience

Agricultural production is characterized by traditional crop and livestock management practices rooted in generational knowledge, which limits the technical and organizational capacity of small-scale producers. Furthermore, a lack of access to continuing education in key areas—such as localized irrigation, fruit tree pruning, stock management, and fertilization—prevents these producers from effectively adopting sustainable agro-pastoral activities adapted to climate change.

Regarding distribution, the process is hampered by the absence of regulated and organized marketing channels and institutional frameworks—such as specialized cooperatives, integrated supply chains, collective farms, water user associations, and product labelling or certification. This deficit makes it increasingly difficult to maintain subsistence farming, income-generating activities, and stable employment, thereby heightening the climate vulnerability of local populations.

This barrier will be addressed through Activity 1.2.6, " Design and deliver targeted training & knowledge transfer programs to project areas," which includes capacity-building workshops focused on public-private support mechanisms and climate-resilient management methods. Additionally, Sub-result 3.1 will target the "Development of selected NWFP and livestock value chains," fostering partnerships between associations—including women's organizations—and providing the legal and technical assistance necessary to secure livelihoods within a climate-resilience framework.

5.4. Summary of the Theory of Change

To mitigate major climate risks—including droughts, erratic rainfall, rising temperatures, and floods—the project employs a strategic suite of activities to foster an enabling environment and a robust regulatory framework for climate-resilient land management. These interventions enhance the resilience of degraded agro-silvopastoral landscapes, bolster carbon sequestration, and secure the livelihoods of the most vulnerable rural communities.

Beyond soil restoration and resilient agriculture, the project strengthens the value chains of smallholders and herders through an innovative development framework tailored to current and future climate shifts (see Theory of Change). Given the escalating threat of desertification, diversifying rural production into rainfall-independent commodities—such as non-Wood Forest Products (NWFPs) like rosemary, honey, and medicinal/aromatic plants—is essential. These products leverage the AGD's native floral diversity to support rural producers and build long-term climate resilience.

To catalyse this transition, the project introduces fiscal incentives (Sub-result 1.1) for improved natural resource management and facilitates commercial and financial partnerships across value chains to enhance market connectivity (Sub-result 3.1), alongside active engagement with local financial institutions.

In parallel, the project implements direct measures to fortify agro-silvopastoral landscapes. These include pasture rehabilitation, the planting of forest, pastoral, and fruit species, and integrated ecosystem management (Sub-results 2.1, 2.2, and 1.3), underpinned by transparent governance and strategic long-term planning (Sub-results 1.2, 1.1, and 3.1).

Strengthening these value chains provides the necessary economic incentives for communities to lead landscape restoration. Furthermore, targeted investments in these production systems will significantly reduce CO2 emissions from land use by rehabilitating degraded terrain. By building the capacity of small producers and state institutions, the project aligns local practices with national policies to enhance the resilience of the agriculture, forestry, and livestock sectors, as mandated by Algeria's NDC.

5.5. Project's contribution to the paradigm shift

The overarching objective of this paradigm shift is to enhance the climate resilience of agro-silvo-pastoral livelihoods and ecosystem services while mitigating land-use GHG emissions in the AGD. Shifting toward sustainable, integrated management of the AGD's steppes and dry forests represents a transformative departure from traditional models.

The project's contribution to this shift will be driven by its ability to catalyze impacts beyond the initial investment through:

- strengthening regulatory frameworks and policies;
- fostering an enabling environment;
- enhancing knowledge sharing and learning;
- investing in scaling and replication; and
- promoting innovative solutions tailored to climate change.

The transition from a single-species conservation model—characterized by intensive Aleppo pine reforestation with minimal community engagement—to a multi-species participatory approach (incorporating endemic species like oak, Atlas pistachio, and juniper) marks a critical shift. This inclusive strategy ensures long-term ecosystem resilience while unlocking environmental, socio-economic, and cultural opportunities for rural populations.

Furthermore, developing fiscal incentives for natural resource management and establishing commercial-financial arrangements between smallholders and buyers will be coordinated with the private sector to ensure market sustainability. This holistic approach integrates users and ecosystems as unified entities. The project aligns with Algeria's 2016 Economic Growth Plan, transitioning natural resource governance from a state-centric model to a participatory management framework involving all stakeholders.

To achieve low-emission development pathways, the project targets carbon sequestration through the rehabilitation of 59,320 hectares: including 6,266 ha of agro-silvo-pastoral cover (reforestation, pest control, and silviculture), 28,491 ha of steppe restoration (pastoral planting, fencing, and 3,150 ha of dune stabilization), and 10,903 ha of perennial crops (olive, prickly pear, and hardy rustic orchards) and 6000 ha of agroforestry.

This transformation directly impacts the livelihoods of 17,770 rural households and is expected to create approximately 17,189 jobs over the seven-year implementation period. By restoring drought-resistant systems and introducing heat-tolerant species, the project increases the productivity and lifespan of the vegetative cover, maximizing carbon storage.

Improved incomes for producer organizations provide the financial motivation to sustain climate-smart practices post-project. Moreover, establishing market standards for six key products (opuntia, olive, rosemary, wool, alfa grass, and peppermint) will allow financial institutions to accept these as collateral for smallholder loans, extending benefits to thousands more.

The project holds immense scaling potential. Selected value chains will be integrated into rural production systems across the six wilayas and beyond, sharing lessons with other steppe regions covering 32 million hectares.

- Olive Oil: While the global market faces supply-demand imbalances, Algeria's domestic market remains unsaturated, with consumption below 6 liters per capita.
- Rosemary: Global demand for essential oils remains stable, with North African rosemary seeing price increases (reaching €45/kg).

- Esparto/alfa grass: Domestic pulp production is strategically justified by Algeria’s high paper import bill, which exceeded €400 million in 2018.

Innovative solutions include: i) rationalized water mobilization through groundwater replenishment and wastewater reuse; and ii) the introduction of hydroponic barley for soilless livestock feeding.

Finally, the project contributes to five SDGs (1, 5, 8, 10, 13, and 17), with a primary focus on SDG 1 (Poverty Reduction) by delivering substantial, sustainable income to 17,770 beneficiary households.

Table 4: GCF Paradigm Shift & Impact Matrix

Investment Criterion	Project Strategic Component	Impact & Transformation Potential (GCF-Aligned)
Paradigm Shift Potential	Transition from single-species (Aleppo Pine) reforestation to multi-species, participatory agro-silvopastoral systems (Oak, Pistachio, Juniper).	Moves away from historically ineffective, state-led monoculture reforestation that has shown low survival under increasing drought conditions. Introduces a climate-resilient, community-managed model that enhances ecological diversity, improves survival rates under climate stress, and embeds local governance—creating conditions for systemic and sustained transformation in land management practices.
Climate Mitigation (LULUCF)	Restoration and protection of 59,320 ha of agro-silvopastoral and steppe ecosystems.	Generates significant carbon sequestration and avoided emissions through vegetation recovery and soil carbon enhancement, while reversing land degradation driven by climate change. The scale of intervention contributes to national LULUCF targets and delivers long-term mitigation benefits in a highly vulnerable dryland context.
Adaptation & Resilience	Diversification into climate-resilient value chains (NWFPs such as rosemary, honey, esparto/alfa grass) and introduction of hydroponic barley.	Directly addresses increasing rainfall variability and drought by reducing livelihood sensitivity to climate-dependent production systems . Provides climate-independent or climate-buffered income sources , stabilizing household economies and enhancing the capacity of beneficiaries to absorb and recover from climate shocks.
Financial Sustainability	Establishment of fiscal incentives and structured partnerships with private sector actors.	Shifts from grant-based, short-term interventions to market-driven adaptation models , leveraging private investment and improving access to finance for vulnerable producers. Ensures that climate-resilient practices remain economically viable and continue beyond the project lifetime , reducing reliance on public subsidies.
Scalability & Replication	Pilot implementation across 6 Wilayas with potential expansion to 32 million ha of steppe land.	Demonstrates a replicable, climate-resilient land management model supported by institutional strengthening and knowledge systems. The project creates a national blueprint for scaling adaptation and mitigation practices, with high potential for replication through policy uptake and additional financing.
Socio-Economic Co-benefits	Support to 17,770 vulnerable households and generation of 17,189 jobs.	Enhances climate-resilient livelihoods while delivering strong development co-benefits, including poverty reduction, improved income stability, and increased participation of women and youth. Employment generation is treated as a co-benefit ,

Investment Criterion	Project Strategic Component	Impact & Transformation Potential (GCF-Aligned)
		while the primary impact lies in increased resilience of households to climate change , aligned with GCF adaptation objectives.
Technical Innovation	Water resource optimization through groundwater recharge and treated wastewater reuse.	Introduces innovative, climate-adaptive water management solutions in a context of increasing water scarcity. Promotes circular water use and improves water availability for productive systems, thereby reducing vulnerability to prolonged drought and declining water resources .

The project will catalyze a fundamental paradigm shift in how Algeria manages its steppe and forest ecosystems - transitioning from a state-led, single-species conservation model with limited community inclusion to an integrated, multi-stakeholder, climate-responsive landscape management system. This shift is operationalized through three interdependent pathways: (i) establishing an enabling governance and climate information framework that modernizes the pastoral legal system, designs carbon pricing mechanisms, and deploys integrated climate information and digital advisory services; (ii) restoring degraded agro-sylvo-pastoral ecosystems through climate-adapted species, formalized rotational grazing, participatory reforestation, and strengthened water infrastructure; and (iii) building climate-resilient livelihoods by connecting smallholder farmers - particularly women - to diversified value chains, sustainable finance, and clean energy access.

5.6. Exit Strategy

This strategy aims to ensure that all project activities remain sustainable over time. Upon completion, the project will have successfully established a framework that continues to deliver expected results and benefits while maintaining its contribution to the paradigm shift.

Project sustainability is guaranteed by two major transformations:

- **Enhanced Capacity and Market Integration:** Increased capacity, improved market links, and access to financial services for smallholder associations (livestock and crop farmers) are achieved through a strategic combination of GCF grants for capacity building and the mobilization of public and private sector financing (processors and traders). This enables integrated farmers within the Value Chains (VCs) to increase production, improve quality and climate resilience, and access formal financial services.
- **Intersectoral Synergy and Co-management:** Successful collaboration and co-management of agro-silvo-pastoral resources between state/wilaya agencies and local farming/herding communities are essential. The technical, organizational, and commercial capacity of smallholder associations, resulting in increased economic returns from high-quality, resilient products (rosemary and prickly pear essential oils, olive oil, wool, and handicrafts), provides a powerful economic incentive to sustain resource management and restoration after project closure.
- **Institutional Strengthening:** GCF funding for institution-building—specifically community-level facilitation teams for co-management—will reduce conflicts between farmers, herders, and other VC constituents. Long-term sustainability is secured through formal agreements on rights and responsibilities, underpinned by the protection of new state-level regulations.

Core Sustainability Pillars:

- **Enabling Environment:** Through capacity building and public policy reform (Sub-result 1.3), alongside regulatory revision and tax incentives (Sub-result 1.1), the project catalyzes a shift from a centralized state model to a decentralized, participatory management framework for local development.

- **Value Chain Investment:** To protect land restoration investments, the project ensures the implementation of more efficient and climate-resilient agro-silvo-pastoral value chains (Sub-result 3.1).
- **Infrastructure Autonomy:** Project funding will be utilized to ensure community buy-in for established equipment and infrastructure before completion. A core group of farmers and herders will be trained as extension agents for government services, ensuring technical knowledge is sustained and disseminated (Activities 1.3.1 and 1.3.2).
- **Commercial Partnerships:** The project supports investment plans for private economic agents, start-ups, and young entrepreneurs within the NWFP and livestock sectors (Activity 3.1.1). It will further develop commercial and financial partnership agreements between producers, processors, and traders (Activity 3.1.2) that operate on market-based solutions, ensuring they outlast the implementation period.
- **Policy Dialogue and Replication:** By supporting civil society (Sub-result 1.3) in structured, inclusive political dialogue, the project ensures an environment conducive to continued intervention. Finally, the experience of the six participating wilayas will be replicated across the rest of the AGD region and potentially the entire 32-million-hectare steppe region.

Component-by-Component Exit Strategy:

Under Outcome 1, the climate information systems, early warning mechanisms, and upgraded governance framework will be fully integrated into the operational infrastructure of the DGF and national meteorological services. The National Climate Committee will continue as the strategic oversight mechanism. Staff trained in climate risk assessment, carbon MRV, and adaptive forest management will remain within the public service. Training curricula will be incorporated into national agricultural extension programs.

Under Outcome 2, ecosystem restoration investments are designed to produce self-sustaining ecological outcomes. Species selection and planting techniques have been tailored to local agro-ecological conditions to maximize survival rates and reduce long-term maintenance costs. The DGF will assume full responsibility for monitoring and maintenance. Landscape restoration plans will be integrated into commune-level and wilaya-level development plans. Community-based natural resource management committees will provide a durable structure for participatory monitoring and conflict resolution.

Under Outcome 3, sustainability is ensured through diversified income generation, sustainable financing, and market integration. Six priority climate-resilient value chains, small-scale livestock modules, hydroponic forage systems, and circular economy solutions establish economically viable livelihood pathways. Access to voluntary carbon finance and climate-adapted microcredit provides communities with durable, market-based financial flows. Carbon revenues are reinvested to sustain and scale ecosystem restoration under Outcome 2.

The Government of Algeria's co-financing of USD 56.5 million (57% of total project cost) demonstrates strong national ownership and guarantees continuity. The project does not create parallel structures; it upgrades existing systems within the DGF's operational framework. Lessons learned will be documented and disseminated through national knowledge platforms, enabling replication across the full 1,500-kilometre extent of the Green Dam.

5.7. Alignment of the project with national priorities and national ownership

By ratifying the United Nations Framework Convention on Climate Change (UNFCCC), Algeria fully commits to the mandates for developing nations, specifically the stabilization of greenhouse gas emissions to prevent anthropogenic interference with the climate system. As an arid and semi-arid country, Algeria is exceptionally vulnerable to climate impacts, necessitating a strategic focus on adaptation measures within the agriculture, forestry, and water resource sectors.

Simultaneously, the country contributes to global mitigation efforts by implementing effective measures across energy, industry, transport, and waste—the primary emission sources and pillars of the national economy.

- The project is strictly aligned with Algeria's Nationally Determined Contribution (NDC), supporting three of its four primary adaptation goals: i) strengthening ecosystem resilience to minimize climate risks; ii) combating water and wind erosion and rehabilitating degraded land under the anti-desertification framework; and iii) mainstreaming climate change into sectoral strategies, specifically agriculture and water resources.
- The project further supports the National Climate Plan (PNC), which defines 156 actions comprising 76 mitigation measures, 64 adaptation measures, and 16 governance-focused actions.
- Core adaptation measures include: i) aligning the institutional and regulatory framework with climate realities; ii) strengthening institutional and human capacities to combat climate change; and iii) developing regional and local Climate Change Adaptation (CCA) plans.
- The project design remains consistent with Algeria's socio-economic development strategies, including the New Economic Growth Model, the Government Action Plan, the National Spatial Planning Scheme (SNAT 2030), and environmental strategies such as the National Biodiversity Strategy and Action Plan (NBSAP).
- While the New Economic Model (2020–2035) does not explicitly cite climate change, its fifth pillar focuses on the energy transition, providing direct mitigation support through energy efficiency and renewable energy development. This model underpins the national program to achieve a renewable energy capacity of 22,000 MW by 2030, as pledged in the NDC.
- The SNAT identifies climate change as a major national risk, outlining priority adaptation needs across the territory. Within this framework, the NBSAP works to ensure the conservation, protection, and restoration of natural ecosystems. The NBSAP highlights climate impacts on biodiversity and identifies pathways for national resilience, emphasizing that synergy with the National Climate Program (PNC) is essential.

6. DESCRIPTION AND FEASIBILITY OF THE PROJECT

Capacity Development Needs Assessment

An institutional capacity assessment was conducted across the principal agencies involved in Green Dam governance. Key findings:

Direction Generale des Forêts (DGF): Possesses mandate and field presence but lacks specialized capacity in climate risk assessment, carbon accounting, digital monitoring, and participatory landscape restoration. Training needs include GIS/remote sensing, climate-adapted silviculture, MRV systems, and community engagement.

Haut Commissariat au Developpement de la Steppe (HCDS): Holds rangeland management expertise but requires strengthening in climate-resilient rangeland management, rotational grazing system design, and integration of traditional knowledge with scientific monitoring.

MADRP: Requires enhanced capacity in climate-informed agricultural planning, value chain development using FAO's MA&D methodology, and design of climate-adapted financial products. Extension services need training in climate-smart agriculture and gender-responsive advisory.

ANCC: Mandated for climate policy coordination but requires capacity building in AFOLU carbon accounting, VCM engagement, NDC tracking, and carbon credit verification.

Local Governance: Communal assemblies and wilaya administrations have limited capacity for climate-informed land-use planning and participatory governance. The project establishes Wilaya Climate Adaptation Committees and community-based NRM committees to address this gap.

6.1. Logical framework of the project

Intervention at the pilot municipality level will be carried out according to the occupancy of their territories characterized by pastoral, agricultural, forestry, and alfa grass areas. The innovation will concern the implementation method, the prerequisites to be met at the institutional and

organizational levels, stakeholder engagement, and the implementation of complementary actions to ensure the objectives of adaptation to and mitigation of climate change through the following actions:

6.1.1. Pastoral Development

Pastoral management in the Green Dam area will be based on the establishment of pastoral units (see the planning study for 62 pastoral units). Rules for land use and management, following rangeland rehabilitation, will be defined and regulated to ensure sustainability and maintain pastoral activity. This activity will be conducted according to a tolerated stocking rate based on the potential and possibilities of the targeted rangelands.

The restoration of rangelands will benefit from one or more seed and fodder plant production units as well as a sowing or planting operation at the rangeland level according to the technical guidelines that will be established by the HCDS in collaboration with other relevant structures including the DSA, research structures and territorial structures of the forestry administration.

The terms of occupation and use will be governed by a collaborative management charter for pastoral land, involving the APC (People's Communal Assembly), livestock farmers, and HCDS (High Council for the Development of the Pastoral System) for state-owned private land, and the DGF (General Directorate of Forests) for state-owned public land. This collaborative management charter will also include the establishment of specifications binding the livestock farmer and the aforementioned entities regarding the occupation of the grazing land. A land fee, set by the finance law, will specify the beneficiaries, its allocation, and its use.

The actions to be taken will concern the pastoral management study of grazing areas including the establishment of a pastoral unit;

- Seeding the paths;
- Pastoral plantation;
- The construction of the livestock watering infrastructure;
- The implementation of a collaborative pathway management charter by local actors;
- The establishment of specifications defining rights and obligations livestock farmers.

6.1.2. Treatment of the hydrographic network

Pastoral lands often consist of areas with insufficient vegetation cover, failing to provide adequate protection during floods. This frequently leads to erosion, manifested by soil leaching on slopes and the transport of materials in tributary valleys and wadis. Furthermore, given the low rainfall and the absence of water and soil conservation structures or diversion systems, infiltration to replenish groundwater is impaired. Finally, these areas have not been managed in a way that promotes land use in a way that respects the landscape.

The recommendation made concerns the construction of water mobilization and diversion works as well as the strengthening of the program for the construction of water and soil conservation works at the level of thalwegs and wadis, ensuring the systematization of biological action by emphasizing non-palatable species: for example, laurel or Nerium by combining white, pink and red, also tamarix gallica or articulata depending on the areas etc.) with a treatment of space obeying an integrated development enhancing the pastoral landscape. The actions to be taken will concern:

- An overall plan for land use;
- Torrential correction;
- Bank stabilization;
- Biological stabilization of riverbanks;
- The creation of row plantings (green belt and living hedge).

6.1.3. Construction of water diversion and mobilization works superficial

The construction of water diversion and surface mobilization structures will ensure the success of the plantings (forage, fruit, and forestry) during the project's implementation. These structures will also serve to recharge groundwater and thus wells and other mobilization systems used by rural populations. The actions to be taken will concern:

- Water diversion structures;
- The Djoubs;
- Water points with storage tank and watering basin;
- Wells intended for agriculture and those for watering livestock in areas of the route.

6.1.4. Reforestation in pastoral areas and restoration of degraded forests

Forest resources are in sharp decline nationally, particularly in pastoral areas where they represent only 18% of the total Green Dam area. This decline is caused by climatic conditions and human activities. This is happening at a time when it is widely agreed that reforestation aims to complement and enhance its various fundamental roles (land protection, timber production, ecological balance, environmental protection, etc.).

Despite all the efforts made since independence, reforestation efforts have not achieved the expected results, given the scale of the investments made by the State. Indeed, significant failures have characterized some reforestation projects.

The national reforestation plan has partially corrected certain shortcomings, including the need to carry out other types of planting, particularly fodder and fruit trees, in order to generate interest among local populations while preserving reforestation carried out using forest seedlings on sloping areas where other species cannot succeed.

The challenge of successful reforestation has been compounded by the issue of managing and monitoring these investments by local forestry organizations once the projects are completed. These organizations face enormous difficulties in administering and managing all the forest areas under their responsibility. Indeed, the ratio of a single forestry unit to 5,000 hectares of scattered forest, excluding reforestation projects, is significant.

The administration is finding it increasingly difficult to contract out reforestation work to companies, as these projects are often hampered by harsh weather conditions, requiring frequent watering and continuous on-site presence, despite the increased registration fees. Indeed, these fees rose by 36% between 2005 and 2008 alone, increasing from 700,000 DA/ha to 110,000 DA/ha, and the forecast of 150,000 DA/ha for 2009 proved accurate. Currently, the cost per hectare of reforestation has doubled to 300,000 DA/ha.

Forests and reforestation have always been a territory often the subject of tension between local residents and forestry structures, even though some very limited uses are permitted given the specific characteristics of certain forests occupied in monoculture by conifers.

The ongoing implementation of the rural renewal policy, which calls for synergy among local stakeholders and the various development programs initiated, presents an opportunity to integrate reforestation as a natural resource protection action to be entrusted directly to rural households within their specific area (sub-watershed). It is understood that reforestation efforts will complement existing activities and other development initiatives that the rural household may undertake and for which it will receive support.

This new approach, given the significant program to be implemented annually (100,000 ha/year), offers the following advantages for reforestation compared to projects entrusted to the company:

- Diversify and increase production capabilities;
- Ensuring the success of reforestation efforts;
- Provide close monitoring;
- To provide employment for rural households over a medium-term period while encouraging work within the family unit;
- To encourage local residents to take an interest in reforestation efforts and forest protection;
- Bringing local residents closer to the structures of the forestry administration;
- To make the investment at a lower cost,
- Limit and/or facilitate state intervention in the prevention and control of fires and pest infestations;

- To lighten the workload of local forestry structures, whose efforts will be directed towards the administration and management of forests while waiting for the reforestation areas to reach the age or vegetative stage allowing their transfer to the national forest estate.

The implementation details are specified as follows:

- The afforestation operation will be entrusted to a company that will be based on a mobilization approach involving rural engineering companies in association with rural households who will be involved in planting and monitoring the reforestation efforts, and nurserymen who will have to supply the plants based on specifications guaranteeing the supply of healthy plants with traceability of the origin of the seed in relation to the seed-bearing stand.
- The identification of PPGs with the support of the INRF and territorial structures of the forestry administration will be sanctioned by an order from the minister in charge of forests.
- The area to be reforested will be the subject of a contract with the forestry administration specifying the conditions of implementation as well as the obligations incumbent upon the implementing company which will act in its capacity as delegated project owner in which will be integrated the rights and obligations of the managers of the production nurseries as well as those of the duly identified and empowered rural households (commitments).
- In the first phase, the area to be entrusted will be the one closest to the rural household's place of residence to facilitate the implementation of planting, maintenance and monitoring activities.
- The technical staff of the forestry administration and those of the rural engineering company will have to provide technical assistance for the actions of identifying the perimeter, developing the implementation project, tracing and staking out the posts as well as estimating the planted area.
- The rural engineering company will also be responsible for preparing the situations which, once approved, will be transmitted to the forestry administration, and once approved, will be communicated to the financial institution for repayment.
- The reforested and completed areas will then be entrusted to the rural household for their monitoring and protection. These obligations will be specified in the contract and agreement to be signed between the rural engineering company and the rural household carrying out the work.
- Finally, rural households that commit to reforestation will benefit from development actions aimed at improving their living conditions and income.

6.1.5. Agroforestry in agricultural areas

Agroforestry will be promoted and developed in each agricultural zone. This will involve explaining and demonstrating the role of planting trees around agricultural plots to improve soil quality and yield. The creation of green strips, hedgerows, and windbreaks will be supported to complement these practices. *fruit tree planting programs.*

6.1.6. Implementation of alfalfa cultivation in pastoral areas

The inadequacy of grazing lands to meet the needs of livestock, particularly sheep, has led farmers in certain pilot municipalities to establish alfalfa fields to cover the missing feed for their livestock.

This irrigated crop requires support in the implementation process, in particular the mobilization of water resources to cover irrigation needs for a minimum period of four to eight years.

6.1.7. Rehabilitation of alfa grass patches

Alfa grass stands, thanks to their high level of adaptation to extreme ecological conditions and their resistance to cyclical droughts, have always been the best way to protect soils and combat desertification. However, uncontrolled use and disregard for basic grazing management rules have decimated the alfa grass "sea," which is now experiencing a decline in area, an opening in the vegetation cover, a shift in its natural boundaries, and the disappearance of glacia and even some mountains.

The alfa grass steppe is in a critical state of degradation, encouraged by the authorities of certain municipal councils (APC) who issue permits for clearing areas with low resilience, areas occupied by valuable alfa grass stands whose ecosystem services far outweigh the harvests reaped by herders who have suddenly become farmers, playing a game of chance.

This anachronistic situation should be addressed as soon as possible by taking strict measures to prohibit all plowing outside of areas designated by the State. Good management practices among rural populations already exist and should be encouraged for various services; their replication in other regions should be promoted by all possible means.

6.1.8. Creation of ecotourism circuits at the pilot municipality level

The creation of ecotourism circuits by local stakeholders familiar with the region and invested in the activity will be encouraged and supported in pilot municipalities with cultural, historical, natural, and archaeological resources.

This investment opportunity should also be considered for municipalities with religious infrastructure such as Zaouias, which are frequently visited, like the internationally renowned Zaouia of El Hamel, and for religious and cultural events like "El Maouassem."

Table 5 Project Logical Framework

Activities	Description	Sub-activities	Deliverables
Activity 1.1.1 Reform the 1975 Pastoral Code and the Local Land Governance Framework	This activity aims to modernize Algeria's pastoral land management framework, introducing the country's first concession system with science-based stocking rates and grazing rotations across 12 communes, reforming fiscal policy to incentivize sustainable practices, removing trade barriers, and establishing a national rotational grazing framework	Sub-activity 1.1.1.1 Propose an amendment to the 1975 Pastoral Code to draft the implementation regulations for the amended pastoral code Sub-activity 1.1.1.2 Propose a reorganization and adaptation of investment incentives in the Green Dam zone Sub-activity 1.1.1.3 Organize information and consultation meetings with the various stakeholder meetings with the various stakeholders	- Amended Pastoral Code with implementation regulations submitted for adoption -Investment incentive reform proposal for the Green Dam zone validated by relevant ministries -Stakeholder consultation reports with attendance records and consolidated recommendations
Activity 1.1.2 Support the design of the foundations of a compensation mechanism for AFOLU within a framework of national carbon pricing	This activity aims to design the foundations of a domestic carbon offset mechanism for the AFOLU sector within Algeria's emerging carbon pricing framework, establishing the policy and regulatory foundations for forest and soil carbon credit issuance, to meet NDC commitments and strengthen CBAM compliance.	Sub-activity 1.1.2.1 Design the foundations of a national carbon credit offsetting mechanism for the AFOLU sector. Sub-activity 1.1.2.2 Develop a policy framework for forest and soil carbon offsets and regulatory instruments for carbon credit issuance and benefit sharing. Sub-activity 1.1.2.3 Embed carbon pricing knowledge into national curricula. Sub-activity 1.1.2.4 Ensure NDC alignment. Sub-activity 1.1.2.5 Establish science-based stocking rate assessments for priority rangeland zones.	-National foundations for AFOLU carbon credit offsetting mechanism designed. -A policy framework for forest and soil carbon offsets and regulatory instruments for carbon credit issuance and benefit sharing developed. -Carbon pricing knowledge embedded into national curricula. -NDC alignment is ensured. -Science-based stocking rate assessments for priority rangeland zones established.
Activity 1.1.3 Establish voluntary carbon finance readiness for ecosystem restoration	The aim of this activity is to establish the methodological readiness required to channel long-term voluntary carbon finance into ecosystem restoration.	Sub-activity 1.1.3.1 Quantify sequestration potential and validate high-integrity restoration-credit methodologies; train national institutions and exchange knowledge with GCF-FAO SURAGGWA Programme.	-A validated methodological readiness for long-term voluntary carbon-finance
Activity 1.1.4 Establish a Multi-Stakeholder Climate Governance	This activity aims to establish an inclusive climate governance platform at national and wilaya levels to strengthen cross-sectoral coordination, stakeholder participation, and	Sub-activity 1.1.4.1 Develop collaborative territorial management agreements (framework for consultation and intervention by local communities)	-Territorial management agreements signed with local communities defining consultation frameworks and intervention protocols

Platform dedicated to the GD	evidence-based decision-making across the Green Dam landscape through formalized advisory committees, participatory land-use planning, and transparent benefit-sharing governance frameworks	Sub-activity 1.1.4.2 Establish partnership agreements with an exclusive media outlet Sub-activity 1.1.4.3 Establish partnership agreements with telephone operators	-Partnership agreement executed with designated media outlet for project communication and outreach
Activity 1.2.1 Establish a climate & ecological observation network at AGD level	This activity aims to establish a national climate and ecological observatory in Djelfa as the central hub for data integration, analysis, and forecasting across the Green Dam landscape, enabling long-term biophysical monitoring, AI-based early warning, and evidence-based decision-making through a coordinated research network fully interoperable with national climate and GIS systems.	Sub-activity 1.2.1.1 Establish an observatory for ecological, climate and socio-economic monitoring Sub-activity 1.2.1.2 Establishment of 4 permanent scientific stations for long-term in situ biophysical monitoring, enabling the collection of data on climate, soils, flora, and fauna	- Ecological, climate, and socio-economic monitoring observatory established and operational in Djelfa - Four permanent scientific stations installed and collecting biophysical data on climate, soils, flora, and fauna
Activity 1.2.2 Install an agrometeorological station network	This activity aims to deploy six automatic IoT-enabled agrometeorological stations-one per wilaya across the AGD to generate real-time agro-climatic data for drought monitoring, wildfire early warning, climate risk management, and resilient land-use planning, fully integrated with national meteorological systems and the project's digital platforms.	Sub-activity 1.2.2.1 Procure and install six automatic IoT-enabled agrometeorological stations across the six project wilayas Sub-activity 1.2.2.2 Conduct professional training and workshops	-Six automatic IoT-enabled agrometeorological stations installed, calibrated, and transmitting real-time data across the six wilayas -Professional training and workshops delivered to institutional staff with completion records
Activity 1.2.3 Develop GIS for agriculture drought & land degradation	This activity aims to establish an integrated GIS platform to support climate-informed land-use planning and drought and land degradation management across the steppe regions	Sub-activity 1.2.3.1 Develop and deploy a GIS at the level of the GD project with an extension to the 6 wilayas of the project Sub-activity 1.2.3.2 Provide GIS equipment for the directorate in charge of the GD project, with an extension to the 6 wilayas of the project	-GIS platform developed, deployed, and operational at the Green Dam project level with extension across the six wilayas -GIS equipment procured and installed at the Green Dam directorate and six wilaya offices
Activity 1.2.4 Develop a portfolio of feasibility studies for sustainable resource management	This activity aims to design and implement a portfolio of targeted baseline and feasibility studies across six thematic areas to strengthen AGD knowledge, address gaps in knowledge capitalization, and support evidence-based, climate-resilient resource management decisions	Sub-activity 1.2.4.1 Establish pastoral units at the level pf the 6 wilayas of the project Sub-activity 1.2.4.2 Promote agroforestry in the development areas at the level of 6 wilayas of the project Sub-activity 1.2.4.3 Create 6 ecotourism circuits	-Pastoral units established and operational across the six project wilayas -Agroforestry promoted in development areas across the six wilayas with implementation reports

	disseminated through the project's digital and governance platforms.	Sub-activity 1.2.4.4 Conduct a classification study for protected areas Sub-activity 1.2.4.5 Conduct a study on agroecological infrastructures at the level of the 6 wilayas Sub-activity 1.2.4.6 Conduct a study on the impact of sand encroachment Sub-activity 1.2.4.7 Conduct a study on ground water recharge Sub-activity 1.2.4.8 and Sub-activity 1.2.4.9 treated wastewater and sludge reuse studies for rangeland rehabilitation and agricultural production Sub-activity 1.2.4.10 and Sub-activity 1.2.4.11 Conduct a study on the exploitation and valorization of alfa products, including market reach and identification of stakeholders using a supply chain approach	-Six ecotourism circuits designed and established with route maps and visitor management plans -Classification study for protected areas completed with site assessments and designation recommendations Agroecological infrastructure study completed across the six wilayas with intervention recommendations -Sand encroachment impact assessment completed with prioritized mitigation measures and treated wastewater reuse feasibility for rangeland rehabilitation -Groundwater recharge study completed with site suitability maps and infrastructure recommendations -Alfa product valorization study completed with supply chain analysis, market reach assessment, and stakeholder mapping
Activity 1.2.5 Build digital climate information & advisory services	This activity aims to establish an integrated, gender-responsive digital climate advisory system that provides farmers, livestock breeders, and land managers across six wilayas with real-time, actionable climate information through multi-hazard early warning, tailored advisory products, mobile applications, and AI-based forecasting services, fully interoperable with national climate systems for long-term scalability.	Sub-activity 1.2.6.1 Strengthening the human capacities of extension agents, focal points, farmers and private service providers through structured formal learning. Sub-activity 1.2.5.2 Organize exchange workshops for the benefit of 101 municipalities in the 6 wilayas Sub-activity 1.2.5.3 Design and deliver a Mobile app (Android-first, with offline mode) — bilingual Arabic and Tamazight; visualizes forecasts, maps, alerts, and personalized advisories Sub-activity 1.2.5.4 Organize coordination/communication seminars for the benefit of 6 wilayas	- Exchange workshops delivered across 101 municipalities in the six wilayas with attendance records and outcomes reports -Coordination and communication seminars delivered across the six wilayas with participant records and action points. - A mobile app designed and delivered. - Capacity- building workshops for institutional stakeholders designed and delivered

Activity 1.2.6 Design and deliver targeted training & knowledge transfer programs to project areas	This activity aims to build human capacity across extension agents, regional focal points, farmers, and private service providers through structured training and knowledge transfer programmes covering climate risk management, project digital tools, climate-smart practices, drought and pasture restoration, with targeted delivery for women and youth.	Sub-activity 1.2.6.1 Develop a training structure for the wilayas implementation committees. Sub-activity 1.2.6.2 Develop a training structure for project leaders 60 sessions Sub-activity 1.2.6.3 Organize training workshops for project leaders Sub-activity 1.2.6.4 Organize training workshops for institutional stakeholders	- Training structure developed and delivered for wilaya implementation committees -Training structure developed for project leaders with 60 sessions delivered -Training workshops organized and delivered for project leaders with completion records -Training workshops delivered for institutional stakeholders with attendance records and competency assessments
Activity 2.1.1 Rehabilitate & create nurseries for climate-adapted seedling production	This activity aims to rehabilitate existing nurseries and establish three new permanent nurseries in Khenchela, Djelfa, and El Bayadh to produce approximately 12,7 million climate-adapted seedlings over seven years, managed by women-led community groups using strict provenance protocols and INRF -validated growing standards, to support ecosystem restoration across 22,658 hectares.	Sub-activity 2.1.1.1 Construction of fodder nursery in El Bayadh Sub-activity 2.1.1.2 Equipment of a fodder nursery in El Bayadh Sub-activity 2.1.1.3 Construction of 3 vitro plant production units Sub-activity 2.1.1.4 Equipment of 3 vitro plant production units	-Fodder nursery constructed and operational in El Bayadh -Three vitro plant production units constructed and operational -Existing nurseries rehabilitated with upgraded infrastructure and equipment
Activity 2.1.2 Implement a program for climate-resilient rangeland management	This activity aims to deliver a comprehensive rangeland management programme across 12 communes covering 28,491 hectares, integrating pastoral planting, Opuntia plantations, deferred grazing, and forage seed collection to restore degraded rangelands, increase productivity, and operationalize Algeria's first formalized rotational grazing system based on traditional g'del practices, while generating significant mitigation co-benefits.	Sub-activity 2.1.2.1 Conduct pastoral planting across 3,780 ha, using climate-adapted fodder species. Sub-activity 2.1.2.2 Establish Opuntia plantations across 1,092 hectares Sub-activity 2.1.2.3 Implement deferred grazing and enclosure measures (23,619 ha) Sub-activity 2.1.2.4 Operationalize forage seed collection sites 30 ha)	- Pastoral planting completed (3,780 ha) using climate-adapted fodder species with survival monitoring reports -Opuntia plantations established with productivity and rangeland stabilization assessments (1,092 ha) -Deferred grazing and enclosure measures implemented (23,619 ha) with vegetation recovery monitoring records -Forage seed collection sites operational (30ha) with seed inventory and distribution protocols
Activity 2.1.3 Reforest & revegetate forest heritage through a participatory approach	This activity aims to consolidate and expand forest cover across 1,145 hectares through reforestation, replanting of underperforming stands across 1,333 hectares, maintenance of reforested areas,	Sub-activity 2.1.3.1 Conduct reforestation across 1,145 ha, using diverse native species adapted to climate conditions Sub-activity 2.1.3.2 Replant underperforming forest stands across	- Reforestation completed across 1,145 ha, using diverse native species with survival rate monitoring reports

	and establishment of green belts and roadside plantations, using diverse native species and community-based restoration through farmer cooperative mobilization, with monitoring linked to the GIS platform.	1,333 hectares, with three- to five-year enclosure protection (repopulation) Sub-activity 2.1.3.3 Row trees plantation Sub-activity 2.1.3.4 Establish green strips plantations across 6 wilayas (1,735 ha)	-Underperforming forest stands replanted across 1,333 hectares, with enclosure protection measures installed and verified - Plantation of alignment trees -1,735 ha green strip plantations established across six wilayas with species composition records
Activity 2.1.4 Implement a dune fixation program	This activity aims to implement a dune stabilization programme across 3,150 hectares in four wilayas combining mechanical barriers, drought-resistant species planting, and organic stabilization materials, with community-based engagement prioritizing women and youth employment and formally established dune management groups linked to livelihood incentives.	Sub-activity 2.1.4.1 Apply biological barriers for dune stabilization (50 ha) Sub-activity 2.1.4.2 Apply mixed stabilization materials for dune fixation (3,100 ha)	- Biological barriers completed across 50 ha) with site-level completion reports for each wilaya -Mixed fixation completed and stabilization effectiveness monitoring records (3,100 ha)
Activity 2.1.5 Strengthen forest health & pest control	This activity aims to improve forest health, resilience, and productivity across 2,688 hectares through silvicultural management and Integrated Pest Management, transitioning vulnerable Aleppo pine monocultures toward diversified, climate-resilient mixed forests through thinning, pruning, gap-filling replanting, and systematic forest health monitoring.	Sub-activity 2.1.5.1 Maintain newly reforested stands Sub-activity 2.1.5.2 Conduct silvicultural interventions including thinning, pruning, sanitary felling, and gap-filling replanting Sub-activity 2.1.5.3 Implement Integrated Pest Management treatments for priority pests and disease threats across affected forest stands	- Maintenance of new plantation - Silvicultural interventions completed across targeted forest stands - Integrated Pest management treatments applied across affected forest stands
Activity 2.1.6 Strengthen forest fire management	This activity aims to strengthen wildfire prevention and response capacity across four wilayas through reinforcement of DFCI infrastructure including watchtowers and access routes, and consolidation of forest land tenure through 9,760 boundary markers, safeguarding forest cover against increasing climate-related wildfire frequency and intensity	Sub-activity 2.1.6.1 Construct of a lookout post across priority forest zones Sub-activity 2.1.6.2 Lookout post layout for wildfire suppression Sub-activity 2.1.6.3 Improve forest access routes to strengthen emergency response and fire suppression logistics Sub-activity 2.1.6.4 Forest track opening Sub-activity 2.1.6.5 Install boundary markers to consolidate forest land tenure and demarcation	- Watchtowers reinforced and constructed across priority forest zones - Watchtower rehabilitated for wildfire suppression - Forest access routes improved for emergency response and fire suppression - Boundary markers installed for forest land tenure and demarcation

Activity 2.1.7 Supervise the land and water restoration activities	This activity will enable the chief technical advisor to provide senior expertise to the project management team for the implementation of land and water restoration activities.	Sub-activity 2.1.7.1 Provision of expertise to the PMU on implementation of land and water restoration activities	Appropriate design and implementation of land and water restoration activities.
Activity 2.2.1 Rehabilitate agricultural access tracks	This activity rehabilitates 478 km of climate-resilient agricultural and rural tracks across five wilayas to improve year-round accessibility for rural communities, strengthen transport links to markets and essential services, enhance logistics for land restoration activities, and facilitate emergency access for fire suppression across remote steppe areas. addressing three stressors: (i) wildfire frequency/severity requiring rapid emergency access; (ii) drought-induced food/fodder/water emergencies requiring relief logistics; (iii) climate-related disruption to restoration supply chains.	Sub-activity 2.2.1.1 Open agricultural (313 km) tracks Sub-activity 2.2.1.2 Open rural tracks (165km) Sub-activity 2.2.1.3 Develop rural tracks	-Agricultural tracks opened -Rural tracks opened -Rural tracks developed
Activity 2.2.2 Implement soil & water conservation structures & practices	This activity aims to address accelerating soil degradation and declining water retention through the construction of hydraulic and erosion-control infrastructure, across 1500 ha, guided by participatory site assessments with local pastoral associations and smallholders to capture runoff, enhance infiltration, and support native planting survival.	Sub-activity 2.2.2.1 Construct mechanical stabilization for riverbanks across 1500 Ha Sub-activity 2.2.2.2 Conduct biological consolidation of soil and water conservation Sub-activity 2.2.2.3 Conduct soil and water conservation work	-Mechanical stabilization constructed across 1500 Ha, for riverbanks -Biological consolidation of soil and water conservation completed -Soil and water conservation works completed
Activity 2.2.3 Mobilize & store water resources for climate-resilient agro-sylvo-pastoral systems	This activity aims to strengthen water security across six wilayas through the construction of new water infrastructure — including 22 boreholes, 3 pastoral wells, 13 water ponds, and 14 ceds (traditional rainwater collector)— rehabilitation of existing water infrastructure, and piloting of treated wastewater reuse for rangeland rehabilitation, with priority sites selected	Sub-activity 2.2.3.1 Drilling work for -200-meter depth Sub-activity 2.2.3.2 Drilling, equipment, watering pond shelters Sub-activity 2.2.3.3 Construct a hillside reservoir Sub-activity 2.2.3.4 Construct a traditional water mobilisation system (ced) Sub-activity 2.2.3.5 Development of ceds	- Drilling works completed for 200-meter depth -Hillside reservoir constructed -Traditional water storage system (ced) constructed -Pond landscaping constructed - Diversion dike constructed -Water point developed -Pastoral wells rehabilitated

	through joint vulnerability mapping and community consultations.	Sub-activity 2.2.3.6 Construct a water feature Sub-activity 2.2.3.7 Pond landscaping Sub-activity 2.2.3.8 Construction of a dike Sub-activity 2.2.3.9 Develop a water point Sub-activity 2.2.3.10 Rehabilitate pastoral wells	
Activity 2.2.4 Promote efficient irrigation & water distribution systems	This activity aims to improve water use efficiency through the installation of drip irrigation across 70 hectares, 10 sprinkler installation systems, and construction of 9,000 linear metres of irrigation canals, expanding cultivated areas and enhancing yields in marginalized High Plateaux communities	Sub-activity 2.2.4.1 Install drip irrigation systems across 70 hectares for efficient localized water delivery Sub-activity 2.2.4.2 Construction of seguia (traditional water canal) Sub-activity 2.2.4.3 Install sprinkler irrigation system	- Drip irrigation systems installed and operational - Sprinkler irrigation system installed and operational ac - 9,000 linear metres of irrigation canals constructed with completion certificates and flow capacity verification - Sprinkler irrigation system installed
Activity 3.1.1 Develop Six priority climate-resilient value chains	This activity aims to develop six climate-resilient value chains — prickly pear, olive, rosemary, wool, alfa grass, and peppermint—targeting small and medium farmers, primarily women, through gender-sensitive market analysis, geographical indications, quality certifications, market linkages, by-product processing, and inclusive capacity-building using FAO's MAD methodology.	Sub-activity 3.1.1.1 Establish 60 opuntia oil extraction units Sub-activity 3.1.1.2 Plantation of 1200 ha of opuntia Sub-activity 3.1.1.3 Oil tree planting covering 3600 ha Sub-activity 3.1.1.4 Establish 24 olive oil mills Sub-activity 3.1.1.5 Establish 12 units of extraction of essential oils from rosemary Sub-activity 3.1.1.6 Establish sales outlets for rosemary extracts Sub-activity 3.1.1.7 install 20 wool looms Sub-activity 3.1.1.8 Establish outlets for wool products Sub-activity 3.1.1.9 Establish 120 artisanal units Sub-activity 3.1.1.10 Establish 12 sales outlets for artisanal products Sub-activity 3.1.1.11 Establish a unit for processing peppermint (10 ha).	- 60 opuntia oil extraction units established - 1,200 ha of opuntia planted - Oil tree planting completed covering 3,600 ha - 24 olive oil mills established - 12 essential oil extraction units for rosemary established - Sales outlets for rosemary extracts established - 20 wool looms installed - Outlets for wool products established - 120 artisanal units established - 12 sales outlets for artisanal products established - Peppermint processing unit established (10 ha). - Peppermint processing equipment including drying shed installed

		Sub-activity 3.1.1.12 Install equipment processing for peppermint including drying shed	
Activity 3.1.2 Establish partnerships between producers and private sector	This activity aims to develop structured partnerships between NWFP and livestock producer associations — including women's organizations — and private companies through contractualization and commercial agreements, collective action mechanisms, and financial institution engagement to strengthen market access and improve access to finance for value chain actors.	Sub-activity 3.1.2.1 Engage private enterprises and negotiate formal partnership agreements with NWFP and livestock producer associations	- Formal partnership agreements signed between private enterprises and NWFP and livestock producer associations
Activity 3.1.3 Provide legal and technical assistance for creation of micro-enterprises	This activity aims to provide integrated legal and technical assistance for creating micro-enterprises producing, marketing, and certifying NWFPs and livestock products, with focus on rural women and youth, covering enterprise registration, cooperative formation, production improvement, post-harvest handling, and certification, with capacity building of local service providers for long-term sustainability.	Sub-activity 3.1.3.1 Deliver technical and legal assistance for micro-enterprise registration, cooperative formation, and regulatory compliance through international expertise Sub-activity 3.1.3.2 National expertise to support sub-activity 3.1.3.1	-Technical and legal assistance program delivered for micro-enterprises
Activity 3.1.4 Facilitate access to microcredit and subsidized finance	This activity aims to facilitate beneficiary access to innovative financial products (microcredit, subsidized loans, guarantees) available in the Algerian market through public and private banks through delivering a two-stream training package: (a) for farmer beneficiaries; financial literacy, business-plan preparation, financial-record keeping, coaching and matchmaking with lenders; and (b) for local branch staff of public and private banks training on climate change impacts and adaptation measures and on improved risk profile of beneficiary farmer groups.	Sub-activity 3.1.4.1 Help the project's beneficiaries to access microcredit facilities through loans and incentives granted by BADR, NASDA and ANGEM	-Financial literacy training for beneficiaries delivered with sex- and age-disaggregated participation and completion records -Training on climate change impacts and mitigation measures for financial institutions delivered

Activity 3.1.5 Provide wilaya-level technical assistance and equipment maintenance follow-up	This activity will support the implementation of on-the-ground investments, providing the selected beneficiaries of Component 3: Climate-Resilient Livelihoods, Value Chains and Sustainable Finance with procured equipment. Each consultant will cover two wilayas, respectively in the West, Center and East, ensuring the availability of maintenance, following up on technical training and linking VC beneficiaries with the local committee and the PMU.	Sub-activity 3.1.5.1 Support the implementation of on-the-ground investments and linkage with VC beneficiaries in the project area and under the supervision of the PMU	-Timely identification and selection of beneficiaries. - Equipment and training provided synchronously.
Activity 3.2.1 Provide rustic fruit cultivation for pastoral farms	This activity aims to establish drought-hardy fruit tree cultivation across 5,974 hectares and promoting agroforestry practices on 2.143 ha across six wilayas, using certified nursery-grown varieties calibrated to irrigation availability, integrating orchard establishment with ecosystem restoration and livelihood diversification to improve soil cover and household income for pastoral farming communities.	- Sub-activity 3.2.1.1 Establish drought-hardy fruit tree orchards - Sub-activity 3.2.1.2 Promotion of agroforestry in MEV areas - Sub-activity 3.2.1.3 Establish wind break plantation	- Drought-hardy fruit tree orchards established across 5,974 ha. -Agroforestry promoted in MEV areas -Windbreak plantation established
Activity 3.2.2 Deploy small-scale livestock modules for rural households	This activity aims to deploy off-ground and small-scale livestock systems — including free-range poultry and beekeeping modules — primarily targeting women, to diversify household income, reduce rangeland pressure, and conserve indigenous sheep and goat breeds through improved husbandry and linkages to climate-resilient value chains.	- Sub-activity 3.2.2.1 Deploy small poultry farming modules across six wilayas primarily targeting women beneficiaries (120 units) - Sub-activity 3.2.2.2 Deploy beekeeping modules (120 units) contributing to pollination services and income diversification	- 120 small poultry farming modules deployed across six wilayas with sex-disaggregated beneficiary records -120 Beekeeping modules deployed with production monitoring services assessment reports
Activity 3.2.3 Install hydroponic forage production systems	This activity aims to strengthen the forage balance and climate resilience of livestock farmers by installing 240 hydroponic barley chambers across six wilayas meeting the forage needs of an estimated 25,146 sheep equivalents, complemented by 360 field-based barley cultivation sites and 240 alfalfa production units, reducing	- Sub-activity 3.2.3.1 Install 240 hydroponic fodder production units across six wilayas - Sub-activity 3.2.3.2 Acquisition of equipment for a hydroponic fodder production unit - Sub-activity 3.2.3.3 Cultivation of barley on a floodplain (unit 5 ha)	-240 hydroponic barley chambers installed and operational across six wilayas with production yield, water efficiency, and forage output monitoring-360 field-based barley cultivation sites established on floodplains with area coverage and forage production records

	dependence on degraded rangelands and alfa grass areas through year-round, water-efficient soil-independent fodder production.	Sub-activity 3.2.3.4 Establish 240 alfalfa production units (5 ha each) across the six wilayas with priority to 12 pilot municipalities Sub-activity 3.3.3.5 Irrigation system for alfalfa production	-240 alfalfa production units established across six wilayas
Activity 3.2.4 Provide circular economy solutions for date production & agro-processing residues	This activity aims to transform agricultural residues into productive resources by establishing date processing and packaging facilities, converting palm grove residues into livestock feed, and valorizing olive oil production residues, promoting circular economy principles for income diversification and sustainability with a focus on women's engagement in bio-based activities.	Sub-activity 3.2.4.1 Date processing and packaging unit (Gharase) and oasis grove waste processing unit	-Date processing and packaging facilities constructed, equipped, and operational with production output records -Palm grove residue-to-livestock feed conversion system operational with production volumes and women beneficiary participation records -Olive oil residue valorization program operational with identified products and income generation records -Training program delivered on circular economy techniques
Activity 3.2.5 Deploy solar energy kits for rural households	This activity aims to provide clean, renewable electricity through 190 solar energy systems to the most isolated rural and agro-pastoral households across six wilayas, with priority allocation to women-headed households, reducing fossil fuel dependence and greenhouse gas emissions while improving living conditions and productive capacity.	Sub-activity 3.2.5.1 Install 190 solar energy kits	- 190 solar energy kits installed across six wilayas with geo-referenced beneficiary records

6.2. Project components & implementation arrangements

Implementation Arrangements

The project will be implemented through a structured arrangement that clearly defines roles, responsibilities, and fund flows across all executing entities, ensuring accountability, transparency, and effective delivery of results in line with GCF requirements.

Accredited Entity (AE)

The Accredited Entity will have overall responsibility for **project oversight, fiduciary management, and compliance with GCF policies and standards**. This includes:

- Financial management and disbursement of GCF funds
- Procurement oversight and safeguards compliance (ESS, gender, etc.)
- Results monitoring and reporting to GCF
- Ensuring alignment with the GCF Investment Criteria and Results Framework

Executing Entity (EE)

The Executing Entity (typically a lead national institution) will be responsible for **day-to-day project implementation and coordination across components**. Its responsibilities include:

- Annual work planning and budgeting
- Coordination of all service providers
- Technical supervision of activities
- Consolidation of monitoring and evaluation data
- Reporting to the Accredited Entity

Component-Level Service Providers

Each project component will be implemented by designated technical entities with clear mandates:

- **Component 1 – Enabling Governance Framework and climate Information**
Implemented by relevant government technical agencies (e.g., land management, climate services). Responsible for data systems, mapping, and decision-support tools.
- **Component 2 – Ecosystem Restoration & Climate-Resilient Land Management**
Implemented by forestry and land management agencies in partnership with local authorities and communities. Responsible for restoration of the 39,407 ha, including planning, contracting, and supervision.
- **Component 3 – Climate-Resilient Livelihoods, Value Chains and Sustainable Finance**
Delivered through a combination of public agencies, cooperatives, NGOs, and private sector actors. Responsible for supporting beneficiaries with inputs, training, and market linkages (e.g., NWFPs, hydroponic fodder).

Local Implementation Structures

At the Wilaya and community levels:

- Local authorities and decentralized technical services will support implementation, supervision, and beneficiary engagement
- Community-based organizations and cooperatives will play a key role in **asset management, adoption of practices, and sustainability**
- Private sector actors will be engaged through contractual arrangements for service delivery and value chain development

Beneficiaries

Beneficiaries (pastoralists, producers, households) are **not employees of the project or government**. They participate voluntarily by:

- Adopting climate-resilient practices
- Accessing project-supported assets and services
- Engaging in value chains and local governance structures

Fund Flow and Contracting

- GCF funds flow from the Accredited Entity to the Executing Entity based on approved work plans
- The Executing Entity allocates funds to service providers through **formal agreements or contracts**

- Service providers (e.g., for restoration works, nurseries, infrastructure) are engaged through **procurement processes**
- Financial mechanisms (Component 3) channel resources to beneficiaries via **partner financial institutions**, not direct government employment

Coordination and Governance

- A **Project Steering Committee (PSC)** will provide strategic guidance and ensure inter-ministerial coordination
- Technical committees may be established for specific components (e.g., water, forestry, finance)
- Regular coordination ensures alignment across sectors and scalability beyond the project

Monitoring, Evaluation, and Accountability

- A centralized M&E system will track progress against **GCF core indicators and investment criteria**
- Roles for data collection, validation, and reporting are clearly assigned across entities
- Independent audits and evaluations will ensure accountability and performance

Component 1: Enabling Governance Framework and Climate Information

Component 1 lays out the regulatory, institutional, and knowledge foundations for climate-resilient ecosystem management. It modernizes the pastoral legal framework, design and build the foundation of carbon market, establishes multi-stakeholder governance platforms, and deploys integrated climate information systems and digital advisory services - supported by baseline studies and capacity building - to enable evidence-based decision-making at all levels.

Outcome 1: Enhanced Enabling Environment for Climate-Resilient Ecosystem Management

Output 1.1: Regulatory, Financial & Institutional Framework for Climate-Resilient Ecosystem Management Strengthened

This output will deliver a modernized legal, financial, and institutional architecture to underpin climate-resilient land and ecosystem management across Algeria's Green Dam landscape. It addresses the root causes of maladaptive land use - including outdated pastoral legislation, absence of carbon pricing mechanisms, and fragmented governance - by reforming the regulatory framework, introducing innovative climate finance instruments, and establishing inclusive multi-stakeholder platforms.

Activity 1.1.1: Reform the 1975 Pastoral Code and the Local Land Governance Framework

This activity, which consists of developing a regulation for an environment conducive to climate change-resilient land management, will be improved at two levels. i) land regulations, including updating the pastoral code, whose amendments should address the protection and maintenance of the vocation of rangelands and alfa grass patches, the establishment of a framework for collaborative management (with the local populations and herders who reside there), the adoption of management standards based on maintaining a balanced pastoral stocking rate, and a review of regulations concerning the management of protected areas, giving priority to local herders during the opening and ii) the reorganization of incentives for economic activities which take into account the issue of climate change and the protection of the environment (e.g., import and/or assembly and manufacture of solar kits, list of beneficiary companies to be established) through partial tax exemption and other advantages (easier access to bank credit, etc.).

This activity updates Algeria's legal, regulatory, and fiscal framework for pastoral land management in the steppe regions, addressing tenure insecurity, insufficient regulation and formal concession system. Led by MADRP in coordination with DGF, HCDS, and relevant ministries, it introduces Algeria's first pastoral concession system with science-based stocking rates and seasonal grazing rotations, establishes concession agreements in 12 communes linking land-use rights to sustainable management, reforms fiscal policy to incentivize sustainable practices, reviews the 1975 Pastoral Code to remove trade barriers, and develops a national rotational grazing framework informing the Resilient Rangelands Programme under Activity 2.1.2.]

Activity 1.1.2: Support the Design of the foundations of a Compensation Mechanism for AFOLU Within a Framework of National Carbon Pricing

This activity designs the foundation for a domestic offset mechanism for the AFOLU sector within Algeria's emerging carbon pricing framework. It establishes the legal and institutional framework for carbon rights and benefit-sharing, addressing gaps, analyzes needed policy reforms for in carbon pricing architecture and AFOLU carbon accounting to meet NDC commitments, advance the Low Carbon Development Strategy, and strengthen CBAM compliance. In close coordination with the Ministry of Environment, it develops a policy framework for forest and soil carbon offsets, formulates regulatory instruments for carbon credit issuance and benefit-sharing, embeds carbon pricing knowledge into national curricula, ensures NDC alignment, and establishes science-based stocking rate assessments for priority rangeland zones.

Activity 1.1.3: Establish voluntary carbon finance readiness for ecosystem restoration

This activity establishes an MRV foundation designed to attract long-term carbon-finance partners beyond the project's lifetime. It builds on [FAO's open-source platform stack — EarthMap, OpenForis, SEPAL \(System for Earth Observation Data Access, Processing and Analysis for Land Monitoring\), Collect Earth, FAO NEXT tool, TAPE \(Tool for Agroecology Performance Evaluation\)](#), and [KoboToolBox](#) for geo-referenced field data collection.

Two reinforcing data layers underpin the system: a top-down remote-sensing pipeline (satellite imagery, multi-layer GIS, machine learning, cloud-based processing) operated jointly by DGF, the Office National de la Météorologie (ONM) and the Centre National des Techniques Spatiales (CNTS); and a bottom-up field-data layer in which trained village technicians within Restoration Management Committees collect geo-tagged site-level and household-level data, complemented by systematic soil-carbon analysis across the six target wilayas.

The dual data flow creates a built-in independent verification mechanism, as community-reported data are systematically corroborated by satellite analysis at national level. A structured training cascade — DGF national → wilaya → commune — develops a dedicated cadre of restoration-monitoring specialists trained over the 7-year horizon, ensuring the system is locally owned and institutionally embedded. The methodology is consistency with GCF-FAO SURAGGWA Programme and builds the foundations required to attract long-term carbon investment to Algeria's steppe restoration.

Activity 1.1.4: Establish a Multi-Stakeholder Climate Governance Platform Dedicated to the Green Dam

As a continuation of the draft regulations for an environment conducive to a Resilient land management in the context of climate change, collaborative management agreements will be developed at the level of the targeted municipalities involving all actors involved in the implementation of the project at the local level.

This activity establishes an inclusive digital climate governance platform at wilaya and central levels to strengthen coordination, stakeholder participation, and evidence-based decision-making across the Green Dam landscape. Led by DGF in coordination with ANCC, MADRP, HCDS, and multiple partners including FAO, it creates a National AGD Advisory Committee for cross-sectoral coordination, six Wilaya Climate Adaptation Committees with at least 30% women's representation, standardized institutional coordination protocols, multi-stakeholder policy dialogues, participatory land-use planning combining traditional knowledge with GIS tools, and transparent benefit-sharing governance frameworks for carbon market revenues.

These collaborative management agreements, mobilizing the various institutional structures, will integrate all associations, particularly those working for nature protection, employment promotion, gender integration, and actors or operators whose activity is based on the natural resources of the territories concerned by the project.

These agreements will be developed at the level of a pilot municipality in each wilaya and will constitute the appropriate framework for consultation and decision support for the various initiatives taken and in the implementation of the various actions of the project.

Output 1.2: Science-Based Climate Information Systems Established and Operational

This output establishes integrated climate monitoring, early warning, and advisory systems to bridge the gap between technical climate knowledge and field-level application, enabling farmers, herders, and land managers to make informed, timely adjustments to their practices in response to climate variability across the Green Dam landscape.

Activity 1.2.1 Establish a climate and ecological observation network at the AGD territory level

This activity establishes a national climate and ecological observatory in Djelfa as the central hub for data integration, analysis, and forecasting across the Green Dam landscape. In close collaboration with CRSTRA, USTHB, the University of Djelfa, and INRAA, it installs permanent scientific stations for long-term biophysical monitoring; develops AGD-specific forecasting models for drought, rangeland productivity, and desertification, deploys AI and machine learning tools for early warning and predictive analytics, establishes a coordinated research centre network, and ensures full interoperability with the national climate database and GIS platform under Activity 1.2.3.

Activity 1.2.2: Install an agrometeorological station network

This activity deploys six automatic agrometeorological stations — one per wilaya — across the AGD to generate real-time agro-climatic data for drought monitoring, climate risk management, and resilient land-use planning. In close collaboration with ONM, it deploys IoT-enabled stations monitoring key climate and soil parameters, integrates real-time data with national meteorological systems, contributes to localized drought and wildfire early warning, ensures interoperability with the digital M&E platform and GIS, and builds technical capacity among relevant institutional staff.

Activity 1.2.3 Develop an integrated GIS for agricultural drought and land degradation management

This activity establishes an integrated GIS to support climate-informed land-use planning and drought and land degradation management across the steppe regions. In close collaboration with ASAL through the Centre of Space Techniques, it builds a unified geo-referenced database integrating multi-source data, combines remote sensing with ground-truthing for baseline characterization, consolidates fragmented institutional datasets into an interoperable decision-support platform, produces centralized analytical outputs for drought monitoring, integrates local field-level knowledge, conducts a climate risk assessment following IPCC AR6 methodology, and supports national environmental reporting obligations.

Activity 1.2.4: Develop a portfolio of baseline and feasibility studies for sustainable resource management

This activity designs and implements targeted studies to strengthen AGD knowledge and support evidence-based, climate-resilient resource management, addressing gaps in knowledge capitalization and project formulation. Drawing on regional resources including the FAO KHIBRA Platform and ReInvest NENA Programme, findings will be disseminated through the digital M&E platform and Multi-Stakeholder Governance Platform. The portfolio covers six areas: forest management assessments, biodiversity inventories, silting and land degradation impact assessments, protected area feasibility studies, groundwater recharge feasibility assessments, and treated wastewater reuse studies.

Activity 1.2.5: Build Digital Climate Information and Advisory Services

This activity deploys AI-enhanced digital climate information and advisory services to bridge the gap between technical climate knowledge and field-level application across the Green Dam landscape. It develops and delivers tailored, real-time climate advisories to farmers, herders, and land managers through mobile platforms and community information hubs. The system integrates data from the agrometeorological station network (Activity 1.2.2), the climate observatory (Activity 1.2.1), and the GIS platform (Activity 1.2.3) to generate location-specific forecasts, drought early warnings, and

seasonal agricultural guidance. Advisory content is co-designed with local communities to ensure relevance to agro-pastoral decision cycles, with gender-responsive delivery formats including oral, visual, and low-literacy channels through the Climate Wise Women (CWW) network.

Through the development of protocols and other institutional coordination mechanisms, and communication activities (workshops, seminars, etc.), this activity aims to improve coordination and the exchange of experiences between actors.

It addresses the current low level of coordination and synergy among stakeholders, the limited technical capacities of actor groups, and the marginal role of the private sector, all of which contribute to the persistence of an environment unfavorable to climate-resilient land management. The activity will be implemented through the organization of 42 coordination/experience-sharing workshops and 42 coordination/communication seminars, at a rate of one workshop and one seminar per wilaya per year throughout the project's implementation period (7 years).

The integrated, gender-responsive digital climate advisory services provide farmers, livestock breeders, and land managers with real-time actionable climate information across six Wilayas through: a Mobile app (Android-first, with offline mode) — bilingual Arabic and Tamazight, plus French; visualizes forecasts, maps, alerts, and personalized advisories; SMS bulletins — push-format advisories to feature phones (still the majority device in the steppe); interactive voice response) — recorded voice alerts in Arabic and Tamazight, accessible to low-literacy users, including many women; WhatsApp / Telegram bot — automated push of daily and event-based advisories, with dedicated women's-cooperative, Community radio bulletins — twice-daily climate-advisory slots on wilaya-level local radio; Wilaya-level digital kiosks in DGF offices and commune halls, complemented by an extension-agent dashboard enabling in-person delivery to non-digital users.

Activity 1.2.6: Design and Deliver Targeted Training and Knowledge Transfer Programme to Project Zones

This activity consists of developing and implementing a training and outreach plan on the tools and policies developed, including the organization of capacity-building workshops that will focus on support mechanisms for certain sectors (public-private) and on crop and livestock farming practices that take climate change into account.

The training recommended by the project is as follows: i) 42 capacity-building workshops for all stakeholders (1 workshop/wilaya/ year) during the 7 years of project implementation ii) Basic training (7-day session) in risk management for focal points at the wilaya level to enable them to carry out their mission of evaluating and coordinating actions undertaken in this context.

A specialized training structure will be mobilized to address the needs of wilaya-level implementation committee members and to deliver training to 8,401 project beneficiaries (including 5,384 women) across 60 sessions, with a focus on disseminating improved agricultural and pastoral techniques. Capacity-building workshops will also be organized for institutional stakeholders to strengthen their skills in planning, coordination, and project implementation. Collectively, these interventions aim to accelerate the adoption of innovative practices and reinforce the technical and organizational capacities of all stakeholders involved in project delivery.

The training courses are part of the implementation of the national policy for risk prevention and disaster management within the framework of sustainable development. They take into account the recommendations of the Sustainable Development Goals and the Paris Agreement on climate change. The training involves 20 people per wilaya (province), for a total of 120. iii) Training and outreach sessions for project beneficiaries (livestock farmers, farmers, VC actors) to strengthen their technical, managerial and entrepreneurial capacities.

Component 2: Ecosystem Restoration & Climate-Resilient Land Management

Component 2 delivers large-scale ecosystem restoration and climate-resilient infrastructure across Algeria's Green Dam landscape. It rehabilitates pastoral and forest heritage through climate-adapted seedling production, rangeland restoration with Algeria's first formalized rotational grazing system, participatory reforestation and revegetation, dune stabilization, silvicultural management transitioning pine monocultures toward diversified mixed forests, and strengthened wildfire

prevention infrastructure. It also restores agricultural and water systems by rehabilitating rural access tracks, constructing soil and water conservation structures, mobilizing and storing water resources through rehabilitated infrastructure, and promoting efficient irrigation — collectively building the resilience of agro-sylvo-pastoral ecosystems while generating GHG emission reduction co-benefits across six project wilayas. All restoration activities under Component 2 will be designed and implemented in alignment with the Global Biodiversity Standard (TGBS) to ensure verifiable, high-integrity biodiversity outcomes.

Outcome 2: Climate Resilient, Low-Emission Restoration and Sustainable Land Management of Agro-Sylvo Pastoral Ecosystems

This outcome captures (1) the adaptation pathway- restoring degraded landscapes and securing water resources to build the climate resilience of agro-sylvo-pastoral ecosystems- and (2) the mitigation pathway- delivering carbon sequestration through reforestation, rangeland soil-carbon, agroforestry, dune fixation and Algeria's first science-based rotational grazing system. The pastoral-concession architecture under Activity 1.1.1 provides the sustainable land management institutional anchor that makes both gains durable.

Output 2.1: Pastoral and Forest Heritage Restored- Climate-Resilient and Low Emission

This output will deliver large-scale ecosystem restoration through an integrated set of interventions covering climate-adapted seedling production, rangeland rehabilitation, community-based reforestation, dune fixation, silvicultural management, and forest fire protection. By restoring and protecting degraded steppe and forest ecosystems, the output strengthens natural barriers against desertification, enhances carbon sequestration, and builds long-term ecological and productive resilience.

Activity 2.1.1: Rehabilitate and Create Nurseries for Climate-Adapted Seedling Production

This activity focuses on the upstream part of all plantations, the success of which depends on the choice of plant varieties, the harvesting and processing of seeds, the quality of the plants planted, and the nursery breeding methods, which should follow very rigorous guidelines.

This activity rehabilitates existing nurseries and establishes three new permanent nurseries in Khenchela, Djelfa, and El Bayadh to produce approximately 12,741,900 climate-adapted seedlings over seven years, supporting ecosystem restoration across 22,658 hectares. Led by DGF, nurseries will produce a diversified portfolio of forest, fodder, and fruit tree species selected for climate resilience, using strict provenance protocols and INRF-validated growing standards. Nurseries will be managed long-term by community groups - primarily women - trained in plant propagation and seed production.]

In addition to the rehabilitation of existing nurseries, the project provides for the creation of 3 large permanent nurseries at the level of each geographical zone of the AGD (Khenchela for the East zone, Djelfa for the Central zone, El Bayadh for the West zone).

This will meet the need for 12,741,900 seedlings (1,820,271 seedlings per year during the project implementation period) required for the restoration, protection, rehabilitation, and expansion of agro-sylvo-pastoral areas across a total of 22,658 hectares. There is a need to diversify production (forest trees, fodder trees, fruit trees), with a selection of species adapted to current and future local climatic conditions. The nurseries will be managed long-term by community nursery groups (primarily women) trained in animal husbandry, planting, and seed production, adhering to the principle of traceability.

Plan for each nursery i) A fence and windbreak system to delimit the property and protect it against intrusions (wild or domestic animals) ii) Windbreaks to protect plants from the wind iii) An essential shading system for planting and propagation work. iv) Buildings and operational structures (administrative office, cold storage for seeds, a shed for storing topsoil, a drying area for seeds, an analysis laboratory, glass or plastic greenhouses, a water supply) and v) Equipment (containers, bags, coveralls, soil sifter, gloves, masks, ladders, wheelbarrows, tank, etc.) and tools (pruning shears, scissors, saws, picks, rakes, shovels, etc.).

The harvesting of seeds for seedling production will take place within pre-selected seedling production areas (PPGs) located in ecological conditions similar to the introduction environment. To ensure their origin, harvest period, processing, and packaging, the participation of forestry officials or an approved organization is required. The seeds must be cleaned, dried, treated, and stored under suitable conditions until sowing. For good root development and sufficient water storage, ensuring the seedling's self-sufficiency and facilitating successful establishment after planting, the containers required to obtain healthy seedlings capable of adapting to the constraints of the planting environment must be of the WM type. They must have a minimum volume of 400 cm³ which would correspond to a cross-section of 25 cm² and a height of 16 cm (INRF recommendations).

Growing substrates must meet specific physical requirements, with a balanced texture that allows for water retention (ideally, a total porosity of 60-80%), drainage, and aeration. They must also provide good root support and have sufficient consistency for easy handling during transport and planting. Chemically, the mixture should have an optimal pH between 5 and 6.5. The salinity (electrical conductivity) for optimal plant growth should be between 0.76 and 1.25 dS/m.

Chemical disinfection (biocides) or solarization of the substrate is essential to eliminate pathogens and insect pests from young plants. Several mixing processes, using topsoil (10 to 15% clay, 50 to 60% sand, 6 to 8% light organic matter) with other local materials composted at different rates, are being tested and have given conclusive results (pine bark, cork granules, and olive pomace. Source: work of the INRF).

Watering and fertilizing seedlings should be kept to a minimum, and weaning them as planting approaches is recommended. This reduces stress on the seedlings and allows them to adapt quickly to the new conditions of their environment. During transport, seedlings should be lightly watered, protected from the wind (covered), and preferably transported in calm weather.

The temporary storage area is not a substitute for a nursery; it is a temporary depot that ensures the supply of seedlings to the planting sites, especially when rain makes access roads impassable. It should be located in a sheltered spot, if possible, accessible to transport vehicles, on level ground, and within the planting area. Containers should be carefully placed there, watered, and those on the outside should be covered with soil.

Activity 2.1.2: Implement a Program for Climate-Resilient Rangeland Management

This activity delivers a comprehensive rangeland management programme across 12 communes covering 28,491 ha, integrating pastoral planting (3,780 ha), *Opuntia* plantations (1,092 ha), deferred grazing and enclosure (23,619 ha), and forage seed collection (30 ha). It operationalizes Algeria's first formalized rotational grazing system (under Activity 1.1.1) and the scientifically determined sustainable stocking rates (developed under Activity 1.1.3). Led by HCDS, the activity emphasizes multi-stakeholder consultation for managing the transition period, follows traditional 'g'del' deferred grazing practices, and generates significant mitigation outcomes through reduced GHG emissions, enhanced carbon sequestration, and improved water management.]

Pastoral plantation: This action concerns the six wilayas (provinces) of the project: Tébessa (812 ha), Khenchela (750 ha), Djelfa (1200 ha), M'Sila (400 ha), El Bayadh (300 ha), and Naâma (518 ha). Some plots are being replanted for pastoral use, with predominantly low success rates. The species to be planted are *Atriplex nummularia*, *canescens*, and *halimus*.

All the work on the plot (from soil preparation to post-planting maintenance) is identical to that of replanting. The relatively long-term protection (3 to 5 years) is justified here, since in addition to protecting the plantation, the entire forage layer (perennial and annual species) will regenerate with good seed production. There could even be a supplementary operation consisting of seed sowing.

The value chain linked to the extraction of seed oils from *Opuntia* will benefit from a specific planting program on an area of 1200 ha planned under component 3, which would be added to the overall objective of pastoral planting of the project.

Regeneration of alfa grass beds: This action is subject to the results of the inventory of alfa rangelands currently being carried out at the BNEDER level at the request of the forestry administration and to those of the study, which targets the exploitation and valorisation of the alfa product including the

market study and the identification of actors with the value chain approach, proposed within the framework of the project's study portfolio.

This action aims to improve the resilience of the steppe ecosystem to climate change and anthropogenic threats, to strengthen the contribution of these areas to biodiversity conservation and sustainable development, and to better integrate alfa grass stands into the socio-economic sphere through the development of a specific conservation and development program for this species. In terms of adaptation, the activity contributes to increasing the ecosystem's resilience, and environmentally, it reduces desertification and the decline of alfa grass stands.

Placed under protection: Delayed grazing, or resting of rangelands, an ancient technique used for rangeland regeneration, is commonly called "g'del" in the traditional pastoral system, which was used on small plots. This technique is recommended for the 5 wilayas (provinces) covering a total area of 23,619 ha (Tébessa 7,607 ha, Khenchela 2,012 ha, Djelfa 3,000 ha, El Bayadh 1,000 ha and Naâma 10,000 ha), in areas of degraded to very degraded rangeland, with very low vegetation cover and a sensitive to very sensitive soil moisture index (SMI).

The majority of relatively recent (or recently replanted) plantations of various types (reforestation, mixed planting, dune stabilization, pastoral planting), which have exceeded the 24-month contractual guarding period, are subject to these protection measures. These measures will allow these young plantations to be protected from livestock, a veritable scourge and the primary cause of most recorded failures.

This will enable the plants to grow to a considerable size, thus avoiding grazing and fulfilling their role in protecting the soil from erosion. The duration of these protection measures cannot be less than three years, ultimately reaching a cumulative total of five years, given that these plantations have already been guarded for two years. If the need arises (drought years, etc.), an extension may be granted.

Boundary stones made of dry stone will be erected at the edges of the protected areas to make them clearly identifiable. These protected areas will generally be accompanied by maintenance work on plantings or pest control treatments.

The fallow periods will be short and alternate, ranging from 3 to 6 years depending on the year (rainy and/or dry) and, above all, the state of the vegetation. For a successful fallow period, it must begin during a rainy year to avoid any reluctance from livestock farmers.

Otherwise, it will be rejected due to the forage deficit recorded during the drought. The plots will be marked by the installation of dry-stone boundary markers approximately 1 meter long. 3 markers will be placed at intervals of 200 to 400 meters. Each marker will be painted with white lime for better visibility. This pastoral management technique, although considered very old and well-known to pastoral communities, has unfortunately, once again, proven to be a very restrictive system, generating more social conflict than pastoral benefits. These observations in no way call into question the ecological and even economic impact of this technique, which we advocate through this project.

The weakness lies primarily in the conditions of its implementation. Currently, the protected areas are demarcated solely through collaboration between technical services and local administration, without considering the opinions of key stakeholders in the area (livestock farmers and agro-pastoralists). Furthermore, the grazing process is managed by the municipal councils (APC) and technically assisted by the High Council for Development Studies (HCDS), with a security system in place.

In some cases, after grazing begins, the system fails, leading to site degradation that requires significant investment for restoration. Therefore, it is essential that each grazing rest action be implemented in consultation with key stakeholders and in collaboration with all parties involved. The principle of deferred grazing offers a dual benefit, regardless of the condition of the rangeland in question

- i) It constitutes in itself a technique for the regeneration and rejuvenation of vegetation and
- ii) It is a method of managing and exploiting this pastoral space that avoids forage deficit and overgrazing.

Activity 2.1.3 Reforest and revegetate forest heritage for climate-resilient management through a participatory approach

This activity, implemented in collaboration with service providers and ensuring best practice with selection criteria of beneficiaries (see annex 23), will restore, protect, and expand forest ecosystems in the six project wilayas, thus, strengthening the resilience of degraded drylands to climate change while aligning with the [Global Biodiversity Standard \(TGBS\)](#). Through targeted afforestation, reforestation, and alignment planting, the activity will stabilize soils, restore vegetation cover, improve soil organic matter and moisture retention, and protect agricultural lands, road infrastructure, and rural settlements from wind erosion, silting, and sand encroachment. It will conduct reforestation of 1,145 hectares using diverse native species adapted to climate conditions; replant underperforming forest stands across 1,333 hectares with three- to five-year enclosure protection. Implementation will follow TGBS criteria on ecosystem integrity, biodiversity enhancement, adaptive management, and community benefits. These interventions will contribute directly to Algeria's NDC adaptation goals and Land Degradation Neutrality (LDN) targets.

Activity 2.1.4 Implement a dune fixation program to control silting and wind erosion

This activity will implement a comprehensive dune stabilization programme to control wind erosion and reduce sand encroachment threatening agricultural lands, rangelands, settlements, and infrastructure across the AGD. By combining mechanical and biological fixation techniques, the programme will stabilize mobile dunes, restore degraded landscapes, and protect productive land and rural infrastructure from silting across 3,150 hectares in four highly vulnerable wilayas: El Bayadh, Naâma, M'sila, and Djelfa. Priority will be given to areas where previous dune fixation efforts achieved limited success, applying integrated restoration methods to improve long-term stabilization outcomes.

Activity 2.1.5 Strengthen forest health through silvicultural management and pest control

This activity will improve the health, resilience, and productivity of forest stands through targeted silvicultural management, maintenance, and Integrated Pest Management measures across 2,688 hectares in six wilayas: El Bayadh, Naâma, Djelfa, M'sila, Tébessa, and Khenchela. Interventions will support the long-term success of reforestation efforts and protect forest ecosystems from increasing climate stressors and biological threats, including the pine mealybug (*Matsucoccus feytaudi*) — an invasive scale insect posing a severe and growing risk to Aleppo pine stands across the Green Dam landscape.

Activity 2.1.6 Strengthen forest fire management and protection infrastructure

This activity strengthens wildfire prevention and response capacity across four wilayas — Tébessa, Khenchela, M'sila, and Djelfa — through the development of Défense des Forêts Contre les Incendies (DFCI) infrastructure including firebreaks, water points, and access routes, along with consolidation of forest land tenure through 9,760 km boundary markers. Led by DGF, these interventions are complemented by 129 km of forest tracks under Activity 2.2.1, collectively safeguarding forest cover against the increasing frequency and intensity of climate-related wildfires.

Activity 2.1.7 Supervise the land and water restoration activities

This activity will enable the chief technical advisor to provide senior expertise to the project management team for the implementation of land and water restoration activities.

Output 2.2: Agricultural and Water Systems Restored- Climate-Resilient and Low-Emission

This output restores agricultural and water infrastructure across the AGD through rehabilitation of rural access tracks, soil and water conservation structures, water resource mobilization and storage, and efficient irrigation systems - addressing increasing drought, soil degradation, and water scarcity to improve rural connectivity, enhance water availability, and strengthen climate resilience for smallholder farmers and pastoralists.

Activity 2.2.1: Rehabilitate Agricultural Access Tracks to Improve Rural Connectivity

This activity rehabilitates 478 km of agricultural and rural tracks across five wilayas (El Bayadh's existing track network was assessed as adequate during the inception-stage technical mission and is therefore not included). The activity directly addresses three intensifying climate stressors that disrupt the functioning of agro-sylvo-pastoral systems and the project's restoration interventions: (i) increased wildfire frequency and severity driven by rising temperatures, prolonged droughts and biomass build-up — requiring rapid emergency-vehicle access to remote forest and steppe ignition zones; (ii) drought-induced food, fodder and water-supply emergencies — requiring rapid logistical access to deliver emergency assistance to pastoral and agro-pastoral households cut off from supply lines during recurrent floods (and drought) episodes; (iii) climate-related disruption to restoration supply chains — requiring reliable access for the movement of seedlings, irrigation components, soil amendments, fodder reserves and equipment that underpin Outputs 2.1 and 2.2 and the project's broader paradigm shift.

In close collaboration with the Rural Engineering Group (GGR) and the Direction des Travaux Publics, track rehabilitation prioritizes segments serving (i) emergency access for fire suppression across remote steppe and forest areas; (ii) drought-relief logistics routing to the most vulnerable communities; and (iii) resilience-enabling supply chains for restoration inputs. Tracks are designed to climate-resilient standards — drainage sized for intensified rainfall events, all-weather surfacing for episodic flash floods, alignment that avoids erosion-prone slopes — ensuring durability under projected mid-century climate conditions. Broader rural-development outcomes, including year-round accessibility and strengthened transport links to markets and essential services, are derivative co-benefits of the climate-specific functions and are not the basis for the climate-additional financing rationale.

Activity 2.2.2: Implement Soil and Water Conservation Structures and Practices

This activity aims to slow down the degradation of soil and the loss of water retention by building and repairing hydraulic and erosion-control infrastructure across 1500 ha. In close collaboration with the Water Resources Direction, it focuses on torrent correction using check dam sequences with gabion-reinforced structures to reduce erosive force, and conservation structures adapted to the semi-arid context to capture runoff, enhance infiltration, and support native planting survival. Implementation is guided by participatory site assessments with local pastoral associations and smallholders.

It restores structures (bank stabilization, torrent correction, soil and water conservation works) to reduce the effects of soil erosion (water and wind) and maintain soil health (increased water retention), and adopting localized irrigation methods (drip irrigation, pivot irrigation) to mitigate the effects of water stress, ensuring better climate resilience.

Torrential correction: Given the extent of the gully erosion, many areas across the AGD have undergone torrent control measures, but others still require this type of intervention. The principle is to build dams in gullies exposed to erosion risk, in order to reduce their longitudinal slopes to slow the water's velocity and mitigate erosion.

Generally, the most commonly used dams are dry-stone walls reinforced with gabions, built across the streambed and perpendicular to its axis. For the dam to be well-supported at its base and firmly anchored in the banks, the foundations must be of sufficient size and, depending on the shape of the gully's cross-section, make stepped excavations (in the banks) are used. To allow sediment to reach the upstream dam and prevent its collapse, the number of dams is increased or counter-dams are constructed. Two types of dams are distinguished: straight and curved.

Straight dams are used when the banks are relatively unstable. The cross-section of this structure is generally that of a wall, with a sloping downstream face (having a batter) and a vertical upstream face. The batter averages 20%, and experience has shown that for a stable structure, its average thickness (E) at mid-height should be equal to half its total height h (above the foundations), hence $E = (1/2)h$. For a batter of 20%, the thickness of the dam at the crest is $(4/10)h$, and its thickness at the base is $(6/10)h$.

Curvilinear dams, unlike the first type, are used when the banks are solid and have the advantage of better resisting the various forces acting upon them. The radius of the curve, whose convexity faces upstream, must be such that the deflection is equal to 1/10 of the span. The spillway, which forms the upper part of the dam from which the ravine water will flow, is also called a weir. It can have a rectangular, trapezoidal, or curvilinear longitudinal cross-section.

If the dam is constructed of gabions, all these shapes are resistant provided their dimensions are close to those of the talwegs to be corrected; if these dimensions are too narrow, regardless of the weir's shape, it will cause lateral scour with effects more severe than before the correction (Greco, 1966).

Drip irrigation, sprinkler irrigation and construction of a *seguia* (irrigation canal): These three actions concern the acquisition and implementation of a localized irrigation network (GAG) on 70 ha, sprinkler irrigation on an area of 10 ha in the commune of Boussemghoun in El Bayadh and the construction of 9000 ml of irrigation canals for better adaptation to water stress induced by the decrease in rainfall and the persistence of drought due to climate change, the improvement of water management, the conservation and extension of vegetation cover to protect the soil and ecosystems, the increase in cultivated area, yields and food self-sufficiency and the maintenance of employment in the disadvantaged regions of the High Plateaux.

Activity 2.2.3: Mobilize and Store Water Resources for Climate-Resilient Agro-Sylvo-Pastoral Systems

This activity addresses three intensifying climate stressors that threaten the viability of agro-sylvo-pastoral systems across the Algerian Green Dam: (i) declining and increasingly irregular precipitation — projected to decrease by up to 16% by 2080–2100 under SSP2-4.5 — that erodes the reliability of seasonal water availability; (ii) groundwater depletion driven by reduced aquifer recharge under drier conditions combined with rising abstraction pressure on shallow wells; and (iii) recurrent and intensifying drought episodes — 68% of the Green Dam was affected by the 2021 drought alone — producing acute water-supply emergencies for the most vulnerable pastoral and agro-pastoral communities.

In close collaboration with the Directorate of Water Resources (DRE) and the National Agency for Hydraulic Resources (ANRH), the activity offers a diversified portfolio of hydraulic infrastructure adapted to the conditions of the steppe: the construction of new hydraulic infrastructure — including 22 forages, 29 surface water mobilization structures (pond, hillside reservoir, *ced*, diversion dike) for rainwater and 3 pastoral wells —, the rehabilitation of existing hydraulic infrastructure and the pilot implementation of treated wastewater use for the rehabilitation of pastures. Priority sites will be selected through vulnerability assessment and community consultations at the inception phase.

The climate-additional benefits are: (a) buffering against climate-driven water-supply volatility through diversified storage modalities — surface reservoirs, ponds, traditional *CED* structures, and boreholes — that perform under different climate-failure scenarios; (b) drought-resilient water access for the most vulnerable agro-pastoral households cut off from supply lines during recurrent drought episodes; and (c) groundwater-recharge support through hillside reservoirs and *CED* structures that recharge shallow aquifers on which downstream wells and pastoral water points depend, mitigating maladaptation risk from sole reliance on boreholes. Water User Associations (WUAs) with 30% female-membership quotas govern allocation, abstraction monitoring and dispute resolution. Broader agricultural-productivity and rural water-supply outcomes are derivative co-benefits of the climate-specific functions and are not the basis for the climate-additional financing rationale.

This project, targeting the six wilayas (provinces), involves the construction of various structures adapted to the context of the AGD (drip irrigation systems across 70 hectares and the development of sprinkler irrigation networks over 10 hectares, 9,000 linear metres of irrigation canals (*ced* & *seguias*) for improved and efficient collection and storage of water. This resource is used for agro-pastoral purposes (and may even provide drinking water for some remote localities).

In addition to the expected agricultural production, this project allows for better adaptation to decreased rainfall and drought through water conservation and system optimization for improved yields. Environmentally, it will contribute to protecting agricultural land from irrigation practices using

degraded water resources (particularly wastewater). Economically, it will expand cultivated areas and optimize the allocation of resources to different crop types.

The climate-additional benefits are: (a) buffering against climate-driven water-supply volatility through diversified storage modalities — surface reservoirs, ponds, traditional CED structures, and boreholes — that perform under different climate-failure scenarios; (b) drought-resilient water access for the most vulnerable agro-pastoral households cut off from supply lines during recurrent drought episodes; and (c) groundwater-recharge support through hillside reservoirs and CED structures that recharge shallow aquifers on which downstream wells and pastoral water points depend, mitigating maladaptation risk from sole reliance on boreholes. Water User Associations (WUAs) with 30% female-membership quotas govern allocation, abstraction monitoring and dispute resolution. Broader agricultural-productivity and rural water-supply outcomes are derivative co-benefits of the climate-specific functions and are not the basis for the climate-additional financing rationale.

Groundwater sustainability is secured through three reinforcing measures:: (i) a recharge-and-abstraction sustainability analysis based on ANRH data, with safe-yield thresholds defined per wilaya and applied as a binding ceiling for every project water point; (ii) climate-stress testing of all water infrastructure under worsening drought scenarios (SSP2-4.5 and SSP5-8.5) to confirm that abstraction remains within safe yield even in the most adverse projected futures; and (iii) safeguards against over-abstraction — metering, Water Users Associations (WUAs) with enforceable abstraction caps, and conditional permit-renewals tied to the ANRH monitoring data. Together these measures ensure the project's water mobilization adapts to — rather than aggravates — Algeria's groundwater-stress trajectory; the corresponding maladaptation risk is explicitly assessed in Section F.

These measures are operationalized through a legally anchored, multi-tier enforcement framework aligned with Algeria's national water legislation. At the local level, Water Users Associations (WUAs) apply abstraction caps among their members and report compliance monthly to the wilaya Directorate of Water Resources (DRE). ANRH oversees groundwater monitoring — including metered abstraction and piezometric data — and issues the technical trigger determinations that underpin adaptive management. Acting on those determinations, the DRE has the legal authority to reduce, suspend, or revoke abstraction permits, with quantified thresholds ensuring that corrective action is initiated before aquifer degradation becomes irreversible.

Activity 2.2.4: Promote Efficient Irrigation and Water Distribution Systems

This activity improves water use efficiency through the deployment of localized irrigation systems and the strengthening of water distribution infrastructure. Led by the Water Resources Direction, it includes the installation of drip irrigation systems across 70 hectares and the development of sprinkler irrigation networks over 10 hectares. In addition, the program supports the construction of 9,000 linear metres of irrigation canals (*seguias*), improving water conveyance and reducing losses. Together, these interventions contribute to expanding cultivated areas, increasing agricultural productivity, and enhancing the resilience of farming systems in steppe regions. The activity is further supported by capacity-building initiatives that promote inclusive water management practices, including the participation of women farmers.

Component 3: Climate-Resilient Livelihoods, Value Chains and Sustainable Finance

Component 3 strengthens the climate resilience and adaptive capacity of vulnerable rural communities across Algeria's AGD. It improves the technical, organizational, and commercial capacities of smallholders — with a strong focus on women — to produce and market climate-resilient NWFPs and livestock products, linking them to value chains, private sector markets, and sustainable financing mechanisms. It promotes a circular economy by recycling agricultural by-products, reducing waste, and optimizing water use, while prioritizing women-led solutions, enterprises and household income diversification across the 6 wilayas.

Outcome 3: Enhanced Resilience and Income Diversification of Local Livelihoods

Outcome 3 strengthens the climate resilience and adaptive capacity of vulnerable rural communities across Algeria's AGD. It improves the technical, organizational, and commercial capacities of smallholders - with a strong focus on women - to produce and market climate-resilient NWFPs and livestock products, linking them to value chains, private sector markets, and sustainable financing mechanisms. It promotes a circular economy by recycling agricultural by-products, reducing waste, and optimizing water use, while prioritizing women-led solutions and household income diversification.

Co-benefit 1: Enhanced Gender Equality

Co-benefit 2: Enhanced social cohesion

Output 3.1: Access to Climate-Adaptive Finance and Technical Support Strengthened

This output will strengthen the climate resilience and economic sustainability of rural communities by developing and connecting smallholder farmers - with a strong focus on women - to diversified, market-integrated value chains. Through the development of six priority climate-resilient value chains, establishment of producer-private sector partnerships, and targeted legal and technical support for micro-enterprise creation, the output will improve household incomes, reduce dependence on climate-sensitive subsistence production, and promote circular economy principles.

Rural communities across the AGD face significant barriers to accessing financial services. The formal banking sector has limited penetration in rural steppe areas. Microfinance through ANGEM has expanded but remains constrained by conservative lending criteria, collateral requirements that exclude pastoral households, and repayment schedules misaligned with seasonal income cycles. Women face compounded barriers including limited documentation, social restrictions on mobility to banking centres, and exclusion from land titles.

Relevant IFI Experience: The World Bank's Agricultural Rural Renewal Support Project demonstrated challenges of channelling finance to dispersed pastoral communities. IFAD's experience shows that group-based lending through women's cooperatives, combined with financial literacy training, significantly improves repayment rates and women's economic participation. GEF-funded projects have piloted payment for ecosystem services mechanisms, providing lessons on benefit-sharing frameworks applicable to carbon finance.

Key constraints to be addressed include: (i) absence of climate-adapted financial products with flexible repayment; (ii) high transaction costs of serving dispersed rural populations; (iii) limited institutional capacity of local financial intermediaries; and (iv) lack of integration between public support schemes and climate adaptation objectives.

Activity 3.1.1: Develop Six Priority Climate-Resilient Value Chains

This activity develops six climate-resilient value chains - prickly pear, olive, rosemary, wool, alfa grass, and peppermint - targeting small and medium farmers, primarily women, using FAO's Market Analysis and Development (MA&D) methodology. Led by MADRP, it conducts gender-sensitive market analysis, develops geographical indications and quality certifications, establishes market linkages, creates processing units for agricultural by-products, valorises traditional crafts linked to eco-tourism markets, and delivers inclusive capacity-building through women-led extension and peer-to-peer learning.

The selection and design of the six priority value chains is climate-additional in three respects: (i) all six are based on drought-tolerant, water-efficient species naturally adapted to the steppe agro-ecology, reducing climate exposure compared to climate-sensitive cereal-based livelihoods that currently dominate the AGD; (ii) diversification across six value chains spreads climate-attributable income risk away from over-dependence on single-product streams that drought has historically wiped out; (iii) certification (organic, Global G.A.P., Fair Trade) anchors premium-market positioning that buffers producers against climate-driven local market volatility and provides the price stability needed for households to maintain restoration investments during drought years. Climate-additional benefits: drought-resilient income streams; reduction of climate-attributable income volatility; financial cushion enabling continued restoration adoption during drought years. Broader income-diversification and market-access outcomes are derivative co-benefits.

Across six target NWFP value chains (prickly pear, olive, rosemary, wool, alfa, peppermint), prior interventions in Algeria, the Maghreb and IFAD/GEF-supported projects converge on five cross-cutting success factors:

1. Quality certification and origin labeling (organic, geographical indications, Global G.A.P., Fair Trade) are decisive for premium-market access — demonstrated for prickly pear, olive, rosemary and peppermint, with documented returns of 200–300 % for certified rosemary producers.
2. Cooperative formalization and women-led producer groups are central to capturing value — especially for prickly pear, wool and peppermint — and to securing access to processing assets, finance, and markets.
3. Processing and post-harvest infrastructure — cold chains (prickly pear), community oil presses with quality testing (olive), improved distillation units (rosemary, peppermint), and quality-control points (alfa, peppermint) — are prerequisites for accessing higher-value market segments.
4. Sustainable management protocols — rotational harvesting, community-based monitoring (alfa), and sustainable wild-collection (rosemary) — are required to prevent resource depletion and protect long-term viability.
5. Anchor-firm and market linkages — eco-tourism and artisanal branding (wool); pharmaceutical and cosmetic buyer networks (peppermint); pulp, paper and composite-materials buyers (alfa); structured off-take with quality testing (olive) — convert production gains into reliable income. Algeria's particular comparative advantage is most pronounced for alfa grass (world's largest natural reserves) and prickly pear (regional production tradition with proven oil and cosmetic demand). The transferable design implication for the project is that each value chain must combine certification + cooperative structure + processing infrastructure + sustainable harvesting + anchor-firm market linkages — none of these elements works in isolation.

The six selected value chains — prickly pear, olive, rosemary, wool, alfa grass and peppermint — are commercially, technically and institutionally feasible. All six are grounded in demonstrated Algerian production capacity and served by growing domestic and export markets, drawing on Algeria's comparative advantages (world's largest natural alfa reserves, a top-ten global olive producer position, and long-standing prickly-pear, rosemary, wool and mint traditions across the steppe). Combining mature large-scale commodities with high-growth premium niches, diversification across six chains spreads climate-attributable income risk that no single-chain strategy could mitigate.

Implementation is delivered through an aligned national institutional stack (MADRP, DGF, INRAA, HCDS, CRSTRA and the wilaya DSA and DRE directorates), integrates the five design conditions distilled from prior IFAD- and GEF-supported interventions in Algeria and the wider Maghreb (certification, cooperative formalization, processing infrastructure, sustainable management, and anchor-firm linkages), and is anchored by a climate-adapted microcredit architecture with BADR, CNMA, ANGEM, NASDA and FGAR, together with anchor-buyer selection in Year 1. Together, these arrangements convert production capacity into durable, market-carried livelihoods and deliver the Component 3 paradigm-shift objective for the 7,818 targeted beneficiary households, with priority participation for women-led producer groups and youth.

The following table summarizes indicative market data for each of the six climate-resilient value chains selected under Activity 3.1.1 — current production and market size in Algeria and globally, 3–5 year growth trajectories (CAGR), and domestic vs. export share — with the source cited alongside each figure, drawing on FAOSTAT, the International Olive Council (IOC), the ITC Trade Map, the OEC trade observatory, sectoral market-research reports (Fortune Business Insights, Grand View Research, Wiseguy Research, Research & Markets, Future Market Insights), and Algerian commodity offices (HCDS, INRAA, ONS and MADRP).

Table 6 Indicative market analysis for the six climate-resilient value chains

Value chain	Current market size — Algeria	3–5 year growth trend	Domestic vs. export share (Algeria)
1-Prickly pear (<i>Opuntia</i>) — fresh fruit, seed oil, cosmetic derivatives	Several wilayas, including Souk Ahras started to grow massively for, prickly pear seed oil production, which reached 1,000 litres in 2018, up from 300 litres in 2017, with plans to increase production seven-fold. One ton of grains is needed to produce one litre of oil.	Prickly Pear Seed Oil Market grew from USD 132.23 million in 2025 to USD 137.66 million in 2026 [Research & Markets] Future Market Insights projects the prickly pear seed oil nutricosmetic market to grow at 9.4% (CAGR (2026–2036) [fmi])	The value chain is still at an early stage of development, with most processing undertaken by small enterprises and cooperatives. Algerian prickly pear oil is exported to France, Germany and Qatar, with plans to sell in the United States. [phys.org]
2-Olive and olive oil	Algeria olive production (~890,000 tones/year (average annual production varies between about 700,000 and over 1 million tones- 8th largest global produce [ioc] Algeria's olive-growing area exceeded 440,000 ha in 2022 [djazagro.com] Production increased by 30.3% in 2022, after a 34.7% decline in 2021, indicating a recovery but also strong climate/seasonal variability [algerie-eco.com]	Global olive oil market: Approx USD 19.4 billion (2024), projected to reach USD 30.6 billion by 2032 [Fortune]	~90% domestic consumption; ~10% export (largely to EU and Maghreb specialty markets) [ioc]
3-Rosemary-essential oil	Algeria possesses abundant wild and cultivated Rosemary resources. Rosemary essential oil is produced by SMEs and cooperatives-no available official national production statistics.	Rosemary essential oil market projected to grow by 2035, at a CAGR of 5.0% [wiseguy]	Algeria is one of the largest exporters of essential oils. In 2024, it exported \$74.7k of essential oils, making it the 130th largest exporter. In 2023, main export destinations were France, Canada, Niger, Luxembourg and Poland [oec], growing export potential (Europe) [cbi]
4-Wool (greasy fleece, carpet and	Algeria's wool production reached 35,270 tones in 2024 [FAOSTAT] Greasy wool production was 0.667% lower than the	Global handicrafts market will grow at a 4.9% CAGR (2025–2030) [grand view research]	~85% domestic (carpets, handicrafts, Babar carpet region); ~15% export (raw wool to Turkey, EU).

handicraft segments)	previous year in 2024; the historical high was 38,373 tones in 2016, indicating relatively stable but slightly declining recent production. [helgilibrary.com]		
5-Alfa grass / Esparto paper pulp, handicrafts, cellulose	Algeria: world's largest natural reserves (~4 million ha, HCDS). Production fallen from over 90,000 tones annually in the 1960s to negligible levels after 2012) [AF] . Alfa's ecological and socio-economic importance in Algeria's steppe zones and its role as a fiber resource [researchgate.net] . Regression of alfa-dominated steppe vegetation due to overgrazing and recurrent droughts [researchgate.net] .	Products based on esparto handicrafts and community-based eco-tourism are expected to grow by approximately 5–8% annually over the medium term [grandviewresearch] , European paper and board production decreased by 1.55 [cepi] .	~70% domestic (handicrafts, informal use, some pulp); ~30% export (residual EU paper industry, niche handicrafts). Algeria's wool exports were expected to rise from USD 1.8 million in 2021 to around USD 2.4 million by 2026, with average annual growth of 4.4% since 2013 [reportlinker.com]
6-Peppermint—essential oil, dried herb	Peppermint cultivated in Algeria on a limited scale, primarily for medicinal, aromatic, and culinary uses. Algeria's peppermint market is characterized by reliance on imports to meet domestic demand [indexbox.io]	Global peppermint oil market will grow from USD 265.0 million in 2026 to USD 448.5 million by 2034, at a 6.8% CAGR. [fortunebusinessinsights]	Commercial essential oil production remains small and fragmented, with domestic demand supplemented through imports, mainly from Egypt, India and Pakistan. [indexbox.io]

Activity 3.1.2: Establish Partnerships Between Producers and Private Sector

This activity develops structured partnerships between NWFP and livestock producer associations - including women's organizations - and private companies through contractualization and commercial agreements. Led by FAO and MADRP, it engages private enterprises for formal partnerships, delivers targeted training with focus on women for priority products, develops collective action mechanisms, and engages financial institutions to improve access to finance for value chain actors.]

Producer–private sector partnerships function as a climate-resilience mechanism: (i) pre-agreed off-take contracts at minimum prices buffer producers against the climate-driven local market volatility that has historically forced distress sales during droughts; (ii) anchor-buyer commitments

provide the demand certainty needed to attract continued investment in climate-resilient production practices; (iii) formal partnerships unlock access to traceability, certification and resilience standards that producers cannot achieve individually. Climate-additional benefits: price stability across drought years; demand certainty for climate-resilient production; structural protection against climate-driven supply-chain disruption. Broader commercial outcomes are derivative co-benefits.

Activity 3.1.3: Provide Legal and Technical Assistance for Creation of Micro-Enterprises

This activity provides integrated legal and technical assistance for creating micro-enterprises producing, marketing, and certifying NWFPs and livestock products, with focus on rural women and youth. Led by MADRP, it covers legal assistance for enterprise registration, cooperative formation, and regulatory compliance, alongside technical assistance for production improvement, post-harvest handling, and certification alignment, with capacity building of local service providers for long-term sustainability.

Micro-enterprises are structured as climate-adaptive livelihood vehicles: diversified portfolios; flexible product mixes that can be reweighed in response to drought; certified operations that retain market access during climate shocks; cooperative structures that pool risk across multiple households. Climate-additional benefits: diversified household-income portfolios that reduce climate-vulnerability concentration; cooperative risk-pooling that buffers individual households against climate shocks; certified market access that survives climate-driven local market disruptions. Broader entrepreneurship and employment outcomes are derivative co-benefits.

Activity 3.1.4: Facilitate Access to Microcredit and Subsidized Finance

This activity facilitates beneficiary access to innovative financial products (microcredit, subsidized loans, guarantees, etc.) already available in the Algerian market by public banks (BADR, FGAR, CNMA, ANGEM, ANADE) and private banks, thus aiming to address structural barriers around the lack of awareness about financial products by smallholder farmers, pastoralists, women and youth. Led by FAO, this activity delivers a two-stream training package: (a) training aimed at farmer beneficiaries (women, youth, pastoralists and smallholders) providing financial literacy sessions, hands-on business-plan preparation and financial-record keeping workshops, coaching and matchmaking meetings with lenders; and (b) training for financial sector beneficiaries (local branch staff of participating public and private banks) on climate change impacts and adaptation measures, and on the improved risk profile of beneficiary farmer groups, so the latter are recognized by the lenders as attractive and lower-risk investment opportunities. LoIs / MoUs with the public financial institutions BADR, FGAR and CNMA expressing intent to send staff to the training are expected by end of Year 1. LoIs/MoUs are not a sine qua condition for the deployment of innovative financial products as these are already available in the market.

Standard agricultural credit typically fails climate-vulnerable agro-pastoralists, who are not aware about the existing financial tools. This activity addresses that gap by connecting beneficiaries to existing bank products. Climate-additional benefits are financial inclusion of climate-vulnerable households previously excluded by standard credit; reduced household debt distress during drought years; and sustained adoption of climate-resilient practices during climate shocks.

Activity 3.1.5 Provide wilaya-level technical assistance and equipment maintenance follow-up

This activity will support the implementation of on-the-ground investments, providing the selected beneficiaries of Component 3: Climate-Resilient Livelihoods, Value Chains and Sustainable Finance with procured equipment. Each consultant will cover two wilayas, respectively in the West, Center and East, ensuring the availability of maintenance, following up on technical training and linking VC beneficiaries with the local committee and the PMU.

Output 3.2: Climate-Resilient Service Delivery and Access to Clean Energy Improved

This output strengthens climate resilience and livelihood diversification of rural households through a complementary package of productive and energy access interventions: establishing rustic fruit orchards, deploying small-scale livestock modules and hydroponic forage systems, promoting circular

economy solutions for agricultural residues, and installing solar energy kits for isolated rural households.

Activity 3.2.1: Provide Rustic Fruit Cultivation for Pastoral Farms

The establishment of hardy fruit tree cultivation to support small and medium-sized pastoral farms across a total area of 5,974 hectares distributed across six wilayas contributes to income diversification, improved soil health, and increased climate resilience for a significant number of households. The focus is on hardy species adapted to local conditions and requiring little water, such as almond, olive, apricot, fig, pistachio, and caper trees.

Fruit tree cultivation is generally recommended for agricultural land used for annual crops and therefore susceptible to erosion, or for land used for agricultural purposes in forested areas (in small quantities for the benefit of local residents).

Planting densities should be between 100 and 150 plants/ha (maximum), depending on the availability of water for supplemental irrigation during the summer or periods of drought. Planting holes should be dug mechanically (using an excavator or backhoe) and be wide (0.8 to 1 meter deep). Seeds should be nursery-grown varieties intended for cultivation throughout their life cycle (soil preparation, fertilization, watering, pruning, and phytosanitary treatments), and may come from other regions. For grafting, the selection of suitable orchards (scions) is necessary.

The value chain aimed at the exploitation of olive groves and the processing of olive oil in the green dam area will benefit from a specific planting program on an area of 3600 ha planned at component 3 which would be added to the overall objective of hardy fruit planting of the project.

Windbreak network: This action to protect rangelands and agricultural lands from the effects of wind erosion will be implemented along a 322 km stretch distributed across five provinces of the AGD region (Tébessa 56 km, Khenchela 20 km, Djelfa 97 km, El Bayadh 44 km, and Naâma 125 km). Wind erosion causes the displacement of fine soil particles, depleting the soil and disrupting the uniformity of plots in the agro-pastoral area. In addition to this protection, this action will create a microclimate (reducing evapotranspiration) that promotes crop growth.

For enhanced protection, the barrier will consist of two wooded strips. This technique strengthens protection against strong winds. This involves planting wooded strips 8 to 10 meters wide around the area in question, with a spacing of 2 to 2.5 meters between rows and 2 meters between plants. The species to be used are: Facing the windward side, a strip of two rows of casuarina, which has very rapid growth (2 meters in 2 years), and facing the perimeter, a strip of two rows of *Acacia cyanophylla*.

Activity 3.2.2: Deploy Small-Scale Livestock Modules for Rural Households

This soilless farming activity contributes to the preservation of natural resources, improves biodiversity, diversifies incomes, and increases the climate resilience of a significant number of households. It is primarily intended for rural women who will benefit from 120 poultry farming modules (each module consists of 30 units) and 120 beekeeping modules (each module consists of 5 modern hives), for a total of 240 beneficiaries and 960 people if members of the rural households involved are included.

This activity will strengthen the climate resilience and income diversification of rural households by deploying off-ground and small-scale livestock systems that reduce pressure on natural rangelands, benefiting 5,334 rural households - primarily women - across the six targeted wilayas. The activity will also support the conservation and promotion of locally adapted indigenous breeds, aligning climate adaptation with biodiversity conservation objectives.]

Rural women in the six provinces are involved in these two types of activities, which are highly suitable for adapting to climate change. These two activities, offered at a rate of 20 modules per pilot municipality (10 for poultry farming and 10 for beekeeping), will bolster household incomes and complement restoration efforts in various ecosystems, particularly agro-sylvo-pastoral ones.

Activity 3.2.3: Install Hydroponic Forage Production Systems

This soilless activity contributes to income diversification, improved food balance (FU needs/FU availability) and increased climate resilience for a significant number of households. This activity will strengthen the dietary balance and climate resilience of small and medium livestock farmers by reducing dependence on degraded rangelands through the introduction of hydroponic forage technology.

The project involves acquiring and installing 240 hydroponic barley chambers, each with a capacity of 540 kg, capable of meeting the feed requirements of 108 sheep equivalents, for a total of 25,146 equivalents. This can be considered a reduction in pressure on grazing lands and alfa grass steppe. All the wilayas (provinces) within the AGD will benefit from these hydroponic barley units, particularly the 12 pilot municipalities, at a rate of 2 municipalities per wilaya (40 units per wilaya or 20 units per pilot municipality).

This innovative technique offers a number of advantages (ITELV, 2013) such as

- Water conservation (water needs are greatly reduced since smart equipment optimizes indoor temperature, humidity, and water consumption, all thanks to advanced technology and a micro-nebulization system that also reduces consumption)
- The farmer will not need to dedicate large spaces to the equipment, which has small dimensions (a few square meters, depending on the quantities to be processed, is sufficient).
- The advantage over time is due to year-round green fodder production, regardless of climatic conditions and geographical area.
- The fodder produced is sanitized, insect-free, and fungus-free.
- In terms of production costs, the investments required to produce hydroponic green fodder will depend on the level and scale of production. Analysis of production costs reveals that, considering the risks of droughts and other adverse weather events, animal losses, and the unit costs of the basic production factor (seed), hydroponic green fodder is an economically viable alternative that deserves consideration.

Other sources of additional fodder production for small-scale livestock farmers will be supported by the project, following the same approach as for hydroponic units. This involves cultivating barley on floodplains (5-hectare units) at 360 sites, as well as establishing 5-hectare alfalfa production units, for a total of 240 units to be identified across the project's six provinces, particularly in the 12 targeted pilot municipalities.

During project implementation, operation and maintenance costs of hydroponic chambers will be fully covered by the project. Beneficiaries will receive practical training on the operation, routine maintenance and basic troubleshooting of the hydroponic systems to ensure that they are able to independently operate and maintain the units after project completion.

Upon project completion, ownership and day-to-day responsibility for the hydroponic units will be transferred to the beneficiary households (and/or producer groups, where applicable). Routine maintenance, consumables and the replacement of minor spare parts will be financed by the beneficiary households through the additional income generated by improved livestock productivity and reduced feed costs resulting from the hydroponic systems.

As several Algeria-based companies already manufacture and service these production units, spare parts, consumables and technical servicing will remain locally available after project completion. In addition, local agricultural directorates, extension services and farmer cooperatives will continue providing technical support and facilitating access to maintenance services whenever required.

These measures ensure that the hydroponic units remain technically, institutionally and financially sustainable beyond the lifetime of the project, without relying on continued project financing.

Activity 3.2.4: Provide Circular Economy Solutions for Date Production and Agro-Processing residues

This activity aims at the exploitation and valorisation of by-products of the palm grove which can constitute a source of production and employment as well as the valorisation of its waste.

This activity transforms agricultural residues into productive resources, promoting circular economy principles for income diversification and sustainability. Led by MADRP and wilaya agricultural directorates, in coordination with HCDS, farmer cooperatives, and INRAA, it establishes date processing and packaging facilities, converts palm grove residues into livestock feed supporting women's engagement in bio-based activities, and valorizes olive oil production residues for additional income streams across the project zones.]

Waste valorisation will also extend to olive groves, whose planting programs have been supported and encouraged by the State among rural populations in the Green Dam area. This will notably involve processing olive pomace for livestock feed production, thereby reducing pressure on grazing lands and enabling adaptation to the effects of climate change.

Activity 3.2.5: Deploy Solar Energy Kits for Isolated Rural Households

This activity contributes to improving the living conditions and livelihoods of rural households (especially those in the most isolated areas) by developing solar energy to provide clean, greenhouse gas-free electricity. This initiative will cover the six provinces included in the project, where 190 rural households will receive solar kits. This activity will improve the living and subsistence conditions of the most isolated rural and agro-pastoral households by providing access to clean, non-GHG-emitting electricity through solar energy systems. A total of 190 solar energy kits will be installed across six wilayas - El Bayadh, Djelfa, Naâma, M'Sila, Khenchela, and Tébessa - reducing dependence on fossil fuels and lowering household greenhouse gas emissions.]

6.3. Project beneficiaries and employment

The calculation of the number of direct and indirect beneficiaries of the project was carried out according to the guidance note provided by the FAO. According to this note, the implementation of the project over seven (7) years will result in 1,084,103 beneficiaries (Direct 142,433 + Indirect 941,670), including 489,064 women (45%), distributed as described below.

6.3.1. The direct beneficiaries of the project

In number **142,433 of which 55,001 are women (38.6%)**, the direct beneficiaries are distributed as follows:

- 35,810 people, including 7,162 women, (i) directly concerned and (ii) mobilized within the framework of the implementation of the project's actions;
- 106,623 people, including 49,2% women, representing members of the households benefiting from permanent or equivalent employment creation at a rate of six (6) people/household according to the household survey carried out at the end of 2022 in the 12 pilot municipalities of the project.

The individuals directly concerned are beneficiaries of targeted adaptation interventions designed to reduce their vulnerability to increasing climate variability and long-term climate change, particularly rising temperatures, erratic rainfall, and more frequent droughts. These include the establishment of pastoral concessions, fruit tree planting, promotion of six climate-resilient value chains, livestock support, seedling production, and supplementary fodder production.

These interventions will deliver concrete adaptation benefits by strengthening the adaptive capacity of vulnerable populations and reducing their exposure and sensitivity to climate risks. Secured pastoral concessions and improved fodder production systems will reduce the impact of drought and seasonal pasture shortages, lowering livestock mortality and stabilizing incomes. The introduction of drought-tolerant fruit trees and the diversification of value chains will reduce dependence on rain-fed systems and provide more reliable and climate-resilient sources of food and income.

Seedling production and ecosystem restoration activities will contribute to improved soil structure, water retention, and microclimate regulation, thereby enhancing the resilience of production systems to climate stress. In parallel, integrated livestock and agricultural practices will increase resource efficiency and enable households to better manage climate variability.

Overall, these measures will enhance beneficiaries' capacity to anticipate, absorb, and recover from climate-related shocks, while supporting a shift toward more climate-resilient livelihood systems.

This component will also benefit managers and technical staff through Component 1, by strengthening climate information systems, territorial knowledge, and decision-making tools. This will improve planning and implementation of adaptation strategies at the local level and ensure the sustainability and scalability of project impacts.

Action (ii) Mobilization concerns the individuals who will be involved in implementing the program to restore the various ecosystems, the water mobilization infrastructure, and improve the living conditions of the population, particularly through opening up access to isolated areas and protecting infrastructure. It will affect all supervisory staff and workers mobilized to carry out the activities during the project's implementation.

The calculation of the number of beneficiaries for this category is based on the employment standard specific to each activity and the volume to be achieved.

6.3.2. Indirect beneficiaries

They number **941,670 people, including 434,063 women**, counted as follows:

- **149,456 farmers and livestock breeders** from the other municipalities of the project (89 municipalities) because they will benefit from the information that will be given by the project and from the experience that will be capitalized by the farmers and livestock breeders placed in the category of direct beneficiaries of the project, in particular those concerned by the fruit planting program and those benefiting from the promotion of the six value chains, small livestock units and production of supplementary fodder units.
- **792,214 inhabitants, including 46% women** (representing the households of farmers and livestock breeders from the 149,456 farmers and livestock breeders mentioned previously (those from the 89 municipalities);

It should also be noted that the actions to restore the territories and enhance the value of the products would allow the entire population of the AGD area to benefit from the improved ecosystem services that will be provided. (Population of the six (6) wilayas: 4.24 M inhabitants.

The ratio of GCF grant amount to total number of beneficiaries is 38 USD / beneficiary (43 million USD / 1,084,103 beneficiaries). It is USD 291 / beneficiary in the case of the GCF grant / number of direct beneficiaries' ratio.

The population of AGD is young, with almost half of its inhabitants under 19 years old. The gender distribution of AGD residents as of December 31, 2020, shows a slight predominance of males, representing 50.8% of the total population. Finally, a detailed breakdown of the number of direct and indirect beneficiaries of the project is provided for each component.

Note that the number of direct beneficiaries has increased at the C3 level following the cancellation of the tannery activity and the new calculation made concerning the artisanal units for Alfa (still for the same value chain).

Furthermore, the project, during its implementation over 7 years, will create a significant number of jobs, potentially around 9,332 PEE (permanent employment equivalent), generated by the implementation of labour-intensive activities (planting, water mobilization, construction of various equipment, etc.) requiring 1,747,604 workdays.

The project approach will also be implemented at the level of the 86 municipalities of the 7 remaining wilayas of the green dam (Laghouat, Bouira, Bordj Bou Arreridj, Sétif, Batna and Biskra) but which are not integrated into the project with the FVC.

Table 7 Project Beneficiaries

Designation	Direct beneficiaries			Indirect beneficiaries			Total
	Targeted	Households	Total BD	Targeted	Households	Total BI	
Total	35,810	106,623	142,433	149,456	792,214	941,670	1,084,103
including women	7,162	47,839	55,001			434,063	489,064
%		45%	38.6%			46%	45%

Table 8 Project Beneficiaries (Component)

Type of beneficiaries	Direct beneficiaries			Indirect beneficiaries			Total Beneficiaries
Components	Targeted	Households	Total BD	Targeted	Households	Total BI	Total
Component 1. The regulatory framework and enabling environment for climate-resilient land management are strengthened.	18,070	180	18,250	68,918		68,918	87,168
Component 2: Ecosystem restoration and climate-resilient land management	6,247	37,480	43,727	80,538	515,646	596,184	639,911
Component 3: Climate-resilient livelihood, value chains and sustainable finance	11,494	68,962	80,456	0	276,568	276,568	357,024
Total	35,810	106,623	142,433	149,456	792,214	941,670	1,084,103

6.4 Social and environmental safeguards

The major challenges Algeria faces in terms of climate change make the integration of adaptation and mitigation measures into development plans essential. Algeria's commitment in its Intended Nationally Determined Contribution (submitted to the UNFCCC in 2015) aims to reduce its greenhouse gas emissions by between 7% and 22% by 2030. Algeria's updated Nationally Determined Contribution (NDC) further reinforces these commitments, with the AFOLU sector identified as a priority area for both adaptation and mitigation action.

The Project *"Improving Climate Resilience in the Steppe and Dry Forest Areas of the Algerian Green Dam"* is therefore part of a broader global picture, as the project's results, particularly regarding climate change adaptation and mitigation, contribute to global processes, including the United Nations Framework Convention on Climate Change (UNFCCC) and its related agreements and processes, and the achievement of the Sustainable Development Goals. Improved land use and biodiversity also contribute to the United Nations Convention on Biological Diversity (CBD) and the United Nations Convention to Combat Desertification (UNCCD).

The project also aligns with the national climate plan which reflects the particular attention paid by the Algerian government to the need for adaptation to climate change, and the crucial issue of the contribution of all governmental and non-governmental partners to this process within the framework of collective and effective action.

In terms of social and environmental safeguards, the project took into account the approach that establishes the risk assessment linked to Social and Environmental Standards (ESS), as defined by the FAO, developed in **Annex 6**. It finds its justification in the challenges due to climate change and faced by the Algerian Green Dam, in particular the desertification of steppe and forest areas that are home to many small farmers and herders.

The Environmental and Social Management Plan (ESMP) for this project is prepared in accordance with FAO's Environmental and Social Management Guidelines, the GCF's Environmental and Social Safeguards Standards, and national EIA legislation. The ESMP identifies the project's policy drivers, activity selection criteria, probable environmental and social impacts, and mitigation measures for identified risks. An environmental and social screening is conducted for the activities using a checklist to identify those that may require mitigation measures.

The project aims to improve the climate resilience of local population and their associated livelihoods, including those linked to livestock and non-wood forest product (NWFP) value chains, within the framework of an integrated three outcomes:

- Outcome 1 - Enhanced Enabling Environment for Climate-Resilient Ecosystem Management;
- Outcome 2 - Climate Resilient, Low-Emission Restoration and Sustainable Land Management of Agro-Sylvo Pastoral Ecosystems Outcome 3 - Enhanced Resilience and Income Diversification of Local Livelihoods.

The project will be executed by the DGF in collaboration with other national partners.

6.4.1 Classification of the risks of the proposal

According to the FAO's Environmental and Social Risk Classification, the project presents a moderate risk. (According to the FAO's Environmental and Social Management Guidelines) Projects with a moderate risk are defined as follows:

- **Project with potential environmental and/or social impacts identified.**

Project activities include afforestation/reforestation and restoration. Native tree species, or non-native species already present in the country and not invasive, will be used for activities in both steppe and forest areas. Selected species have been identified from among endemic/native and naturalized species not listed in the IUCN's list of invasive species.

A detailed species selection was carried out based on ecological and climatic trends and projections for the target areas. Regarding economic sustainability, the project will invest in forest restoration in state-owned forest areas where the primary purpose of the forests is not direct economic use but rather the ecosystem services provided to local communities and the country as a whole.

As for incentives, trees will be planted only on designated public lands and will be maintained by the relevant public agencies. Potential impacts could include a temporary reduction in access to the areas to allow for vegetation growth and survival.

These activities may require small-scale irrigation and the use of fertilizers. Income diversification activities may have environmental impacts, but these can be mitigated.

- **The potential impact is not unprecedented in the project area.**

The project area is located in an area that is part of the national Green Dam project;

There are activities, in or near the areas targeted by the ICR-AGD, which are being implemented and on which this project draws lessons and builds, including experiences with potential impact.

- **The potential impacts are limited to the project's footprint.**

If any of the identified potential impacts are confirmed, they will occur within the project's intervention area. The positive impacts related to climate change resilience are relevant at the national, regional, and global levels.

- **The potential impacts are neither irreversible nor cumulative.**

The potential impacts are reversible and non-cumulative. The components include mitigation measures.

Any potential negative impacts can be resolved by using good practices. Recognized management or pollution reduction practices have been demonstrated to have been used successfully in the project areas (upstream and downstream). These will be addressed through mitigation measures (e.g., ensuring stakeholder engagement, following best practices, obtaining necessary technical permits).

6.4.2. Green Climate Fund Guarantee

The GCF has adopted the performance standards (PS) and implementation guidelines of the International Finance Corporation (IFC). There are eight IFC performance standards that address key environmental and social issues that must be considered when starting a project, using international best practices. This table lists them and aligns them with the nine FAO standards of 2022.

Table 9: FAO/GCF Standards Alignment

IFC standards performance	FAO Standards
1) Risk and impact assessment	NES 3: Reducing risks related to climate change and disasters
2) environmental & social management	NES 6: Gender equality and prevention of gender-based violence
3) Work and working conditions	NES 4: Decent Work
4) Resource efficiency and pollution prevention	NES 2: Efficient use of resources and pollution prevention and management
5) Community health, safety and security	NES 5: Health, protection and safety of populations
6) Land acquisition and involuntary resettlement	NES7: Land Tenure, Displacement and Resettlement
7) Biodiversity conservation and sustainable resource management, natural living	NES 1: Preservation of biodiversity and sustainable management of natural resources
8) Indigenous Peoples	NES 8: Indigenous People
9) Cultural Heritage	NES 9: Cultural Heritage

6.4.3. FAO Guarantee

The project underwent an environmental and social assessment in relation to FAO environmental and social standards; the application of these standards is justified in the following table:

Table 10 Justifications in relation to FAO environmental and social standards

ESS	Triggered (Yes/No)	Why (main aspects of potential risks)
ESS 1 – Biodiversity & Natural Resources	Yes	Component 2 restoration (reforestation, rangeland rehabilitation, dune fixation) and land-use changes can cause localized habitat disturbance, species selection risks, and biodiversity impacts if not well planned; some activities may occur near sensitive/protected areas.
ESS 2 – Resource Efficiency & Pollution	Yes	Component 2 water mobilization (boreholes, reservoirs, irrigation) increases pressure on scarce water resources and may alter hydrology; Components 2–3 may involve fertilizers/pesticides and generate waste from construction and processing, with risks of soil/water contamination.
ESS 3 – Climate Change & Disaster Risk	Yes	The project aims to enhance resilience (positive), but Component 2 resource-use changes (water/land) may affect non-beneficiaries sharing resources, and Component 3 technologies could create dependency if sustainability is not ensured.
ESS 4 – Decent Work	Yes	Components 2–3 involve labor-intensive activities (forestry, construction, agro-processing) with occupational health and safety risks; need to ensure fair labor conditions and safe workplaces.
ESS 5 – Community Health, Safety & Security	Yes	Component 2 infrastructure and works (tracks, water systems, erosion control) may expose communities to construction hazards and environmental health risks; ecosystem changes may affect services (e.g., erosion control, water quality).
ESS 6 – Gender Equality & GBV	Yes	Structural gender gaps in access to land, finance, and decision-making may lead to unequal benefit distribution under Components 2–3; risk of exclusion and need for gender-responsive targeting and safeguards.
ESS 7 – Land Tenure & Access	Yes	Component 2 restoration may temporarily restrict access to grazing land and natural resources, creating livelihood impacts and potential conflicts, even though no physical displacement is expected.
ESS 8 – Indigenous Peoples	Yes	While Algeria does not formally recognize Indigenous Peoples, vulnerable pastoral groups exist and require inclusion measures
ESS 9 – Cultural Heritage	Yes	Component 2 earthworks and land interventions may affect unknown cultural or archaeological resources and local cultural landscapes if not properly managed.

This project was designed to have positive environmental and social outcomes. Key interventions such as strengthening governance of natural resource management, reforestation, and pasture rehabilitation will contribute to climate change mitigation through carbon sequestration and will also provide co-benefits for adaptation by creating opportunities for income diversification and increasing and improving capacity.

The project will not fund or be involved in activities classified as high Risk. However, actions classified as moderate risk according to the SSE screening are identified in Annex 6, along with the main activities and potential problems that may arise from these actions, as well as the actions that must be ensured or the mitigation measures to be taken to avoid negative consequences. Regarding potential impacts on the workforce, such as risks and impacts on occupational health and safety, the project operates in accordance with national laws.

7. MONITORING, REPORTING AND VERIFICATION (MRV)

In alignment with GCF requirements, the project will establish a comprehensive Monitoring, Reporting and Verification (MRV) framework to track climate adaptation outcomes, GHG emission reductions, and socio-economic co-benefits across all three project outcomes. The MRV framework will integrate the following elements:

Climate and Environmental Monitoring: The project's climate monitoring infrastructure - including the agrometeorological station network, the climate and ecological observatory, and the integrated GIS platform - will generate continuous, spatially referenced data on vegetation cover change, soil carbon dynamics, rangeland productivity, water availability, and forest health. Remote sensing analysis using satellite imagery (Sentinel-2, Landsat) will complement ground-based measurements through permanent sample plots across all six wilayas.

GHG Accounting and Carbon MRV: GHG emission reductions and carbon sequestration will be monitored using the NEXT carbon assessment tool, consistent with the Funding Proposal. The MRV system will track biomass carbon stocks through periodic forest inventory and allometric equations, soil organic carbon changes through stratified sampling, avoided emissions from reduced land degradation and fire management, and emission reductions from clean energy deployment. Verification will be conducted by independent third-party assessors in line with GCF and IPCC AFOLU guidelines.

Adaptation and Socio-Economic Monitoring: Household-level resilience indicators will be tracked through baseline, mid-term, and end-line surveys, covering livelihood diversification, income changes, , women's economic participation, and adoption rates for climate-resilient practices. Gender-disaggregated data will be collected across all indicators to monitor progress against the Gender Action Plan targets.

Reporting: The PMU will prepare semi-annual progress reports and Annual Performance Reports (APRs) in accordance with GCF requirements. A comprehensive mid-term review will be conducted in Year 4 to assess implementation progress, validate the theory of change assumptions, and recommend adaptive management adjustments. An independent terminal evaluation will assess the achievement of project outcomes and the sustainability of results.

8. INSTITUTIONAL CONTEXT FOR THE IMPLEMENTATION OF THE PROJECT

Several institutions and bodies are responsible, in whole or in part, in either an executive or consultative capacity, for ensuring the implementation of the project *"Improving climate resilience in the steppe and dry forest areas of the Algerian Green Dam."* These entities operate at different levels. In addition, several partner institutions of the forest administration, at both central and local levels, participate in or support decision-making related to natural areas, particularly those affected by erosion and/or desertification.

8.1. Main institutions involved in the project

8.1.1. National Institutions

8.1.1.1. The National Coordination Body for Combating Desertification and Reviving the Green Dam

The revitalization of the Green Dam rehabilitation and expansion program was facilitated through the establishment of a coordinating body created by Executive Decree No. 20-213 of July 30, 2020. This body is responsible for ensuring intersectoral coordination of the national program to combat desertification and the Green Dam revitalization action plan. It comprises a scientific committee responsible for research related to its missions, a technical secretariat provided by the services of the Directorate General of Forests, and local committees responsible for implementing the national program and action plan.

The missions of this coordinating body, established on October 25, 2021, include:

- Contributing to the development of the national strategy and program to combat desertification and mitigate the effects of drought;
- Ensuring coordination and evaluation of the implementation of the national program to combat desertification and mitigate drought;
- Ensuring the coherence of sectoral programs in combating desertification and mitigating drought;
- Ensuring implementation of the United Nations Convention to Combat Desertification;
- Reviewing and validating the annual report on the status of implementation of the national program;
- Reviewing and validating the national report on implementation of the Convention, prepared in consultation with relevant sectors;
- Monitoring the implementation of resolutions adopted at Conferences of the Parties to the Convention;
- Designating the relevant sector(s) to participate in Conferences of the Parties.

Regarding the revival of the Green Dam, the body is responsible for:

- Reviewing and validating the action plan for rehabilitation, extension, and development of the Green Dam;
- Monitoring and evaluating implementation of the action plan;
- Reviewing and validating the annual progress report.

Additionally, the coordinating body is responsible for:

- Ensuring synergy and proper functioning of local committees;
- Examining and issuing opinions on legislative and regulatory texts related to desertification, drought mitigation, and the Green Dam;
- Identifying training and research needs;
- Determining priorities for financial assistance and technical cooperation.

The coordinating body, chaired by the Minister in charge of forests or a representative, includes representatives from 14 ministries, 11 organizations, and 3 civil society representatives, including the federation of breeders.

8.1.1.2. The Intersectoral Coordination Commission for Combating Desertification and Reviving the Green Dam

The commission is composed of senior officials from eight sectors whose designated members form the project's steering committee. This committee was officially established on October 27, 2022, at the headquarters of the Directorate General of Forests.

Its missions include:

- Reviewing the Green Dam project and its implementation framework;
- Defining intervention methods, task allocation, timelines, and achievement of objectives;

- Proposing improvements;
- Monitoring implementation of the action program;
- Ensuring continuous follow-up;
- Organizing evaluation meetings;
- Conducting joint field missions;
- Organizing information and awareness activities.

8.1.1.3. The Ministry of Agriculture, Rural Development and Fisheries (MADRP)

Under current regulations, the MADRP is responsible for developing and overseeing national policy in agriculture, rural development, forestry, and natural areas.

Executive Decree No. 20-128 (May 21, 2020) expanded its responsibilities to include the development and implementation of the national strategy to combat desertification and the Green Dam action plan.

Its forestry-related missions include:

- Management and expansion of forest and alfa grass resources;
- Combating desertification and erosion;
- Conservation of ecosystems and biodiversity;
- Development of forest ecosystem services;
- Supporting entrepreneurship in agriculture and forestry.

8.1.1.4. The Ministry of the Environment and Quality of Life (MOE)

Within an intersectoral framework, the Ministry is responsible for environmental policy and sustainable development.

Its missions include:

- Designing and implementing environmental strategies;
- Developing planning tools;
- Protecting ecosystems;
- Leading climate change mitigation actions;
- Promoting environmental awareness;
- Supporting green and circular economy initiatives;
- Promoting biotechnology and ecolabels;
- Supporting environmental associations.

8.1.1.5. The Ministry of Water Resources (MRE)

The Ministry is responsible for:

- Assessing water quantity and quality;
- Conducting hydrogeological and hydro-climatological studies;
- Identifying water resources and infrastructure sites;
- Conducting agro-pedological studies.

8.1.1.6. The Ministry of the Interior, Local Authorities and Spatial Planning (MICLAT)

MICLAT oversees territorial cohesion policies and coordination with local authorities.

For the project, it will rely on rural animation units within municipal assemblies to facilitate intersectoral coordination and implementation.

8.1.1.7. The Directorate General of Forests (DGF)

The DGF is the main executive body responsible for forest policy implementation. As lead executing entity, the DGF possesses the mandate and field presence for forest management across the Green Dam landscape. However, institutional capacity assessments conducted during project preparation identified gaps in climate risk assessment, carbon accounting, digital monitoring systems, and participatory landscape restoration approaches. The project addresses these gaps through targeted training in GIS/remote sensing, climate-adapted silviculture, MRV systems, and community engagement methodologies under Activities 1.2.7 and 1.1.4.

Its missions include:

- Managing forest and natural resources;
- Combating desertification;
- Conserving biodiversity;
- Supporting rural populations;
- Enforcing forestry regulations;
- Monitoring forest resources;
- Conducting awareness programs.

8.1.1.8. The Directorate for Combating Desertification and the Green Dam

This directorate is responsible for:

- Developing national strategies and action plans;
- Implementing desertification and Green Dam programs;
- Coordinating national and international commitments;
- Supporting technical implementation.

8.1.1.9. The National Climate Change Agency (ANCC)

The ANCC promotes integration of climate change into development planning and coordinates sectoral actions related to climate change. The project will significantly strengthen ANCC's capacity in AFOLU carbon accounting, MRV for carbon market, NDC tracking, and carbon credit verification systems through Activities 1.1.2 and 1.1.3, positioning the agency to manage Algeria's participation in regional and international carbon markets beyond the project period.

8.1.1.10. The Renewable Energy Development Centre (CDER)

CDER develops renewable energy technologies and supports national research programs in solar, wind, geothermal, and biomass energy.

8.1.1.11. The Algerian Space Agency (ASAL)

ASAL develops space technologies and supports national development through scientific and technological applications.

8.1.1.12. The National Agency for Entrepreneurship Support and Development (NASDA)

NASDA supports young entrepreneurs through:

- Business creation support;
- Training and advisory services;
- Access to information and partnerships.

8.1.1.13. The National Agency for Water Resources (ANRH)

ANRH is responsible for:

- Monitoring water and soil resources;

- Data collection and analysis;
- Resource protection.

8.1.1.14. The National Agency for Nature Conservation

This agency ensures inventory, conservation, and protection of biodiversity.

8.1.2. Regional and local institutions

8.1.2.1. The High Commission for the Development of the Steppe (HCDS)

HCDS manages development of steppe areas and pastoral systems, focusing on: HCDS holds deep expertise in rangeland management and pastoral development but requires strengthening in climate-resilient rangeland management, rotational grazing system design, and integration of traditional pastoral knowledge with scientific monitoring. The project builds HCDS capacity through Activity 2.1.2, which operationalizes Algeria's first formalized rotational grazing system in close coordination with HCDS field teams:

- Rangeland restoration;
- Water access for livestock;
- Forage production;
- Community-based management;
- Livelihood diversification.

8.1.2.2. The Regional Commission for Agricultural Development in Saharan Areas (CDARS)

CDARS promotes agricultural development in Saharan regions through:

- Environmental studies;
- Resource assessments;
- Development planning;
- Support to agricultural production.

8.1.2.3. The Wilaya Forest Conservation (CFW)

Responsible for local forest management, protection, and development.

8.1.2.4. Wilaya Environment Directorate

Responsible for environmental protection, climate action, and awareness at the local level.

8.1.2.5. Belezma National Park (PNB)

A protected area aimed at conserving biodiversity and supporting education and recreation.

8.1.2.6. The Directorate of Agricultural Services (DSA)

Implements agricultural policies at the wilaya level.

8.1.2.7. Training Establishments

Provide specialized forestry education and training.

8.1.2.8. Advisory Bodies

Include:

- Protected area classification commissions;
- Forest fire protection committees;
- Land-use authorization commissions;
- Recreational forest permit commissions.

Other stakeholders

– Rural Engineering Company (GGR): Key partner for project implementation.

8.1.3. Research Institutions

8.1.3.1. The National Institute for Forestry Research (INRF)

Conducts research in forestry, biodiversity, erosion control, and desertification.

8.1.3.2. The Scientific and Technical Research Center on Arid Regions

Focuses on water management, soil studies, desertification monitoring, and socio-economic research.

8.1.3.3. The Agropastoralism Research Centre (CRAPast)

Conducts research on steppe ecosystems, biodiversity, and climate change.

8.1.3.4. The National Institute of Agronomic Research (INRAA)

Conducts agronomic research and promotes innovation and knowledge transfer.

8.1.3.5. Other Technical and Scientific Structures

The implementation of the dam program will benefit from the support of a scientific committee and local scientific committees, established within the national body responsible for coordinating the fight against desertification and the revitalization of the Green Dam, whose missions are defined by an order issued by the Minister of Agriculture, Rural Development and Fisheries.

These committees are established in accordance with the provisions of Article 11 of Executive Decree No. 20-213 of July 30, 2020, establishing a coordinating body for the fight against desertification and the revitalization of the Green Dam.

The scientific committee is composed of researchers from various universities and national scientific research institutes. It was established to carry out all research related to the missions of the national body for combating desertification and revitalizing the Green Dam project. As such, the 25 members of the scientific committee, including six researchers from the National Institute for Research and Training (INRF), consist of tenured faculty and permanent researchers holding positions such as professors, senior lecturers (Class A), associate professors (Class B), research directors, senior research professors (Class A), and senior research professors (Class B), whose disciplines are aligned with the missions of the body.

The role of the scientific committee includes supporting the national coordinating body for combating desertification and revitalizing the Green Dam project through the following missions and tasks:

- Proposing any measures aimed at combating desertification, revitalizing the Green Dam, adapting to climate change, and protecting biodiversity, based on scientific knowledge;
- Ensuring that the information provided by the sectors involved in the fight against desertification and the revitalization of the Green Dam is regularly updated;
- Proposing research themes related to combating desertification, drought mitigation, and the rehabilitation, expansion, and development of the Green Dam;
- Conducting expert assessments and consultations at the request of the head of the coordinating body;
- Organizing scientific conferences for institutions responsible for implementing programs to combat desertification, mitigate drought, and revitalize the Green Dam;
- Establishing data collection systems related to combating desertification, revitalizing the Green Dam, adapting to climate change, and protecting biodiversity;
- Contributing to the analysis and evaluation of international agreements;
- Guiding the actions of local committees in the implementation of the national program to combat desertification and the action plan for the revitalization of the Green Dam;
- Providing technical support to members of local committees and creating thematic working groups as needed.

In this capacity, the scientific committee issues opinions and recommendations, particularly on:

- The strategy for combating desertification and mitigating the effects of drought;
- The implementation and evaluation of the national program to combat desertification and mitigate drought;
- The action plan for the rehabilitation, expansion, and development of the Green Dam;
- The methods for evaluating and monitoring the implementation of the action plan for the rehabilitation, expansion, and development of the Green Dam;
- Progress reports and the annual report on the Green Dam program;
- Legislative texts related to the fight against desertification and drought mitigation, the revitalization of the Green Dam, and environmental policy.

Members of the scientific committee are appointed for a renewable period of four (4) years by decision of the Minister in charge of forests.

The local committees are composed of representatives from various sectors at the wilaya level, as well as associations active in fields related to the national coordinating body. These committees are responsible for implementing the national program to combat desertification and the action plan for the revitalization of the Green Dam.

The local committees, tasked with implementing the national program to combat desertification and the action plan for the revitalization of the Green Dam, have the following missions:

- Identifying actions to be carried out in the field to combat desertification and restore the Green Dam, in accordance with the strategic guidelines defined by the scientific committee;
- Organizing focus groups with rural populations, giving priority to areas threatened by drought and desertification, in order to identify socio-economic needs;
- Monitoring and supervising the implementation of the program to combat desertification and the action plan for the rehabilitation, expansion, and development of the Green Dam;
- Organizing field visits to supervise ongoing work;
- Organizing meetings to evaluate implemented programs;
- Participating in consultations on programs implemented in accordance with the missions of each sector;
- Planning and conducting household surveys;
- Organizing information and awareness-raising days on desertification and the Green Dam.

These committees are planned at the level of 58 wilayas, of which 13 wilayas are affected by the Green Dam program and six (6) wilayas are concerned by the present feasibility study project.

8.2. Policies and Strategies on Climate Change and Agriculture in Relation to the Project

The climate change policies and strategies implemented in Algeria are aligned with international commitments and agreements. Indeed, Algeria has signed and ratified the United Nations environmental conventions, namely: (i) the United Nations Framework Convention on Climate Change (UNFCCC) in 1993; (ii) the United Nations Convention on Biological Diversity (UNCBD) in 1995; and (iii) the United Nations Convention to Combat Desertification (UNCCD), adopted in Paris on June 17, 1994 and ratified by Presidential Decree No. 96-52 of January 22, 1996.

Algeria also ratified the Paris Agreement on October 5, 2017, adopted at COP21 in 2015. As a reminder, the Paris Agreement is an additional protocol to the United Nations Framework Convention on Climate Change (UNFCCC). This agreement is legally binding, although it does not provide for sanctions against countries that fail to comply. Its objective is to limit global warming to below 2°C compared to pre-industrial levels.

Each country is required to submit a Nationally Determined Contribution (NDC) every five years. A global stocktake is also scheduled every five years, with the first conducted in 2023. These assessments are intended to lead to strengthened NDCs, in accordance with the principle of progression established by the agreement. The agreement also stipulates that developed countries must provide financial assistance and technology transfer to developing countries, both for mitigation and adaptation purposes. Algeria has submitted its NDC, in which it commits to reducing its greenhouse gas emissions by 2030.

8.2.1. Policies and Strategies Related to the UNFCCC

In line with its international commitments, Algeria developed its first National Climate Plan (NCP) for the period 2020–2030, which was validated during an Interministerial Council in September 2019. This plan focuses on actions to be implemented by Algeria to meet its commitments to combat climate change, as outlined in its Intended Nationally Determined Contribution (INDC), with the objective of reducing greenhouse gas emissions. In this context, the role of the forestry sector is predominant, if not decisive, in stabilizing and strengthening forest carbon stocks (carbon sinks).

The objectives of the National Climate Plan focus on two main action plans: one for adaptation and the other for mitigation:

- The first aims to address the impacts of climate change by adapting to a rate of warming that is approximately twice the global average (about 1.5°C over nearly a century compared to 0.7°C globally), as well as to a decrease in rainfall ranging from 10% to 20% from west to east;
- The second aims to mitigate greenhouse gas emissions in order to meet international commitments under the Nationally Determined Contribution (NDC), targeting a 7% reduction in emissions by 2030 using national resources, and up to 22% with international support.

With regard to the Law on Environmental Protection within the framework of sustainable development and the Law on the Promotion of Renewable Energies, both explicitly refer to climate change, in particular:

- The law on environmental protection considers greenhouse gases as air pollutants (Article 4, Title II) and provides for financial and customs incentives for companies importing equipment that reduces or eliminates greenhouse gas emissions or other forms of air pollution (Title V, Article 76);
- The law on the promotion of renewable energies recognizes renewable energy as a key means of reducing greenhouse gas emissions (Articles 2, 3, 6, 13, and 17).

Furthermore, the contribution of forests to climate change mitigation, as well as the adaptation and resilience of rural populations—particularly those living near forest areas—was integrated into the national strategy by the Directorate General of Forests as early as 2016, through the forest development plan for 2035.

8.2.2. National Policies and Strategies

The major challenges facing Algeria in terms of climate change make the integration of adaptation and mitigation measures into development planning and programming essential. Improving the institutional framework for development, as well as implementing national and local climate change strategies and plans in Algeria, are among the responsibilities assigned to the Ministry of the Environment and Quality of Life. These responsibilities are carried out in consultation with other relevant ministerial departments.

The National Climate Plan (NCP) reflects the particular attention paid by the Algerian Government to the need for adaptation to climate change, the mobilization of implementation resources, and the crucial contribution of all governmental and non-governmental stakeholders within a framework of collective and effective action.

Today, the National Climate Plan (NCP) is evolving within a changing national and international context. This process justifies the need to update the NCP in order to translate Algeria's commitments into concrete actions. This task falls to the National Climate Committee (CNC), which was established in July

2015 by decision of the Prime Minister. Its initial mission was to develop the Nationally Determined Contribution (NDC); today, its advisory role is essential on all issues related to climate change and the NCP.

Like other UN member states, Algeria adopted the 2030 Agenda for Sustainable Development in September 2015. This agenda is structured around 17 Sustainable Development Goals (SDGs), accompanied by 169 targets and 241 indicators. These SDGs, which succeed the Millennium Development Goals (MDGs) for the period 2000–2015, aim to eradicate extreme poverty, combat inequality and injustice, and address climate change. Member states that have adopted the 2030 Agenda commit to implementing the program to achieve the 17 SDGs through all organizational, institutional, and political means, including the mobilization of public financial resources and capacity building, as well as taking all necessary steps to measure national indicators. This data is essential for informed decision-making.

Following this adoption, Algeria established a national multisectoral coordination committee within the Ministry of Foreign Affairs (MAE), tasked with monitoring the implementation of the SDGs, with technical support from the National Statistics Office (ONS). The Ministry of Agriculture, Rural Development and Fisheries (MADRP) also established a central committee, which it chairs, to monitor the implementation of the program.

Algeria published its Voluntary National Review (VNR), presented to the United Nations in July 2019, in which the Directorate General of Forests (DGF) highlighted its contribution to 10 SDGs (1, 2, 4, 6, 8, 12, 13, 14, 15, and 17), along with the establishment of thematic scientific and technical working groups (GTST).

The activities carried out by the DGF to achieve these SDGs include, in particular, the following:

- Preparation of the MADRPP sector report entitled “Contribution of the DGF to the implementation of the Sustainable Development Goals for the years 2016, 2017, and 2019”;
- Initiation of three thematic scientific and technical working groups (GTST) for the characterization and categorization of natural environments, degraded lands and soils, and the establishment of a red list for flora and fauna;
- Signing of a DGF-ASAL agreement on June 18, 2020, to support the measurement of indicators related to the monitoring of natural ecosystems within the framework of the SDGs;
- Contribution to the establishment of the National Indicators Framework (CNI) in May 2021, under the leadership of the National Statistics Office (ONS), with the support of ASAL, INCT, and ONEDD, under the supervision of MAECNE.

The matrix on which the DGF is working includes 14 UN indicators related to SDG 4 (education), SDG 6 (clean water and sanitation), SDG 8 (decent work), SDG 13 (climate action), and SDG 15 (life on land). It also contributes to informing other indicators under the responsibility of other sectors, such as SDG 1 (no poverty), SDG 2 (zero hunger), SDG 14 (life below water), and SDG 17 (partnerships for the goals).

It should be noted that, for its monitoring needs in specific thematic areas and under the supervision of the ONS, the DGF has introduced 17 additional indicators, referred to as national indicators, which it monitors to report on the sector’s efforts toward the sustainable development of forests and natural ecosystems.

In this context, it is important to highlight that the constraints identified in achieving certain SDG indicators include the lack of a standardized methodology and clear definitions, as well as insufficient financial resources to support indicator measurement and the functioning of working groups. It is therefore recommended that UN agencies provide support and assistance for the measurement and implementation of each SDG.

The DGF has made significant efforts to raise awareness and promote this globally important program, as demonstrated by:

- The implementation, by the Ministry of Agriculture, Rural Development and Fisheries through the Directorate General of Forests, in collaboration with the United Nations system in Algeria, of a joint program comprising information, awareness-raising, and public engagement

activities aimed at preserving natural ecosystems, promoting the sustainable development of goods and services, and achieving the Sustainable Development Goals (SDGs);

- The organization of workshops for sector managers and participation in intersectoral meetings to raise awareness of the role of forests in achieving the SDGs;
- The creation of an SDG grove on Monday, December 27, 2021, at the educational farm in Algiers. This activity, the first organized under the theme “The forest at the heart of sustainable development,” was held on the occasion of the 76th anniversary of the United Nations and included the planting of the “Grove of Hope” as a tool for raising awareness about the achievement of the SDGs.

Furthermore, the implementation of the forestry development strategy guidelines is part of the New Model of Economic Growth and Sectoral Strategies adopted by the Council of Ministers on July 26, 2016, as referenced in the Prime Minister’s note dated September 19, 2016.

The document outlining the national forest development strategy for 2035 was prepared by the Directorate General of Forests, finalized in December 2016, and subsequently transmitted through the relevant authorities for inclusion in the overall Agriculture and Rural Development sector strategy, as well as to the Ministry of Finance to serve as a reference for the new investment programming approach within the framework of a program law.

The approach adopted in developing the forestry strategy is based on a participatory, bottom-up process at both the geographical and decision-making levels, involving all stakeholders in the forestry sector as well as the relevant ministerial departments. This approach prioritizes consultation and integrates both national economic interests and the needs of the population, while ensuring the sustainability of ecosystems and their resources. The vision for the sector is defined as follows:

“The conservation and sustainable management of resources (soil, water, flora, fauna) in forests, alfa grasslands, and other natural areas, with a view to ensuring their sustainability and guaranteeing sustained production of goods and services for the benefit of the population and the national economy.”

The challenges to be addressed include improving:

- The health and productivity of forest ecosystems and other natural areas;
- Water and soil protection measures in the management and use of natural areas;
- The conservation and enhancement of biodiversity;
- The production functions of forests and other natural areas, which require further development;
- The promotion of forest products and non-timber forest products, whose exploitation should be encouraged and supported, particularly among local communities.

In this context, an operational action plan was established by the DGF, involving local structures for its implementation, taking into account the guidelines issued in July 2017 by the Minister of Agriculture, Rural Development and Fisheries to enhance the contribution of the forestry sector to the national economy.

8.2.3. At the Regional and Local Level

The identification of drought-resistant species adapted to climate change has been the subject of several meetings organized by the DGF, focusing on actions carried out during the period 2000–2018 under the program to combat desertification.

These meetings made it possible to identify best practices and constraints, and to initiate reflection on the implementation of a territorial approach in the form of a territorial intelligence model. This approach supports forest conservation efforts in steppe and southern regions and contributes to improved territorial governance.

Among the stated priorities is the relaunch of the Green Dam program, particularly in natural steppe areas, where the program must be integrated and diversified. Based on a territorial assessment, priority will be given to forests, rangelands, and alfa steppe (whose potential must first be assessed), as well as to actions aimed at improving rural livelihoods and significantly reducing pressure on natural resources.

The Green Dam program will be consolidated in the southern peripheral or pre-Saharan zone, particularly through actions aimed at rehabilitating drought-resistant species already identified.

The proposed action plan emphasizes the study of the Green Dam program, particularly concerning species such as *Argania spinosa*, the Atlas pistachio tree, and *Acacia raddiana*:

- The rehabilitation and expansion of the Green Dam, whose digitization revealed an area of 3,698,000 hectares instead of the previously estimated 3,000,000 hectares. Development activities have extended beyond these limits, requiring the integration of additional municipal territories and leading to a revised total area of 4,730,000 hectares;
- The inventory of alfa groundwater resources covers 3,829,488 hectares;
- The ecological assessment of *Acacia raddiana* stands and the proposal of an action plan for their rehabilitation and expansion;
- The ongoing national inventory of woody species in steppe and Saharan regions, intended to support the development of national forest management and conservation plans for Saharan ecosystems.

Finally, it should be noted that steppe rangelands have also been subject to a rehabilitation program under the responsibility of the High Council for Development and Solidarity (HCDS), including the establishment of communal grazing areas, an experience that merits further expansion.

This program was part of the major public works initiative launched in 1994. A review conducted at the end of 2007 showed that 2.9 million hectares had been covered, of which 1.8 million hectares (62%) were located in the wilayas of Naâma and El Bayadh, due to their significant grazing potential.

The rehabilitation program increased rangeland productivity from 30 to 250 forage units per hectare. The restoration of alfa grass and wormwood stands increased their coverage from 10% to 30%. Pastoral plantations within designated areas increased forage availability from 30 to 600 forage units, representing a twentyfold increase.

This program also significantly reduced the conversion of rangelands into cultivated land. Its implementation relied on consultations organized at the municipal level, which enabled the establishment of coordination platforms involving all relevant stakeholders in steppe areas.

8.3. Synergies and Coordination with Related Initiatives and Projects

The rehabilitation of the Green Dam has consistently been a priority within the program implemented by the Directorate General of Forests, with funding provided through state support.

As part of the implementation of the contract awarded to the Rural Engineering Group (GGR), a portion of the program is dedicated to the Green Dam across eight wilayas (Tébessa, Khenchela, Batna, Djelfa, Laghouat, M'Sila, El Bayadh, and Naâma), covering 108 communes and 261 localities, including 94 classified as shadow areas.

The planned actions within the Green Dam area integrate sustainable development, desertification control, and climate change adaptation, with a focus on:

- The rehabilitation of existing forests through reforestation;
- The restoration of rangelands through fencing, the establishment of watering points, and pastoral planting to reduce overgrazing pressure;
- The conservation of alfa grasslands through maintenance and regeneration;
- Water and soil conservation measures to reduce erosion caused by torrential rains and floods;
- Combating sand encroachment and dust storms through dune stabilization and the establishment of windbreaks.

Finally, efforts are made to develop rural areas and improve living conditions through better access to isolated zones, water mobilization, and the planting of hardy fruit trees and windbreaks. Steppe regions have also benefited from rural development programs through the implementation of Local Integrated Rural Development Projects (PPDRI) across all steppe municipalities.

These projects are based on a participatory approach involving targeted rural households and are implemented through a bottom-up process, starting from municipal rural development units and progressing through wilaya-level structures to central ministerial departments.

In this context, the highest national authorities have recommended accelerating the implementation of all necessary measures related to the Green Dam action plan, strengthening coordination among all stakeholders, and establishing, as soon as possible, all bodies responsible for monitoring this strategic project.

The approach adopted aims to adapt the Green Dam program to steppe and pastoral areas through a new project supported by the FAO and the Green Climate Fund (GCF), with the objective of improving climate resilience in these regions.

The relaunch of the Green Dam program, which serves as both a benchmark and a challenge for the Agriculture and Rural Development sector, seeks to address desertification while creating favorable conditions for economic growth, and social stability.

This project is part of a broader public policy approach aimed at enhancing ecosystem resilience to climate change and enabling local populations to develop adaptive livelihood strategies while improving their living conditions.

To this end, public authorities have initiated the establishment of an organizational framework designed to strengthen institutional capacities and promote coordination among stakeholders at both national and local levels.

At the central level, governance of the Green Dam revitalization project is entrusted to the national coordinating body for combating desertification and revitalizing the Green Dam, supported by an intersectoral commission acting as the project's steering committee.

The directives issued during ministerial and interministerial councils held in 2021 and 2022 led regional authorities (walis) to instruct local committees, in coordination with daïra heads and presidents of communal people's assemblies, to ensure effective implementation of these guidelines on the ground.

At the operational level, consultations with targeted rural populations will be systematically conducted, and exchanges within focus groups will be organized to ensure the effective implementation and sustainability of project actions.

This framework, along with the guidelines established during interministerial meetings and consultation workshops held in the six wilayas included in the project proposed to the Green Climate Fund—out of the thirteen wilayas covered by the Green Dam program—defines the range of stakeholders involved.

Related International Climate Finance Projects and Synergies

This project is strategically positioned within a broader portfolio of complementary development initiatives supported by international partners across Algeria's diverse ecological zones. Rather than operating in isolation, the project deliberately builds on the institutional relationships, technical methodologies, operational infrastructure, and lessons learned generated by these related initiatives - leveraging proven approaches, avoiding duplication of effort, and maximizing the cumulative impact of international climate investment in Algeria.

• FAO/GEF Bibans Project - GEF ID 10170 | Budget: USD 3.2M | Status: Ongoing since August 2025

The project presents strong synergies with an incipient FAO/ONEDD initiative implemented across 32,257 hectares in two pilot communes within the Tell Atlas northern mountain forests. The established FAO institutional relationships and implementation modalities developed under this initiative have significantly reduced GCF preparation costs and streamlined project development processes. Technical approaches refined through the Bibans experience - including participatory natural resource management, evidence-based species-site matching, and NWFP value chain development - have directly informed the design of the GCF project's restoration and livelihood components. The two initiatives are geographically complementary, spanning a continuum from the northern mountain forests to the arid steppe zone of the Algerian Green Dam. The GCF project will represent a direct scaling-up of the Bibans pilot approaches, expanding coverage from two communes to six wilayas, 101 communes, and approximately 32 million hectares. The project has benefited from this synergy already at formulation stage through the adoption of tested community engagement protocols, validated species selection criteria for climate-adapted restoration, and the shared use of the Khibra Platform for knowledge exchange and good practice dissemination across both initiatives. The complementary and research for efficiency will be prosecuted during the project's implementation, notably regarding impact of reforestation, deferred grazing etc on two contrasting ecosystems.

• FAO/GEF Cork Oak Project - GEF ID 9806 | Budget: USD 27.9M | Status: Ongoing

The project draws on a second FAO-implemented initiative covering 22,530 hectares across three pilot zones in Bejaia, Jijel, and Tlemcen, targeting 60 SMEs and community-based organizations with a minimum 40% women's participation requirement. The GCF project has benefited substantially from the shared FAO accreditation framework, comprehensive biodiversity inventories, and digitized landscape mapping developed under this initiative, which provide a tested operational foundation that strengthens project readiness and eliminates the need for duplicative baseline assessments. NWFP traceability systems and value chain development models piloted for cork, honey, and mastic have directly informed the design of GCF Outcome 3, offering proven approaches to climate-resilient livelihood development that have been adapted to the specific products and market conditions of the Green Dam zone - including prickly pear, rosemary, alfa grass, and olive value chains. The women's participation framework established under the Cork Oak initiative, with its demonstrated 40% inclusion threshold, has informed the GCF project's Gender Action Plan and its design of women-led cooperatives and micro-enterprise development under Activities 3.1.1 and 3.1.3.

• UNDP/GEF Aleppo Pine Project - GEF ID 11179 | GEF Grant: USD 3.5M | Total Budget: USD 27.5M | Concept Approved: June 2024

The project builds on a complementary UNDP/DGF initiative implemented across three Aleppo pine sites at Senalba, Telagh, and Beni Imloul. Both initiatives share a common focal species - *Pinus halepensis* - which covers approximately 68% of Algeria's 4.1 million hectares of forest and address the shared challenge of transitioning fragile monoculture pine stands toward more diverse and resilient forest ecosystems. The GCF project is closely aligned with Algeria's 2023 national commitment to the sustainable management of 850,000 hectares of Aleppo pine, reinforcing the country's policy priorities at scale. The relationship between the two initiatives follows a clear pilot-to-scale logic: the UNDP/GEF project develops silvicultural frameworks, Integrated Pest Management protocols, and monitoring

tools at selected pilot sites, while the GCF project scales these approaches across the broader Algerian Green Dam zone. The project has directly benefited from this synergy through the adoption of silvicultural transition methodologies for converting monoculture pine stands toward diversified mixed forests, pest management strategies for combating the pine mealybug (*Matsucoccus feytaudi*) and pine processionary caterpillar, and forest health monitoring protocols - all of which are directly applicable to GCF Activity 2.1.5, targeting the restoration and sustainable management of 12,524 hectares of Aleppo pine stands across six wilayas.

• **Adaptation Fund / IFAD Halfah Project - AF ID AF00000405 | Financing Requested: USD 10M | Status: Concept Endorsed**

The project is closely complementary to an IFAD initiative implemented in partnership with the Ministry of Environment, targeting El Bayadh wilaya through three components: steppe restoration (USD 4.7 million), livelihood transformation (USD 2.6 million), and adaptation mainstreaming (USD 1.1 million). The two projects share the same geography, with El Bayadh identified as a priority wilaya under both initiatives, addressing the same agro-pastoral communities and underlying desertification drivers. Both projects also share a common focal species - *Stipa tenacissima* (alfa/halfah grass) - which has declined by 30% in El Bayadh between 2008 and 2024, underscoring the urgency of coordinated restoration efforts. Nursery infrastructure and seed bank outputs developed under the Halfah Project directly feed into GCF Activity 2.1.1, providing ready-to-use climate-adapted restoration inputs and avoiding parallel investment in duplicative facilities. Livelihood and value chain interventions under both projects target the same communities in El Bayadh, enabling a more integrated and impactful support package for agro-pastoral households that combines steppe restoration with income diversification and access to adaptive finance. The rangeland restoration methodologies developed for alfalfa grass ecosystems inform the GCF project's broader rangeland management programme under Activity 2.1.2.

Alignment with Regional Climate Initiatives

The project aligns with three major regional initiatives that reinforce its climate rationale and scaling potential:

• **Great Green Wall Initiative:**

Algeria's reforestation and anti-desertification programmes directly contribute to the Great Green Wall's goal of restoring 100 million hectares of degraded land across the Sahel and North Africa. Algeria's Barrage Vert (Green Dam), a 1,500 km afforestation belt, is one of the earliest and largest national efforts aligned with the Great Green Wall vision. The GCF project's land restoration interventions combat soil erosion and expand vegetative cover along the northern edge of the Sahara, reinforcing the initiative's east-west corridor of restored landscapes.

• **Middle East Green Initiative (MGI):**

Algeria's renewable energy transition targets and emissions reduction commitments align with the MGI's objective of reducing regional carbon emissions. The project's investments in solar energy infrastructure (Activity 3.2.5) and ecosystem-based carbon sequestration support the MGI's emphasis on clean energy adoption and large-scale land restoration as pathways to climate resilience.

• **FAO REINVEST NENA Programme:**

Algeria's agricultural modernization, water efficiency, and rural livelihood strengthening efforts align with REINVEST NENA's focus on boosting sustainable investment in agri-food systems across the Near East and North Africa. The project's climate-smart agriculture practices and value chain development directly support the programme's goal of mobilizing responsible private-sector investment in climate-resilient food production systems.

Summary of Synergies and Added Value

Collectively, these related initiatives create a mutually reinforcing programmatic architecture from which the GCF project draws significant added value: established institutional partnerships that reduce transaction costs and accelerate implementation readiness; tested technical methodologies validated

under comparable agro-ecological conditions; shared operational infrastructure - including nurseries, mapping systems, and knowledge platforms - that eliminates duplication and maximizes cost-efficiency; proven livelihood and value chain models adapted to the conditions of the Green Dam landscape; and a coherent national policy framework strengthened by the cumulative contributions of all initiatives to Algeria's climate adaptation, land restoration, and sustainable development objectives.

9. PROJECT CO-BENEFITS IN TERMS OF MITIGATION

9.1 Greenhouse gas emissions in Algeria

The results of the national inventory of direct greenhouse gas emissions by sector for the year 2000 are summarized in the table below:

Table 11 Total GHG Emissions/Absorption in Algeria (year 2000)

Business sectors	Emissions (Gg eq-CO ₂)	Absorptions (Gg CO ₂)	Net Emissions (Gg CO ₂)
Energy	87,579	0	87,579
Industrial processes	5,463	0	5,463
Agriculture & Forests	12,822	14,167	(-) 1,345
Of which Agriculture	6,535	0	6,535
Of which Forests	6,287	14,167	(-) 7,880
Waste	11,428	0	11,428
TOTAL	117,310	14,167	103,143

Source: MATET, February 2010

Global direct greenhouse gas emissions total 117,310 Gg, or 117.31 million tonnes of eq. Carbon sequestration through forestry is estimated at 14.167 million tonnes of eq., leading to net emissions of 103.143 million tonnes of eq.

Based on a population of 29,726,500 inhabitants (year 2000), gross emissions stand at 3.95 tonnes of eq. per capita. For context, the global average is 4.68 tonnes, while recorded figures for other nations are estimated at 19.85 tonnes (USA), 6.15 tonnes (France), 3.50 tonnes (Lebanon), 1.92 tonnes (Tunisia), and 1.27 tonnes (Morocco).

The energy sector is the primary emitter, accounting for 75% of total emissions. As the engine of the national economy, the hydrocarbon industry represents a dominant share of economic activity and, consequently, of national greenhouse gas (GHG) emissions. Emissions in this sector stem from energy consumption (6%), hydrocarbon production, processing, and transport (20%), and natural gas liquefaction (8%).

Agriculture, land-use change, and forestry generate 11% of total GHG emissions. The waste and industrial processes sectors account for 10% (95% of which is methane from landfills) and 5% (60% of which is from the cement industry), respectively.

For the entire inventory, the margin of uncertainty is estimated at 12.90%. Within a 95% probability range, Algeria's total gross emissions are estimated between 102.170 and 132.434 million tonnes of eq. Net emissions are projected to fall between 89.831 and 116.44 million tonnes of eq.

Mineral soils are disturbed by agricultural activities and forest fires. Livestock farming and manure management are the principal sources of methane emissions via enteric fermentation and animal waste. Nitrous oxide (N₂O) is primarily released through manure spreading and fertilizer application, while limited emissions also result from forest fires.

9.2 The GHG sequestration capacities of the project

9.2.1 Methodology for accounting for Greenhouse Gases (GHG)

The GHG accounting methodology is fully aligned with the Funding Proposal, which specifies the use of FAO's Nationally Determined Contribution Expert Tool (NEXT) for quantifying the project's mitigation co-benefits.

The Nationally Determined Contribution Expert Tool (NEXT) is a new generation of greenhouse gas (GHG) accounting tool developed by the Food and Agriculture Organization of the United Nations (FAO) to support annual environmental impact assessments for the Agriculture, Forestry, and Other Land Use sector (AFOLU). It applies IPCC Tier 1 and Tier 2 emission factors for the AFOLU sector, providing a conservative and internationally recognized basis for estimating carbon sequestration and emission reductions across the project's restoration, rangeland management, and land-use change interventions.

The NEXT tool provides a 30-year time series of yearly and cumulated estimates of carbon removal and greenhouse gas emission reductions from actions determined by Parties in their climate policies. The tool was designed to provide results that directly respond to the provisions of the Enhanced Transparency Framework and support the Nationally Determined Contributions (NDC) development as required by the modalities, procedures, and guidelines.

NEXT provides a detailed temporal series of results and a comprehensive set of indicators, including the social value of carbon, enabling a thorough environmental and economic overview of climate actions in achieving mitigation targets.

The tool helps countries to interpret, track, and scale up the ambition of their NDCs, which could ultimately inform the global stocktake of the Paris Agreement in a harmonized way. NEXT is a land-based accounting standard for national and subnational GHG reduction goals, measuring annual carbon stock changes per unit of land (in hectare), methane (CH₄) and nitrous oxide (N₂O) emissions, expressed in a tonne of carbon dioxide equivalent per year, tCO₂-eq /year. NEXT provides the annual and cumulated estimation of the potential changes in GHG emissions from a set of climate actions over 30 years reading grid (Schiettecatte et al., 2022 a,b).

The full methodology and calculation are detailed in Annex 22.

The results of the NEXT 20 years after the start of the project amounts to total reduction of GHG emissions by 1,838,910 tonnes of carbon dioxide equivalent (tCO₂-eq), or 1.84 million tCO₂-eq (year 2046). Distributed between 1.16 million tCO₂-eq sequestered in the biomass and 781 000 tCO₂-eq sequestered in the soil.

The 20-year accounting period is aligned with GCF requirements and IPCC methodology for land-based projects. It reflects the full lifecycle of the project's interventions - from implementation through to the sustained carbon sequestration benefits of restored ecosystems. For nature-based solutions such as the Green Dam, a 20-year horizon captures the full carbon sequestration cycle, as trees and restored vegetation need time to mature and reach their peak carbon storage potential.

A shorter timeframe would significantly underestimate the project's climate benefits. The project applied conservative IPCC default values throughout, representing a lower-bound estimate of actual climate benefits. Risks to permanence - including fire, drought, and land-use change - are addressed through the project's integrated design: climate-adapted species selection, community-based fire management, strengthened land governance, and conservative carbon accounting that accounts for potential reversals.

10. CO-BUDGET

10.1 Project Costs

The cost of each of the three project components is presented in the Annex 4. This indicative cost does not include agency fees or operating expenses. It was estimated based on valued basic technical specifications and current market prices for goods and services.

10.2. Financing Plan

The Economic and financial evaluation is presented in **Annex 3**.

The total indicative cost of the project is USD 99,500,000 (DA 13,930,000,000) of which USD 43,000,000 (DA 6,020,000,000) is in the form of a grant from the GCF.

Table 12 Project Financing Plan

Components/Outputs	Indicative cost	FVC Funding		Co-financing		Institution
	USD	Amount (USD)	Financial instrument	Amount (USD)	Financial instrument	
Component 1. Enabling Governance Framework and Climate Information	2,934,235	2,934,235	Grant	0	/t	/
Component 2: Ecosystem Restoration and Climate-Resilient Land Management	47,654,719	22,093,040	Grant	25,561,679	Grant	Governt
Component 3: = Climate-Resilient Livelihoods, Value Chains and Sustainable Finance].	42,141,397	13,699,555	Grant	28,441,842	Grant	Governt
	1,834,652	1,834,652	Grant	0	/	/
Project management unit	4,409,997	1,913,518	Grant	2,496,479	Grant + In kind	Governmen t
Contingency	525,000	525,000	Grant	0	/	/
Grand Total	99,500,000	43,000,000		56,500,000		

The co-financing amounts to USD 56,500,000 from the Algerian Government. The grant application is justified given the vulnerable nature of small-scale producers, particularly livestock farmers and crop farmers in the rural areas of the Algerian Green Dam (AGD), who are already suffering the adverse effects of climate change (change of activity, migration to the northern provinces).

The project is not financially viable on a commercial basis and would not proceed without GCF grant financing. The proposed investments generate primarily public goods - including carbon sequestration, soil stabilization, watershed protection, and biodiversity conservation - that do not produce direct revenue streams.

The Economic and Financial Analysis (Annex 3) confirms that the Project is both financially and economically viable at the project level. The with-project financial analysis yields a Financial Internal Rate of Return (FIRR) of 16.3%, exceeding the 10% financial discount rate by 6.3 percentage points, while the carbon-inclusive economic analysis yields an Economic Internal Rate of Return (EIRR) of 18%, exceeding the 6% social discount rate by 12 percentage points. The financial Net Present Value (NPV) is AD 6.18 billion—approximately USD 44.15 million—with a financial Benefit-Cost Ratio (BCR) of 1.37. The carbon-inclusive economic NPV is AD 16.9 billion—approximately USD 121 million—with an economic BCR of 1.82. The higher economic returns reflect the inclusion of benefits not captured in private market cash flows, including carbon sequestration valued conservatively at USD 12/tCO₂e, watershed and hydrological services, avoided desertification, and the application of shadow wages to rural employment. Despite positive aggregate returns, individual beneficiary households in the arid pre-Saharan zone cannot mobilize the upfront capital required for nursery establishment, rangeland enclosure, water harvesting infrastructure, and cooperative processing facilities, and commercial credit at market rates is not accessible for the seven- to nine-year yield trajectories characterising these interventions. GCF grant financing therefore plays a critical catalytic role by absorbing these upfront risks, unlocking the transition from degraded baseline to sustainable land management, and establishing the foundations for replication and scaling across the broader Green Dam landscape.

As the project aims to provide public goods, the Government of Algeria (GoA), through the FAO, is requesting 100% concessionality from the Green Climate Fund (GCF). The substantial government contribution (56% of the total project cost) and the anticipated financing from the private sector and project beneficiaries significantly leverage the GCF grant and underscore the importance of this project for the Algerian government and other stakeholders involved.

11. Project Implementation

11.1. Implementation Arrangements

The implementation of the Green Dam revitalization project will follow the guidelines issued by the national coordinating body responsible for combating desertification and relaunching the Green Dam program. This body will facilitate implementation within an intersectoral framework, based on recommendations provided by the scientific committee and local committees established by executive decree.

The national commission will be responsible for monitoring the implementation of decisions and programs and will ensure that the objectives set and the expected impacts are achieved.

In this context, the baseline study designed to support the formulation of a financing proposal to the Green Climate Fund (GCF) for the project entitled *“Improving climate resilience in the steppe and dry forest areas of the Green Dam”* will include a critical assessment of organizational capacities. It will build on two key experiences implemented by the General Directorate of Forests and its territorial structures: the Rural Employment Project (PER) and the Integrated Rural Development Projects (PPDRI), carried out under the rural renewal program.

As is often the case, expertise mobilized for new projects tends to explore new approaches and related programs, particularly when significant human, material, and financial resources have already been invested in similar initiatives targeting rural areas facing comparable challenges. These long-term projects have generated valuable results that can be consolidated and further strengthened.

The initiative to capitalize on these experiences within the framework of the Green Dam project also aligns with the guidelines issued by public authorities regarding the involvement of rural populations in development programs. It takes into account the level of acceptance of the proposed approach by local communities, as well as the extent to which their concerns and expectations are addressed.

Furthermore, the innovative aspect lies in the fact that previous rural development experiences provide a strong foundation for implementation in the targeted territories because:

- These projects address concerns identified through quantitative and qualitative surveys conducted as part of socio-economic diagnostics of households and analysis of their priorities;
- The Rural Employment Project made it possible, at the methodological level, to carry out socio-economic surveys at household level and to establish focus groups;
- The approach of initiating local rural development projects at the territorial level is well known to rural populations, and the facilitation role entrusted to local forestry technical services has been effectively and appropriately carried out;
- The various stages of local project development—validation and approval—have enabled the mobilization and empowerment of local authorities through municipal rural development units, as well as technical supervision at the daïra and wilaya levels within an intersectoral framework, ultimately ensuring access to funding

The new program will benefit from existing tools and instruments, including:

- A technical, institutional, and regulatory framework validated by higher authorities and implemented through operational structures (instructions, directives, etc.);
- Tools developed under capacity-building and technical assistance programs (PRCHAT), including training and project supervision guides, monitoring and evaluation systems, and the “SIPSRI” project information system.

However, organizational aspects will be further analyzed and strengthened, taking into account the following elements:

- Evaluation of projects already initiated and completed in the six (6) pilot wilayas selected for the study area, with particular focus on the 12 pilot municipalities;
- Review and possible adjustment of the proposed program based on findings from the socio-economic study and discussions with focus groups once established;
- Assessment of the management capacities of territorial structures and identification of capacity-building needs;
- Evaluation of implementation conditions, particularly in relation to the capacities of economic operators previously involved in similar programs;
- Analysis of human and material resources available or potentially mobilizable within the targeted areas;
- Promotion of entrepreneurship among rural youth and women for the implementation of project activities;
- Support for the creation and strengthening of collective organizations for the promotion of local products (NWFPs and others);
- Development of incentives to encourage rural populations to support actions of general interest, particularly those related to biodiversity conservation;
- Promotion of alternative income-generating activities aimed at improving the livelihoods of rural households, especially those living near forest areas.

In addition, the project will build on successful experiences implemented by other structures of the Ministry of Agriculture, Rural Development and Fisheries (MADRP), including:

- Initiatives promoting pastoral activities led by the High Commission for the Development of the Steppe (HCDS), particularly the establishment of communal pastoral areas managed by Municipal People's Assemblies (APC);
- Programs implemented by the Directorates of Agricultural Services (DSA) at the wilaya level, particularly those related to the development of agricultural land through concession mechanisms on state-owned land.

Finally, a monitoring and evaluation system will be established for the project, based on SMART indicators defined at the outset, regular supervision during implementation, and a final evaluation at project completion. In addition, an independent post-project evaluation will be conducted after five (5) and ten (10) years to assess long-term outcomes. This evaluation framework will be integrated into a roadmap defining the roles and responsibilities of technical departments within the forestry administration and partner institutions involved in project implementation.

11.2. Project Co-financing

The project will have a total budget of USD 99.5 million, of which USD 56.5 million (approximately 57%) will be provided as co-financing by the Algerian government, and USD 43 million (43%) will be requested from the Green Climate Fund. This financing structure demonstrates the application of the GCF minimum concessionality principle. The government's contribution covers those investments that can be financed through domestic public resources, including infrastructure, staffing, and operational costs. GCF resources are targeted exclusively toward the incremental costs required to achieve climate-resilient outcomes - including climate information systems, adaptation-oriented restoration techniques, carbon monitoring infrastructure, and the development of climate-resilient value chains.

It is also anticipated that activities under the component focused on strengthening the climate resilience of smallholder farmers—particularly through rangeland management, non-timber forest products, and climate-resilient livestock value chains—will benefit from co-financing by relevant economic operators.

Similarly, activities aimed at creating assets for rural households under the component on improving the climate resilience of degraded agro-sylvo-pastoral landscapes, land quality, biodiversity, and carbon sequestration will require beneficiary participation, including labor contributions to support successful implementation.

The USD 56.5 million Government of Algeria co-financing represents new earmarked expenditure approved by the Ministry of Finance and integrated into DGF's multi-year Plan d'Action Pluriannuel (PAP) — it is not a reallocation of existing baseline spending. To prevent any displacement of baseline DGF financing, a financial-additionality monitoring protocol has been embedded: DGF's annual national budget allocations to AGD-related programmes will be tracked against the pre-project baseline, with the monitoring results reported in the project's Annual Performance Reports (APRs). This mechanism confirms that GCF financing is genuinely additional and that DGF cannot reallocate its existing budget away from GCF-covered activities over the project lifetime.

11.3. Project Execution

The project will be implemented by the General Directorate of Forests, under the Ministry of Agriculture, Rural Development and Fisheries (MADRP), within the framework of a program contract with a rural engineering firm, and in accordance with the requirements and expenditure rules of the Green Climate Fund governing co-financed projects.

This arrangement will primarily cover development activities aimed at improving pastoral and forestry potential, as well as water and soil conservation measures. The program contract structure—comprising a multi-year framework agreement and annual implementation contracts—will ensure cost stability and significantly reduce procurement timelines. Typically, such contracts require approximately three months to be finalized, although this period may extend to six (6) months in the event of unsuccessful tendering procedures.

Other activities will be implemented through competitive procurement processes, in compliance with national regulations, including Law No. 90-21 of August 15, 1990 on public accounting, Presidential Decree No. 15-247 of September 16, 2015 regulating public procurement and public service delegations, as well as the requirements of the Green Climate Fund.

The program proposed under this study, with an implementation period of seven (7) years, may be supplemented, if necessary, by additional actions proposed or recommended:

- By the scientific council and local committees established for this purpose;
- Following consultations and exchanges with focus groups once established;
- Through additional studies related to land development and socio-economic factors.

11.4. Project Governance

Overall governance of the project will be ensured by the national coordinating body responsible for combating desertification and relaunching the Green Dam. This body will facilitate implementation within an intersectoral framework, based on recommendations issued by the scientific committee and local committees established by executive decree.

This governance structure is reinforced by the national intersectoral commission, which will monitor the implementation of decisions and programs and ensure that project objectives and expected impacts are achieved.

At the local level, governance will be ensured by existing local committees established within the framework of the Green Dam revitalization program. These committees will be coordinated by the territorial structures of forestry, agriculture, and the High Commission for the Development of the Steppe, under the authority of the competent Wali.

The guidelines issued during ministerial and interministerial meetings held in 2021 and 2022, dedicated to the relaunch of the Green Dam program, led regional authorities to provide the necessary directives to local

committees, in coordination with district heads and presidents of Municipal People's Assemblies, to ensure effective implementation on the ground.

Within the project intervention areas, consultations with targeted rural populations will be conducted systematically. Discussions and exchanges with focus groups, once established, will ensure effective implementation of project activities and contribute to their long-term sustainability.

GCF-Aligned Governance Architecture

The project governance structure is designed to meet GCF fiduciary, environmental, and social safeguard requirements while building on Algeria's existing institutional framework for the Green Dam. FAO, as the GCF Accredited Entity, will provide oversight of financial management, procurement, and reporting in accordance with GCF policies. The Project Management Unit (PMU), embedded within the DGF structure, will be responsible for day-to-day coordination, technical supervision, and monitoring across all three outcomes.

A Project Steering Committee (PSC) will provide strategic direction, comprising representatives from MADRP, DGF, MOE, ANCC, HCDS, the Ministry of Water Resources, and FAO. The PSC will meet semi-annually to review implementation progress, approve annual work plans, and ensure cross-sectoral coordination. At the wilaya level, six Wilaya Climate Adaptation Committees - established under Activity 1.1.4 with binding 30% women's representation - will serve as the primary platforms for stakeholder engagement, participatory planning, and local governance of project activities.

A dedicated Gender Specialist will be recruited within the PMU to oversee implementation of the Gender Action Plan, supported by 13 Climate Wise Women (CWW) agents deployed across all Green Dam wilayas. A full-time M&E Officer will manage the project's monitoring, reporting, and verification systems, ensuring timely and accurate reporting to the GCF.

12. CONCLUSIONS

The project *"Improving climate resilience in steppe areas and dry forests of the Algerian Green Dam"* will address the agriculture, forestry, water, environment, and land-use planning sectors within the framework of climate change (CC) mitigation and adaptation.

It is expected that the project's results, in terms of both mitigation and adaptation across the six (6) targeted wilayas (El Bayadh, Naâma, M'Sila, Djelfa, Tébessa, and Khenchela), will lead to increased resilience of:

- The most vulnerable populations and groups, particularly in relation to health, well-being, and access to water;
- Forest ecosystems, steppe ecosystems, and the ecosystem services they provide.

The expected adaptation outcomes will benefit a population of 1,084,103 inhabitants, representing approx. 2.1% of Algeria's total population (≈ 25.6%) of the 6 target wilayas (595,039 men; 489,064 women) across 101 municipalities. These municipalities are part of the broader Green Dam territory, which includes 187 municipalities (54% of all municipalities).

The project will be implemented across three (03) geographical zones (West, Central, and East), covering an area of 454,138 ha (project coverage area), in 12 pilot municipalities, spanning 6 wilayas, delivering both adaptation and mitigation benefits

These objectives will be achieved primarily through improved efficiency in the management of climate change adaptation (CCA) programs in the targeted wilayas. This will be supported by enhanced coordination, stronger synergies among stakeholders, and the active involvement of all relevant sectors in the formulation, preparation, and implementation of project activities.

This need for coordination, stakeholder synergy, and cross-sectoral involvement has led the highest authorities in Algeria to establish a national coordinating body for combating desertification and relaunching the Green Dam program for the period 2023–2030.

The implementation timeline of this national initiative aligns with that of the proposed Green Climate Fund financing for the pilot project entitled *“Improving climate resilience in the steppe and dry forest areas of the Green Dam.”*

The communications, debates, interviews, and meetings conducted during public workshops in the six targeted wilayas, involving a wide range of stakeholders—including institutional representatives (Walis, Presidents of People’s Communal Assemblies) and civil society organizations—helped to clarify the project’s approach, address concerns, improve stakeholder perceptions, and establish a clear link between climate change challenges and the project’s objectives.

Previously, local populations perceived the project primarily as a continuation of reforestation efforts, which they believed would reduce pastoral and agricultural land in favor of forest expansion, thereby limiting their economic activities.

This resilience-building project is also aligned with the national land-use planning framework and is consistent with the first National Climate Plan (NCP) for the period 2020–2030, adopted in September 2019. Within this framework, the roles of the agriculture, rural development, and forestry sectors are critical for stabilizing rural populations and enhancing carbon sequestration.

The approach to be developed—covering both adaptation and mitigation—will rely on support from international institutions, particularly the Green Climate Fund, as well as on national experience in rural development and natural resource management. This approach is also intended to serve as a reference framework for:

- The seven (7) remaining wilayas of the Green Dam, covering approximately 1,283,352 hectares
- The broader steppe regions, which extend over approximately 32 million hectares
- The Great Green Wall initiative of the Sahel, within the framework of South-South cooperation with Algeria.

Finally, the project will generate valuable knowledge and data that will enable national authorities and sectoral stakeholders to develop new strategies and decision-making tools at the territorial level, while facilitating the integration of climate change considerations into planning and development processes.

The project will catalyse a fundamental paradigm shift in how Algeria manages its steppe and forest ecosystems - transitioning from a state-led, single-species conservation model with limited community inclusion to an integrated, multi-stakeholder, climate-responsive landscape management system. By establishing an enabling governance and climate information framework, restoring degraded agro-sylvo-pastoral ecosystems at scale, and building climate-resilient livelihoods through diversified value chains and sustainable finance, the project breaks the vicious cycle of climate stress and maladaptation that currently traps communities across the Green Dam landscape.

The project's strategic alignment with four complementary international climate finance initiatives - the FAO/GEF Bibans Project, the FAO/GEF Cork Oak Project, the UNDP/GEF Aleppo Pine Project, and the Adaptation Fund/IFAD Halfah Project - ensures that GCF investment amplifies and scales the collective impact of Algeria's climate action portfolio. The project further reinforces Algeria's commitments under the Great Green Wall Initiative, the Middle East Green Initiative, and the FAO REINVEST NENA Programme, positioning the Green Dam as a cornerstone of regional climate resilience.

With a total investment of USD 99.5 million - including USD 43 million from the GCF and USD 56.5 million in government co-financing representing 57% of total project cost - the project demonstrates strong national ownership and financial commitment. The Government of Algeria's substantial contribution guarantees institutional continuity and long-term sustainability of project outcomes. The project's exit strategy, embedded in its design across all three outcomes, ensures that restored ecosystems, strengthened

institutions, diversified livelihoods, and carbon finance revenues will sustain results well beyond the seven-year implementation period.

The feasibility analysis confirms that the project is technically sound, institutionally viable, environmentally and socially sustainable, and financially justified. It addresses genuine, measurable climate change impacts through evidence-based interventions calibrated to the specific vulnerabilities of the Green Dam landscape and represents the most effective use of GCF concessional financing to achieve lasting climate resilience for over one million people across Algeria's most vulnerable steppe and dryland ecosystems.