

## For the GCF Project “Improving climate Resilience in the steppe and Dry Forest Areas of the Algerian Green Dam”

### Project Site and activities

**Methodology.** GHG emission reductions/gains and the resulting carbon balance from proposed intervention packages are assessed using FAO’s Nationally Determined Contribution Expert Tool (NEXT, described in the following sections), with a project implementation period of 7 years<sup>1</sup>. The main methodology is based on the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories* (IPCC, 2019). Tier 2 methodology was adopted for some activities; see Table 1. We assumed the dominant climate and soil type of the wilayas following the IPCC classification, i.e., warm temperate dry climate and High Activity Clay soil.

**Land-use assumptions.** For activities under Outcome 2, we considered that all interventions were taking place on severely degraded grasslands. This choice is motivated by the fact that most of the areas are degraded and that the soil organic carbon content for this IPCC land-use category is the lowest, making it the closest available representation of degraded land (a category not formally defined by the IPCC). For land under Outcome 3, the initial land was assumed to be annual cropland with full tillage and low inputs.

**Data sources and scope.** The implementation timeline of the activities (referred to in NEXT as the “dynamic of implementation”) was aligned with the “financial” deployment reported in Annex IV. The matrix of land-use changes is available in the “AGRIFOOD INDICATORS” worksheet. The annual changes in activity data are available in the target section of the “USER ACTIVITY DATA” worksheet and repeated in the “USER NOTE” worksheet. The assumptions made are listed in Table 1 and in the “USER NOTE” worksheet in NEXT. Only activities with an impact on carbon stocks and GHG emissions, and a quantifiable indicator, are discussed.

**Survival rates and emissions assumptions.** All land-based interventions are expected to have a positive impact on carbon stock (biomass and soil). A survival rate was applied to forestry activities, including natural regeneration of *Opuntia* plantations (70 percent). For other agroforestry activities, a survival rate of 90 percent was used, assuming active farmer involvement in these actions. Survival rate is factored into the growth rate to simplify tracking of land use and land management changes. Poultry is the only activity expected to generate a small amount of GHG emissions, from manure (CH<sub>4</sub> and N<sub>2</sub>O).

**Carbon balance results.** For each intervention package, the carbon balance is computed per the assumed number of hectares where interventions will be implemented. Results are provided in Figure 1 for the mid-term project, project completion, and 20 years after project start. This amounts to a total reduction of GHG emissions of 1,838,910 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>-eq), or 1.8 million tCO<sub>2</sub>-eq, 20 years after project start (year 2046) across all areas combined. Of this, about 1.13 million tCO<sub>2</sub>-eq is sequestered in biomass and about 703,00 tCO<sub>2</sub>-eq in soil (see “Results summary” worksheet).

**Breakdown by activity.** The 20-year mitigation potential by activity is available in the “Balance cumulative” worksheet and reproduced in Table 1. Restoration of grazing areas, together with forestry activities, has the most significant impact, contributing about 1.46 million tCO<sub>2</sub>-eq combined (see “Balance cumulative” and “USER NOTE” worksheets) as enhanced carbon in biomass and soil. Cropland activities are the main driver of enhanced soil organic carbon sequestration.

<sup>1</sup>Except for some activities that start and/or end at different points within the implementation period; see Annex IV and the “USER ACTIVITY DATA” worksheet in NEXT.

Table 1. Details of the activities included in NEXT with a potential impact on carbon stock changes and or emission reductions

| Component & Activities                                                                     | Assumptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Hectares <sup>2</sup> | NEXT Allocation      | Mitigation potential 20 years | Tier 2                      |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------|-------------------------------|-----------------------------|
| <b>Component 2: Ecosystem Restoration &amp; Climate-Resilient Land Management</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                      |                               |                             |
| Outcome 2. Increased Resilience of Agro-Sylvo-Pastoral Ecosystems                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                      |                               |                             |
| <b>Output 2.1 Pastoral and Forest Heritage Rehabilitated, Protected and More Resilient</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                      |                               |                             |
| Activity 2.1.2 Implement a program for climate-resilient rangeland management              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>28,491</b>         |                      |                               |                             |
| <i>pastoral planting</i>                                                                   | The practices will lead to the rehabilitation of the native grassland with an increase of the biomass and an increase of the SOC, from severely degraded to non-degraded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3,780                 | Crop & Grass   AGL-1 | -110,144                      |                             |
| <i>Opuntia plantations</i>                                                                 | This will lead to an increase of biomass and the SOC. The proxy “perennial monoculture / orchards” is used.<br><br>The default biomass growth rate is corrected in tier 2 after Perez, 2021. The maximum of biomass found in literature according to Perez is up 50 t dry matter (35.1% C content). The carbon stored by O. maxima in Tenerife is 25.6 tons/ha and 21.24 tons/ha for O. dillenii. O. maxima usually produces less than 10 tons of aerial dry matter hectare-1 year-1 under non-irrigated conditions (de Cortázar & Nobel, 1986; de Cortázar & Nobel, 1992). A global-scale study [...] obtained a theoretical estimation of 2 tons hectare-1 year-1 of O. maxima aerial dry matter for the Canary Islands (Nobel, 1991b). Here we took the lowest growth rate, 2*35.1% tC/ha/year and derived the maximum period of growth rate from 21.24/(2*35.1%). | 1,092                 | Crop & Grass   AGL-2 | -33,434                       | Yes, scientific publication |
| <i>Assisted enclosure/deferred grazing</i>                                                 | The management practices help to increase SOC sequestration and restore biomass. The increase of biomass is estimated using the conservative approach of IPCC, shifting from severely degraded to non-degraded although several practices could further increase the SOC rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 23,619                | Crop & Grass   AGL-3 | -689,483                      |                             |

<sup>2</sup> Except for poultry which is in number of head

|                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |                      |          |                |
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| <i>forage seed collection (stipa tenacissima)</i>                                               | Not included                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |                      |          |                |
| Activity 2.1.3 Reforestation and revegetation of forest heritage through community associations |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>4,214</b> |                      |          |                |
| <i>Reforestation</i>                                                                            | <p>Reforestation completed across 1,145 ha, using diverse native species with survival rate monitoring reports</p> <p>We used the different growth rates reported under subtropical steppe in NID 2024, the dominant global ecological zones in the project areas, to estimate the carbon sequestration from the forest biomass. The survival rate is 70%</p>                                                                                                                                               | 1,145        | Forestland   AFO-1   | -230,262 | NID Table 6.23 |
| <i>Repopulation</i>                                                                             | <p>Underperforming forest stands replanted across 1,333 hectares, with enclosure protection measures installed and verified</p> <p>We used the different growth rates reported under subtropical steppe, the dominant global ecological zones in the project areas, to estimate the carbon sequestration from the forest biomass. We considered the activities will allow the biomass to increase on 5% of the area over the period of implementation. The survival rate is 70%</p>                         | 1,333        | Forestland   MOF-1   | -13,989  | NID Table 6.23 |
| <i>Row planting</i>                                                                             | Hedgerow. Assumed 4 meters width                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1            | Crop & Grass   AGL-4 | -9,521   |                |
| <i>Planting green strips</i>                                                                    | <p>1,735 ha green belts and roadside plantations established across six wilayas with species composition records</p> <p>This fall under reforestation. We used the different growth rates reported under subtropical steppe in NID 2024, the dominant global ecological zones in the project areas, to estimate the carbon sequestration from the forest biomass. The survival rate is 70%</p>                                                                                                              | 1,735        | Forestland   AFO-2   | -354,355 | NID Table 6.23 |
| Activity 2.1.4 Implement Dune Fixation Programme to Control Silting and Wind Erosion            | The activities lead to the stabilization of the dunes, reduced soil erosion, and increased soil organic carbon sequestration, leading to improved ecosystem resilience and biodiversity recovery in degraded areas                                                                                                                                                                                                                                                                                          | 3,150        | Crop & Grass   AGL-5 | -95,700  |                |
| Activity 2.1.5 Strengthening forest health through silvicultural management and pest control    | <p>Led by DGF, silvicultural interventions across 2,688 hectares improves forest health through silvicultural management (thinning, pruning, sanitary felling, gap-filling replanting), diversifies Aleppo pine monocultures by introducing native broadleaved species, and applies Integrated Pest Management against priority pests and diseases.</p> <p>We used the different growth rates reported under subtropical steppe, the dominant global ecological zones in the project areas, to estimate</p> | 2,688        | Forestland   MOF-2   | -58,290  | NID Table 6.23 |

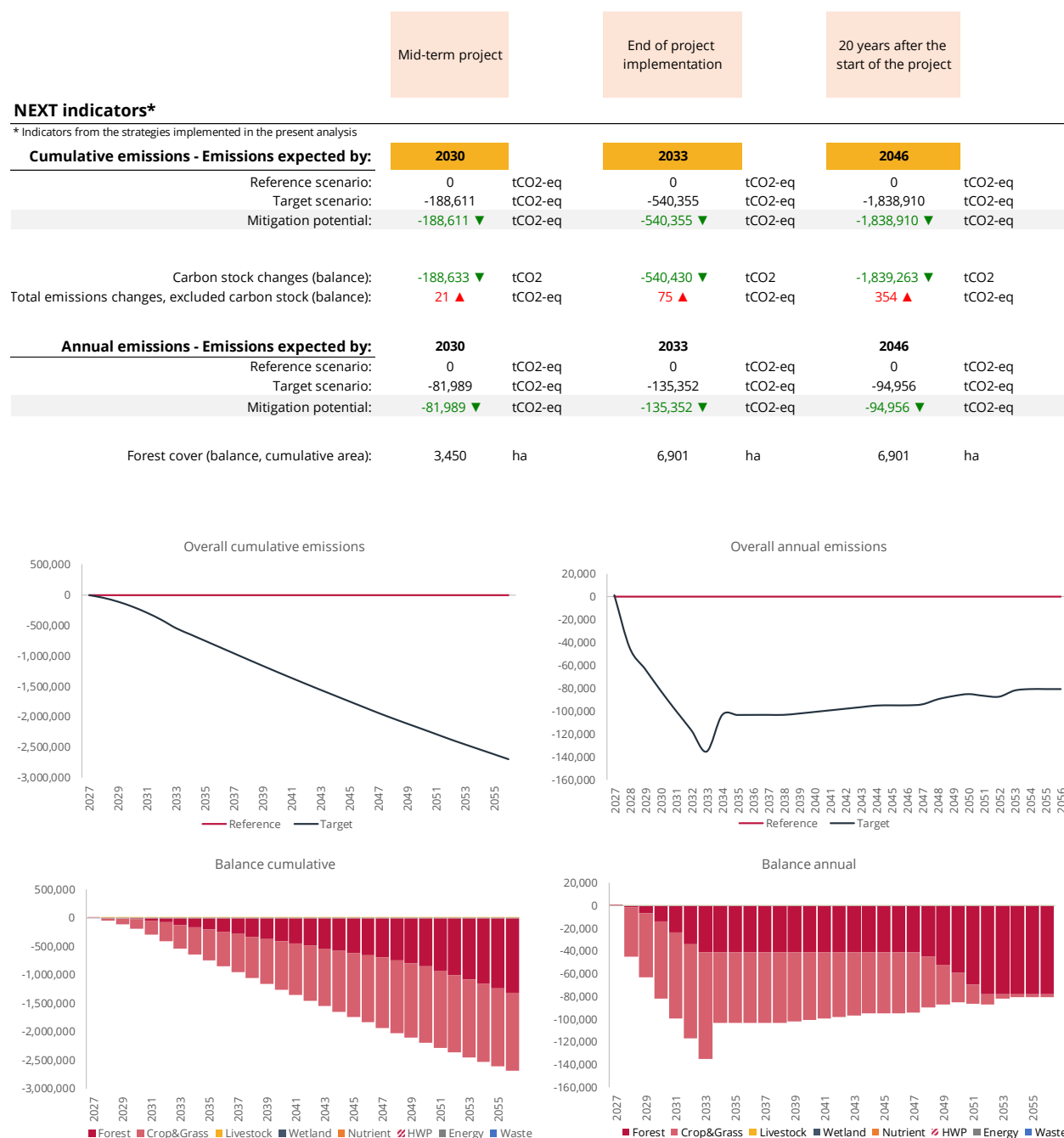
|                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                       |         |                        |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------|---------|------------------------|
|                                                                                                     | the carbon sequestration from the forest biomass. We considered the activities will allow the biomass to increase on 10% of the area over the period of implementation. The survival rate is 70%.                                                                                                                                                                                                                                                                                                                                                 |       |                       |         |                        |
| Activity 2.1.6 Strengthen Forest Fire Management and Protection Infrastructure                      | Not included                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                       |         |                        |
| <b>Output 2.2 Agricultural and Water Systems Restored and Sustainably Managed</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                       |         |                        |
| Activity 2.2.1: Rehabilitate Agricultural Access Tracks to improve rural connectivity               | Road reconstruction (478 km)<br>Width of the roads is estimated to 2.5 meters                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 120   | Crop & Grass   AGL-6  | 0       |                        |
| Activity 2.2.2 Implement Soil and Water Conservation Structures and 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. Plantations of Tamarix.<br><br>Tier 2 from scientific literature. Assumed growth over 5 years the implementation period of the activity to remain conservative. Survival rate is 70% | 1,500 | Crop & Grass   AGL-11 | -5,342  | Yes                    |
| Activity 2.2.3 Mobilize and Store Water Resources for Agro-Pastoral Systems                         | Not included                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                       |         |                        |
| Activity 2.2.4 Promote Efficient Irrigation and Water Distribution Systems                          | Irrigation systems considered under settlement<br>Orchards will benefit from this. However, its is not possible to estimate its impact on SOC sequestration with the current IPCC methodologies.                                                                                                                                                                                                                                                                                                                                                  | 70    | Crop & Grass   AGL-7  | 0       |                        |
| <b>Component 3: Climate-Resilient Livelihoods, Value Chains and Sustainable Finance</b>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                       |         |                        |
| Outcome 3: Enhanced Resilience and Income Diversification of Local livelihoods                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                       |         |                        |
| <b>Output 3.1 : Value chains are enhanced and climate-resilient</b>                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                       |         |                        |
| Activity 3.1.1: Develop Six Priority Value Chains                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                       |         |                        |
| <i>Establishment of 60 opuntia oil extraction units supported by a plantation covering 1200 ha,</i> | The project will promote the development of six priority value chains, one of them being the opuntia seed oil. This will lead to an increase of the biomass and the SOC. The proxy “ perennial monoculture / orchards ” is used.                                                                                                                                                                                                                                                                                                                  | 1,200 | Crop & Grass   AGL-8  | -97,648 | Scientific publication |

|                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                       |         |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------|---------|--|
|                                                                                                                                                    | The default biomass growth rate is corrected in tier 2 after Perez, 2021. The maximum of biomass found in literature according to Perez is up to 50 t dry matter (35.1% C content). The carbon stored by <i>O. maxima</i> in Tenerife is 25.6 tons/ha and 21.24 tons/ha for <i>O. dillenii</i> . <i>O. maxima</i> usually produces less than 10 tons of aerial dry matter hectare-1 year-1 under non-irrigated conditions (de Cortázar & Nobel, 1986; de Cortázar & Nobel, 1992). A global-scale study [...] obtained a theoretical estimation of 2 tons hectare-1 year-1 of <i>O. maxima</i> aerial dry matter for the Canary Islands (Nobel, 1991b). Here we took the lowest growth rate, average $(2,10) \times 35.1\%$ tC/ha/year and derived the maximum period of growth rate from $25.6 / ((2,10) \times 35.1\%)$ . |       |                       |         |  |
| <i>Establishment of 24 olive oil mills supported by an olive grove covering an area of 3600ha</i>                                                  | The project will promote the development of six priority value chains, one of them being olive. The survival rate is 90%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 3,600 | Crop & Grass   AGL-9  | -81,179 |  |
| <i>Establishment of 12 units for the extraction of essential oils from Rosemary, including the establishment of sales outlets for the product.</i> | Not included - no GHG impact already existing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                       |         |  |
| <i>Establishment of one (1) unit processing peppermint, including a drying shed and cultivation on 10 hectares to promote local Ghassoul mint</i>  | Not included - no GHG impact already existing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                       |         |  |
| <b>Output 3.2 — Climate-Resilient Service Delivery and Access to Clean Energy Improved</b>                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                       |         |  |
| Activity 3.2.1 Provide rustic fruit cultivation for pastoral farms                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                       |         |  |
| <i>Rustic Fruit Orchards</i>                                                                                                                       | <p>This activity aims to establish drought-hardy fruit tree cultivation across 5,974 hectares and promote 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</p> <p>In the module, under orchard minus area occupied by olive trees (3.1.1 - Crop&amp;Grass   AGL-9) to avoid double counting of areas. The development of these agroforestry systems will enhance carbon</p>                                                                                                                                                                                   | 5,974 | Crop & Grass   AGL-10 | -49,680 |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                       |              |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|--------------|--|
|                                                                                                                                                                                                                                                                                                                                                                                                                       | sequestration in the biomass and the soil<br>The survival rate is 90%                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                       |              |  |
| Promotion of agroforestry in MEV areas                                                                                                                                                                                                                                                                                                                                                                                | Not included - no GHG impact already existing (Valorization of existing forest)                                                                                                                                                                                                                                                                                                                                                                                       |                 |                       |              |  |
| Windbreak planting                                                                                                                                                                                                                                                                                                                                                                                                    | Hedgerow. Assumed 4 meters width                                                                                                                                                                                                                                                                                                                                                                                                                                      | 129             | Crop & Grass   AGL-4  | See<br>above |  |
| Activity 3.2.2 Deploy Small-Scale Livestock Modules for Rural Households                                                                                                                                                                                                                                                                                                                                              | Developing small-scale poultry farming: 120 units of 200 chicks.<br>Accounting emissions from manure management<br><br>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 | 24,000<br>heads | Livestock   LIVE-1    | 354          |  |
| Activity 3.2.3 Install hydroponic forage production systems<br><br>This activity aims to strengthen the forage balance and climate resilience of livestock farmers by [...] complemented by 360 field-based barley cultivation sites [...], and 240 alfalfa production units, reducing dependence on degraded rangelands and alfa grass areas through year-round, water-efficient soil-independent fodder production. | Sub-activity 3.2.3.2 Establish field-based barley cultivation across 5ha/unit<br><br>The barley is sown after the riverbanks have flooded.                                                                                                                                                                                                                                                                                                                            | 1,800           | Crop & Grass   AGL-12 | -4,966       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                       | Sub-activity 3.2.3.2 Supplementary Afalfa<br><br>N-Based plant and irrigation. SOC is going from low to high inputs without manure<br><br>full tillage to reduced tillage                                                                                                                                                                                                                                                                                             | 1,200           | Crop & Grass   AGL-13 | -5,270       |  |

Notes: For Opuntia, we used biomass growth rates reported in Perez, ER. 2021. Calculation of carbon storage of invasive species (Opuntia spp.) in Tenerife. Master Universitario en Biodiversidad de La Laguna. For forest activities, we used the biomass growth rate from table 6.23 of the National Inventory Document (NID) of Algeria 2024 Submission under the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement. For *Tamarix* sp. (activity 2.2.2), after KUMAR KOTHAR et al, 2025. Tree Biomass, Carbon Inventory and Annual Carbon Sequestration Potential of Different Tree Species in a Coastal District of West Bengal, Indi. J. Indian Soc. Coastal Agric. Res. 43(2):126-140(2025) <https://doi.org/10.54894/JISCAR.43.2.2025.167887>. Output 2.1: We took grassland severely degraded as the main initial land use, given it is the one with the lowest SOC. Biomass is corrected with the ratio SOC grassland degraded/SOC ref. Output 3: We took annual cropland full tillage & low inputs as initial land to represent a land already under agriculture with low management practices. Tier 2 means here the update of tier 1 (default IPCC 2019 carbon stock and emission factors) with more suitable information such as for Opuntia. Table 6.23 of the NID reports default values used for the different ecological zones. Goats are excluded from the analysis. The better feeding practices is expected to decrease of the CH<sub>4</sub> emissions from enteric fermentation. However, there is no sufficient information to support the analysis at that stage.

Figure 1. NEXT dashboard



## Additional notes

- **On Measurement, Reporting and Verification (MRV):** A dedicated mitigation MRV system for GHG progress will be established during project implementation. As part of the M&E activities, a GHG-monitoring protocol will be developed, detailing data collection procedures and linking these to the NEXT tool. Under this protocol, an *ad hoc* monitoring matrix will be developed for each activity used in the *ex-ante* calculation (Table 1, Annex 22), ensuring that relevant key data are collected in line with project implementation progress and used to measure mitigation potential as the project advances e.g. restored and managed areas, planted areas (including survival rate), number of small-scale poultry units, etc.

Data will be collected quarterly through field reports, georeferenced surveys, GIS/remote sensing, and on-site screening checks. The PMU will explore the use of mobile data collection and survey tools to gain efficiency on reporting and monitoring.

The PMU, in collaboration with FAO technical support and DGF, will use this data as input the NEXT tool to calculate the annual mitigation potential. The calculation will be accompanied by an explanation of the underlying data (disaggregated by activity), sites, and assumptions (including any deviations from the *ex-ante* estimates) along with the rate of progress consistent with the logical framework mid-term and end of project-target, results as per the Annual Progress Report will be reported in tCO<sub>2</sub>eq, in addition to further disaggregation per activity and gas.

QA/QC procedures will include data completeness checks, spatial validation, and consistency checks against implementation records, together with tool version control and documentation of assumptions and uncertainty. Verification will comprise internal technical review, sample-based field verification, and, where applicable, independent verification aligned with GCF reporting requirements. Together, these measures will ensure that *ex-ante* mitigation estimates are progressively updated with implementation evidence, remaining transparent, conservative, and verifiable throughout the project.

- **On leakage and permanence:** Leakage has not been factored into the GHG appraisal. Estimating leakage would require constructing a set of assumptions about the probability and magnitude of activity displacement (for example, whether grazing pressure shifts to adjacent areas, or whether biomass extraction moves elsewhere) that cannot be empirically grounded at the ex-ante stage. Including an estimate that is neither verifiable nor monitorable at this stage would risk introducing a spurious level of precision into the analysis and could undermine rather than strengthen its credibility. For symmetry, and for the same reasons, positive indirect effects such as replication and broader mitigation co-benefits have equally been excluded. This conservative and consistent treatment ensures the reported carbon balance represents a defensible lower bound of the project's climate change mitigation potential. While the project expects negligible leakage, Activity 1.2.1 and Activity 1.2.3 of the project, which are associated with M&E, MRV, and GIS establishment and data collection, will help support and identify any leakage and permanence issues/ biomass loss factors (drought, fire, grazing pressure etc.) that take place during the project. These measurements are expected to take place on a biannual basis during the project implementation period. In case of significant changes detected, an updated GHG estimation using NEXT tool will be carried out and inform according to the GCF.

- **On additionality:** The afforestation and forest management related activities of the project are additional to existing DGF forestry activities, with no area overlap between the project and the DGF programme. However, for the activities related to perennial agroforestry, rangeland management and perennial monocultures, the baseline areas of the DGF programme associated with these activities still need to be determined. This would be possible to estimate during year 1 of the project when baseline surveys, data collection and M&E will be conducted. The NEXT model will also be updated to reflect the DGF areas (reference areas) for these activities at the project baseline stage.

- **On uncertainty:** Uncertainty is not addressed in the document. The only source that can be quantified at this stage is the activity data, which are ex-ante projections, alongside the uncertainty ranges the IPCC publishes for the Tier 1 (and, where used, Tier 2) emission factors and carbon stock values applied in the calculations. During monitoring, the activity data will be updated with observed values, together with Tier 1 emission factors or carbon stock values where possible. A quantitative uncertainty analysis was not considered appropriate to include at this stage.

## Methodologies for GHG accounting

### The Nationally Determined Contribution Expert Tool (NEXT) tool

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 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. NEXT was developed using the Intergovernmental Panel on Climate Change (IPCC) methodologies, and estimates can be made using either the IPCC 2006 guidelines or the IPCC 2019 refinement to the IPCC 2006, which are complemented with the IPCC 2013 Wetlands Supplement. 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 (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions, expressed in a tonne of carbon dioxide equivalent per year, tCO<sub>2</sub>-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<sup>3</sup>).

Thanks to the 30 years reading grid, NEXT can be used at multiple points in time of the climate mitigation commitments, including NDC, investments, and projects:

- Before the implementation of climate action to evaluate its potential changes on GHG emissions reductions
- During the implementation of a climate action to assess and report progress toward the mitigation goal and evaluate additional GHG emissions reductions to achieve the mitigation commitments,
- At the end of the climate action period, assess its achievement regarding GHG emissions reductions.

The 30-year time series of results per gas, activity, and carbon pool allows us to understand the impact of past and current climate actions and shape the necessary actions and related international and national investments for countries to meet their climate targets.

### NEXT logic

NEXT allows users to assess the impact of climate actions against a hypothetical reference scenario. In NEXT's terminology, the climate action is defined as the target, while the hypothetical baseline scenario is the reference. A climate action can be a policy, or low-carbon measures implemented within the country or region of interest.

3 Schiettecatte, L-S., Audebert, P., Umulisa, V., Dionisio, D., and Bernoux, M., 2022a The Nationally Determined Contribution Expert Tool (NEXT): A Comprehensive Greenhouse Gas Accounting Tool to Support Annual Environmental Impact Assessment Over a 30-Year Time Series in the Agriculture, Forestry and Other Land Use Sector. *Front. Clim.* 4:906142. doi: 10.3389/fclim.2022.906142. Schiettecatte, L-S., Audebert, P., Umulisa, V., Dionisio, D., and Bernoux, M., 2022b. Technical Guidance to the Nationally Determined Contribution Expert Tool, NEXT. Rome: FAO.

In the context of low-carbon development, the reference scenario refers to scenarios based on the assumption that no mitigation policies or measures will be implemented beyond those already in force or planned to be adopted. The reference scenario is not a prediction of the future but rather a counterfactual projection based on information retained to indicate the level of emissions without any mitigation policy or with existing baseline policy measures already put in place. The term “**reference scenario**” can be used interchangeably with **the baseline or BAU scenarios**.

Once users have provided a set of basic information per activity, which is the area, the start and end of the climate action, and the land management practices, NEXT will estimate the annual and cumulated GHG fluxes and carbon stock changes from the transition of the initial land-use or management practices to the final land-use or management practices, including changes in GHG fluxes and carbon stocks that will keep occurring after the end of the climate action. These estimates are done for the target, the reference scenario, and, ultimately, the balance. The final results of NEXT are the potential changes in GHG emissions reductions per activity and per gas. This potential change in GHG emissions reductions, or balance, is defined as the difference between the gross fluxes from the target and those from the reference.