



ANNEX 23

Beneficiary Estimation Methodology

Mauritania

February 2025



Annex 22 – Beneficiary Estimation Methodology

Green Climate Fund Full Proposal

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List of acronyms and abbreviations

Acronym	Explanation
CSA	Climate-smart Agriculture
EbA	Ecosystem-based Adaptation
GCF	Global Climate Fund

1. Description of methodology for estimating project beneficiaries

1.1. Project Background

Prolonged droughts across Mauritania have accelerated vegetation loss in desert environments, diminishing ecosystem services related to sediment stabilisation and water infiltration. As a result, the rate of dune advancement along the Sahara-Sahel boundary has increased, leading to greater sand encroachment in oases. This has negatively impacted water resources, agricultural productivity and income generation across northern Mauritania.

The siltation of dams, boreholes, wells and rivers has reduced the accessibility and availability of already scarce water resources. Additionally, reduced rainfall and decreased water infiltration due to vegetation loss have lowered the water table, causing many pastoral wells to dry up. This has made it increasingly difficult for pastoralists to sustain traditional nomadic lifestyles, leading many to adopt a sedentary lifestyle around rural oases. As a result, pressure on limited natural resources — such as food, water and income-generating opportunities — has intensified around these oases, contributing to the strain on communities. Sand inundation also poses a direct threat to critical socio-economic infrastructure within the Sahel-Sahara region, including roads, schools and hospitals. In extreme cases, entire villages and communities have been displaced by advancing sand encroachment. The Sahara Desert's projected expansion southward into the Mauritania's most fertile lands — in the Sahelian region and near the Senegal River — is expected to exacerbate these issues.

Ecosystem restoration and conservation along the Sahel-Sahara boundary are necessary to slow the rate of desertification and improve water security in Mauritania. These efforts — which include measures like dune stabilisation — will improve ecosystem services, such as water infiltration, flood attenuation and the provision of natural resources. The project has identified four regional hubs in northern Mauritania where desertification processes are most extreme and adaptation needs are greatest. These hubs are: i) Aoujeft, in the Adrar wilayah; ii) Rachid, in the Tagant wilayah; iii) Tamcheket, in the Hodh El Gharbi wilayah; and iv) Néma, in the Hodh Ech Chargui wilayah.

The proposed GCF project will equip local communities with the operational and technical capacities needed to implement selected climate adaptation measures. Within each of the four target hubs, the project will focus on, *inter alia*: i) stabilising dunes and controlling sand encroachment; ii) improving water resource management and demand planning; iii) adopting sustainable agricultural and livestock management practices; and iv) promoting sustainable natural resource-based livelihoods.

1.2. Beneficiary Background

Adaptation interventions within the project will have both direct and indirect beneficiaries. Direct beneficiaries are defined as individuals who experience an immediate and sustained reduction in vulnerability, as a result of GCF investments, due to improvements in: i) resilience of physical and natural assets; ii) economic and social well-being; and iii) climate-adaptive capacities. Indirect beneficiaries include individuals who do not directly participate in or use project interventions but nonetheless experience positive impacts. These indirect impacts include: i) increased household or community financial resilience due to greater household incomes; ii) improved adaptive capacity through knowledge sharing within households and communities; iii) increased resource availability due to reduced pressure on existing resources; and iv) reduced competition over resources as a result of increased resource availability.

Given the project activities (Table 60 in Annex 2), it is expected that each of the four target hub communities will experience considerable benefits. These hubs are population centres within their respective wilayahs, collectively housing a considerable portion of Mauritania's sparsely distributed population^{1,2,3}. As project activities will restore ecosystem services primarily around target hubs, individuals living within and around the target hubs will see improvements in water security, agricultural productivity, economic stability and climate resilience.

Project activities like dune stabilisation, for example, will limit further sand encroachment — this protects infrastructure such as wells, roads and agricultural land and provides continued access to resources. Establishing mechanical and biological dune-stabilisation infrastructure and green belts will restore degraded landscapes and reduce the risks associated with wind erosion and sand deposition. These protective measures will preserve the viability of existing agricultural and pastoral lands and reduce the migration pressures associated with land degradation. The exact positioning of dune-fixation sites will be finalised during the project implementation stage, through the development of commune-level restoration plans. This will take place in consultation with local community members in each priority commune, using culturally appropriate and site-specific indicators to promote local ownership. Sites for the establishment of buffer zones — in which Ecosystem-based Adaptation (EbA) dune-fixation measures, including land rehabilitation and afforestation, will be implemented — were strategically selected to ensure that high-risk preliminary target communes are afforded maximum protection against southward-advancing sand dunes.

Water security interventions — including ecosystem-based measures, such as planned tree barriers, the implementation of water-harvesting infrastructure and the promotion of water-efficient agricultural techniques — will directly improve the availability of water resources in each hub. Increased access to household and agricultural water supply will reduce dependence on deepening wells or costly water-transport alternatives. These benefits will extend beyond direct project participants, since neighbouring communities will experience improved groundwater recharge and reduced pressure on shared water sources.

Agricultural productivity improvements, through the adoption of climate-smart agricultural (CSA) techniques, will enable farmers within each hub to increase crop yields and diversify their income sources. CSA techniques — which include the use of drought-resistant crop varieties, drip irrigation and agroforestry practices — have already demonstrated success in increasing yields and financial returns in similar arid environments⁴. As more farmers implement these techniques, the increased market availability of food, reduced competition for arable land and expanded agricultural opportunities will benefit the surrounding communities.

Efforts to diversify livelihoods will improve economic stability by promoting sustainable income-generating activities — this includes non-timber forest product collection, small-scale food processing and climate-resilient livestock management. Higher household incomes will result in strengthened local markets, increased employment opportunities and improved financial security for indirect beneficiaries.

By incorporating a hub-based approach, the project outlines adaptation measures that — if implemented within the four target hubs — will extend their benefits to adjacent communities.

¹ National Agency for Statistics and Analysis of Economic Data (ANSADE) of Mauritania/2023 General Population and Housing Census (see ANSADE website).

² World Population Review. 2022. Mauritania population 2022 (live). Available at:

<https://worldpopulationreview.com/countries/mauritania-population>.

³ EarthData. N.d. Gridded Population of the World, Version 4 (GPWv4): Population Density, Revision 11. Available at:

<https://sedac.ciesin.columbia.edu/data/set/gpw-v4-population-density-rev11>.

⁴ Saadani Y. 2017. Project of Enhancing Resilience of Communities to the adverse effects of Climate Change on Food Security in Mauritania (PARSACC): Mid-term evaluation. Available at: <https://www.adaptation-fund.org/projects-document-view/?URL=https://pubdocs/en/880911532334932499/pdf/14-MTE-AF-Project-Mauritania-English.pdf>



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These neighbouring communities are considered indirect beneficiaries (~~Table 2~~~~Table 2~~), contributing to impact of the project interventions. Improved environmental conditions, resource availability and economic stability in neighbouring communities will strengthen the region's long-term resilience, promoting a sustainable future for all beneficiaries.

For both the direct and indirect beneficiaries (Table 1 and 2), the benefits of adaptation activities have been outlined. As the same project adaptation activities will be carried out in all four target hubs, the benefits experienced by local communes will be similar across all four target hubs.

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2. Project beneficiaries

2.1. Direct beneficiaries

Table 1. The number of direct beneficiaries across the four target hubs⁵. Adaptation actions and the benefits they will provide to local communes have been included.

Direct beneficiaries					
Hub	Target commune	Males	Females	Total	Adaptation Actions & Direct Benefits
Aoujeft	Aoujeft	2,615	2,747	5,362	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will protect infrastructure and farmlands, and limit siltation of water sources • Water Security Interventions, such as tree planting: Will increase household and agricultural water supply • Climate-Smart Agriculture Techniques: Will support higher crop yields, improved food security and opportunities for livelihood diversification • Livelihood Diversification: New income sources and strengthened local markets
	Elmaeden	1,750	1,727	3,477	
	Ain Savra ⁶	1,072	939	2,011	
	Elmeddah	1,751	1,651	3,402	
Total Aoujeft		7,188	7,064	14,252	
Rachid	Tidjikdja	8,880	10,506	19,386	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will protect infrastructure and farmlands, and limit siltation of water sources • Water Security Interventions, such as tree planting: Will increase household and agricultural water supply • Climate-Smart Agriculture Techniques: Will support higher crop yields, improved food security and opportunities for livelihood diversification • Livelihood Diversification: New income sources and strengthened local markets
		4,265	4,230	8,495	
	El Wahat				
Total Rachid		13,145	14,736	27,881	
Tamcheket	El Mabrouk	1,495	1,535	3,030	

⁵ National Agency for Statistics and Analysis of Economic Data (ANSADE) of Mauritania/2023 General Population and Housing Census (see ANSADE website).

⁶ Ministère des Affaires Economiques et du Développement (MAED) & Office National de la Statistique. 2013. Recensement Général de la Population et de l'Habitat (RGPH 2013). Available at: http://www.dgct.mr/wp-content/uploads/2016/06/Populations-2013-brochure-RGPH_Final-4-aou.pdf

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		4,942	6,050	10,992	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will protect infrastructure and farmlands, and limit the siltation of water sources — particularly in El Mabrouk • Water Security Interventions, such as tree planting: Will increase household and agricultural water supply • Climate-Smart Agriculture Techniques: Will support higher crop yields, improved food security and opportunities for livelihood diversification • Livelihood Diversification: New income sources and strengthened local markets
	Guaet Teidouma				
Total Tamcheket		6,437	7,585	14,022	
Nema	Jreif	2,707	3,324	6,031	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will protect infrastructure and farmlands, and limit the siltation of water sources — particularly in Nwal and Jreif. A combination of biological and mechanical (green-grey) dune fixation measures will be installed around vulnerable infrastructure in Oualata and Nbeiket Lahwache to protect farmlands, water sources and infrastructure. • Water Security Interventions, such as tree planting: Will increase household and agricultural water supply • Climate-Smart Agriculture Techniques: Will support higher crop yields, improved food security and opportunities for livelihood diversification • Livelihood Diversification: New income sources and strengthened local markets
	Nwal	2,704	2905	5,609	
	Oualata	2,362	2,420	4,782	
	Nbeiket Lahwache	6334	6318	12652	
Total Nema		14,107	14,967	29,074	
Grand total		40,877	44,352	85,229	

In the Aoujeft hub (Adrar wilayah), adaptation actions will focus on limiting desertification and improving water resource management. A 325ha community-managed buffer zone will be established using EbA dune fixation measures, alongside green-grey dune fixation infrastructure around vulnerable sites. Water availability will be enhanced through potential implementation of groundwater dams, clay dikes, stone gabions and stone bunds, based on hydrogeological assessments. These adaptation actions will increase water infiltration and raise the water table, making wells more reliable and accessible, especially for pastoral communities. The project will promote climate-smart agriculture practices and support alternative livelihoods in the priority communes of Ain Savra, Elmeddah, Elmaeden and Aoujeft.

Adaptation activities in the Rachid hub (Tagant wilayah) will focus on mitigating sand encroachment and enhancing agricultural resilience. A 296ha community-managed buffer zone will be created using EbA dune fixation techniques, with green-grey dune fixation infrastructure placed



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strategically around vulnerable areas. Limiting sand encroachment benefits local communities by preserving agricultural land for local food security and income generation, and ensures continued access to essential services like healthcare and education by preventing sand inundation of roads and buildings. Water resource management will be addressed through potential construction of groundwater dams, clay dikes, stone gabions and stone bunds. The project will support climate-smart agriculture practices and diversified livelihood options in the priority communes of Tidjikja and El Wahat. For example, drought-resistant crops will reduce vulnerability to rainfall variability, providing communities with more stable harvests, even during dry periods

Adaptation actions in the Tamchekett hub (Hodh El Gharbi wilayah) will concentrate on limiting siltation, managing water resources and strengthening agricultural and livestock resilience. A 333ha community-managed buffer zone will be established using EbA dune fixation methods, with green-grey dune fixation infrastructure protecting vulnerable infrastructure. Water management interventions may include groundwater dams, clay dikes, stone gabions and stone bunds, to increase water infiltration and raise the water table. The project will promote climate-smart agriculture practices and alternative livelihoods in the priority communes of El Mabrouk and Gueate Teidoume — specific adaptation actions include drip irrigation systems to conserve scarce water resources while maximizing agricultural output and training in non-timber forest product collection and small-scale food processing to create new employment opportunities, particularly for women and youth

In the Néma hub (Hodh Ech Chargui wilayah), adaptation actions will address flood risks, manage water resources and promote sustainable livelihoods. A 185ha community-managed buffer zone will be established using EbA dune fixation techniques, with green-grey dune fixation infrastructure implemented around high-risk villages in Oualata and NBeiket Lahwache. Water resource management may involve groundwater dams, clay dikes, stone gabions and stone bunds. The project will support climate-smart agriculture practices and livelihood diversification in the priority communes of Oualata, NBeiket Lahwache, Nwal and Jreif. Given the higher flood risk in this hub, activities will be designed to address this specific vulnerability.

2.2. Indirect beneficiaries

Table 2. The number of indirect beneficiaries across the four target hubs⁷. Adaptation actions and the benefits they will provide to local communes have been included.

Indirect Beneficiaries					
Hub	Commune	Males	Females	Total	Adaptation Actions & Indirect Benefits
Aoujeft	N'Teirguent	796	840	1,636	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will experience reduced sand encroachment and improved regional agricultural viability • Water Security Interventions, such as tree planting: Will improve the groundwater recharge experienced by surrounding communities • Climate-Smart Agriculture Techniques: Will enhance food market availability and regional food security • Livelihood Diversification: Will support economic stability and job opportunities in neighboring areas
Total Aoujeft		796	840	1,636	
Rachid	Tensigh ⁸	3,186	3,595	6,781	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will experience reduced sand encroachment and improved regional agricultural viability • Water Security Interventions, such as tree planting: Will improve the groundwater recharge experienced by surrounding communities • Climate-Smart Agriculture Techniques: Will enhance food market availability and regional food security • Livelihood Diversification: Will support economic stability and job opportunities in neighboring areas
Total Rachid		3,186	3,595	6,781	
Tamcheket	Tamchaket	2,264	2,732	4,996	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will experience reduced sand encroachment and improved regional agricultural viability
	Radhi	4,509	5,222	9,731	
	Sava	6,947	8,240	15,187	

⁷ National Agency for Statistics and Analysis of Economic Data (ANSADE) of Mauritania/2023 General Population and Housing Census (see ANSADE website).

⁸ Ministère des Affaires Economiques et du Développement (MAED) & Office National de la Statistique. 2013. Recensement Général de la Population et de l'Habitat (RGPH 2013). Available at: http://www.dgct.mr/wp-content/uploads/2016/06/Populations-2013-brochure-RGPH_Final-4-aou.pdf

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					<ul style="list-style-type: none"> • Water Security Interventions, such as tree planting: Will improve the groundwater recharge experienced by surrounding communities • Climate-Smart Agriculture Techniques: Will enhance food market availability and regional food security • Livelihood Diversification: Will support economic stability and job opportunities in neighboring areas
Total Tamcheket		13,720	16,194	29,914	
Nema	Agoueinit	4,203	5,116	9,319	<ul style="list-style-type: none"> • Dune Stabilization using EbA measures: Will experience reduced sand encroachment and improved regional agricultural viability • Water Security Interventions, such as tree planting: Will improve groundwater recharge experienced by surrounding communities • Climate-Smart Agriculture Techniques: Will enhance food market availability and regional food security • Livelihood Diversification: Will support economic stability and job opportunities in neighboring areas
	Achemmim	1,555	1,743	3,298	
	Biribava	2,716	3,258	5,974	
	Bangou	6,108	7,564	13,672	
	El Mabrouk	3,201	3,715	6,916	
	Oum Avnadeche	11,820	13,239	25,059	
	Néma	15,951	19,091	35,042	
	Hassi Etila	3,263	4,134	7,397	
Total Nema		48,817	57,860	106,677	
Grand total		66,519	78,489	145,008	

The project's adaptation activities, centered within the four target hubs, involve stabilizing dunes through EbA measures and green-grey infrastructure, which will indirectly benefit surrounding communes by reducing sand encroachment and protecting regional agricultural viability. Furthermore, water security interventions such as tree planting and the potential implementation of groundwater dams and other water-harvesting structures within the hubs will contribute to improved groundwater recharge in neighboring communities and reduce pressure on shared water sources. The adoption of climate-smart agriculture techniques in the target hubs is expected to lead to enhanced food market availability and improved regional food security for adjacent communes. Lastly, efforts to promote livelihood diversification within the hubs will foster economic stability and create job opportunities in the neighboring areas, thereby increasing household and community financial resilience across the wider region.