Verified Carbon Standard

AGROFORESTRY AND REFORESTATION WITH SMALL-SCALE FARMERS IN UGANDA

Document Prepared by PUR Projet

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1.1 Summary Description of the Project

Project's purpose and principles

PUR Projet is an international organisation specialised in the development of ecosystem restoration and conservation projects, within the agricultural supply chains such as coffee, cocoa and vanilla.

Agroforestry and reforestation with small-scale farmers in Uganda is a grouped afforestation and reforestation project, initiated by PUR Projet in 2016. The purpose of the project is to reforest degraded agricultural land through the promotion of sustainable agroforestry with small-scale farmers located in Uganda.

The production of cash crops (coffee, vanilla, cocoa) as well as food crops is managed mostly by very smallholder farmers having customary land ownership. 90% of producers own less than 0.5 ha in Uganda. Those producers are highly impacted by climate hazards such as flooding, and rainfall causes land degradation.

In this context, the main objectives of the project are:

- Climate change mitigation through carbon removals generated by tree-planting activities.
- Increase farms' resilience to climate change, diversify incomes and restore ecosystem services by supporting agroforestry practices, inside and around coffee, cocoa or vanilla parcels.
- Increase perennial crop yields and quality by implementing Good Agricultural Practices.

The project consists of tree planting rolled-out over annual planting waves. The project will plant approximately 2,195,000 trees from 2020 to 2025 and include new implementing partners such as Agrievolve.

With the first plantations from 2016 to 2019, around 270,000 trees have been planted over 590 ha and worked with 880 farmers with the Rwenzori Farmers Cooperative Union (RFCU) in the Rwenzori region. For those plantations, the average annual Emission Removals is 1,863 tCO2e and the total ex-ante potential of the project is 65,216 tCO2e over the 35 years of the project duration. The sequestration of carbon in the trees that are planted will allow the generation of GHG emission removal.

All measures will be put in place to minimise harvesting until trees reach maturity (expected 15-20 years). Mitigation measures will be put in place to dissuade local farmers from harvesting more than 1% per year, and replant whenever harvesting is performed.

1.2 Sectoral Scope and Project Type

Sectoral scope: AFOLU

AFOLU project category: ARR

Grouped Project: The Project is a grouped project.

Activities (CDM classification):

- Grassland to forested land
- Cropland to forested land
- Degraded fallow to forest land

1.3 Project Eligibility

The Ugandan Government defines forests[1] as land with:

- A minimum area of 0.5 hectares
- A minimum tree crowns cover of 10%
- A minimum tree height of 5 metres

As described in section 1.11, the plantations are on parcels of one of the following land-use: degraded land, cocoa, coffee or vanilla parcels, pastures and annual crops. These land-uses fall into the grassland or cropland categories and none of them fall in the forest definition.

During the project technicians first visit to the parcel where the trees will be planted, they collect information on the historical land-use for the specific parcel, and assess the existing tree cover, to ensure the parcel meets the eligibility criteria (Section 1.4). The data is collected, analysed and saved in the planting registry.

The proposed planting models include planting forest trees at densities from 70 - 1111 trees/ha, and therefore leads to the restoration of a crown cover above 5 metres and with higher crown coverage than 10%.

The proposed activity is a reforestation activity, according to the official Ugandan definition of a forest, and increases carbon sequestration by establishing biomass cover through the planting of trees.

a) The land subject to the project activity does not fall in wetland categories.

The proposed project activities are only implemented on croplands, pastures, or fallows, and degraded lands.

b) Project activities are implemented on lands where <10% of the total surface project area is disturbed as result of soil preparation for planting.

[1] http://www.fao.org/3/az362e/az362e.pdf

Land preparation only consists of digging a 30 cm x 30 cm x 30 cm pit for each tree. Maximum soil disturbance is reached with highest planting density in model 3 –full stand (1111 trees/ha). The total area disturbed therefore amounts to 100 m2 per hectare, i.e., 1% of the surface. On top of this, this plantation model is implemented on only 17% of the total project area, the other models (section 1.11.2) leading to even fewer disturbances. Furthermore, the existing trees are not removed for soil preparation before planting. Therefore, the project meets eligibility criteria whereby fewer than 10% of the total surface project is disturbed as result of soil preparation for planting.

1.4 Project Design

The project is developed as a grouped project, designed to expand and scale progressively over the project lifetime, with the following criteria for the inclusion of future projects instances.

Instance location: All project instances will be located in the Republic of Uganda suitable for growing crops such as Coffee, Cocoa & Vanilla (see figure 2 for regions suitable for coffee plantations).

All the parcels must comply with the following requirements to be involved in the project instances:

- owned by smallholders (fewer than 20 hectares)
- not be cleared of native ecosystems within the 10-year period prior to the project start date, as set out in section 3.1.6. of the VCS AFOLU requirements
- not falling under 'forest' as defined by the Ugandan government
- owner has clear land-use rights with no land-tenure conflicts
- outside of any conservation area (National Parks, concessions for conservation, etc.)

Entities should be:

- Any entity working with smallholder farmers, for example:
    - A community-based organisation with on-going participatory processes (general assembly, elections at least) such as cooperatives, farmers associations, community associations, native communities.
    - Companies, NGOs, or entities working with smallholder farmers operating the project through a dedicated team of professionals, under the supervision and control of Pur Projet, and following the project's proceedings communicated by Pur Projet

Beneficiaries: Small-scale farmers who are owners of multi-purpose farmland within the Rwenzori region and other regions where coffee, cocoa & vanilla can grow in Uganda, and have affiliation to one of the Project Entities.

Proceedings: Implementing partners will apply Pur Projet's proceedings for the project, which includes (not exhaustive) participative approach involving beneficiaries, application of defined planting models, training curriculum and technical assistance, monitoring and traceability proceedings, contracts signed with each beneficiary, and contract signed between Pur Projet and the implementing partner.

In addition, future project instances will need to follow the planting models described in Section 1.11.2 and match the baseline scenario described in Section 3.4.

1.5 Project Proponent

Organisation name	PUR Development Pte. Ltd. hereinafter referred to as 'PUR Projet'
Contact person	Aurélien Cartal
Title	Carbon Senior Manager
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Telephone	(+33) 1 55 28 98 05
Email	**carbon**@purprojet.com www.purprojet.com

The Project proponent PUR Projet is the project developer, which started the project by conducting a feasibility study with the partner i, then by setting-up the plantations design (reforestation design) and the monitoring processes, and organised the local management team.

PUR Projet is in charge of the overall forestry component's design and management, the proceedings definition, the reporting, the certification, and the coordination of all activities related to the tree plantation (technical assistance given to farmers on this topic, workshops, training, capability development, planting, monitoring). PUR Projet financed the activity from the funding received from partners.

PUR Projet wants to build a large-scale model project with smallholder farmers, which would stand as a success model to duplicate, thus promoting the rollout of agroforestry practices across the world.

1.6 Other Entities Involved in the Project

For the implementation of the project and tree planting activities, PUR Projet relies thus far on local organisations working with farmers and communities. At this stage PUR Projet works with one cooperative and one coffee agribusiness company:

1. The Rwenzori Farmers Cooperative Union (RFCU), which originally started as Mubuku Vanilla Moringa Farmers Association (MVFA) in 2005, brought together farmers who wanted to intervene in vanilla production when communities lost hope in the crop due to low prices. It registered as a Union in 2014.

This umbrella organisation represents the interests of 16 primary cooperative societies from the districts of Kasese, Kabarole, Ntoroko, Bunyangabo and Bundibugyo in the Rwenzori region of western Uganda.

The RFCU gathers a total membership of 2.800 vanilla, cocoa and coffee farmers. It is fair-trade certified and some of its vanilla members are organic certified.

Organisation name	Rwenzori Farmers Cooperative Union
Role in the project	Implementing partner
Contact person	Jimmy Police Bagonza
Title	General manager
Address	Kogere road, Kilembe Quarter's Kasese Municipality P.O. BOX 414 KASESE
Telephone	+,256,782,466,226
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2. Agrievolve, with support from Volcafé Ltd, started operations in the Rwenzori Region in 2015 and implemented a reliable coffee governance built around promoter farmers to accompany farmers in the production of better-quality coffee. By coordinating a group of about 30 producers whom they visit regularly, promoter farmers foster a better connection with farmers, building fidelity within the supply chain. The promoter farmers are responsible for the purchase of the coffee as well as its transport to buying centres, thus ensuring traceability.

Since 2020, PUR Projet has been collaborating with Agrievolve to work in the north part of the Rwenzori region known as Fort Portal & part of Bunyangabo District.

Organisation name	Agri Evolve
Role in the project	Implementing partner
Contact person	Jonny Rowland

Title	General manager
Address	Stockdale Cottage, Longsleddale, Kendal, Cumbria LA8 9BE and at Kisinga Coffee Station in Kasese District of Uganda
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1.7 Ownership

1.7.1 Right of Use

In Uganda, Article 237 (1) of the Constitution of Uganda states that land belongs to the citizens of Uganda and according to Article 237 (3) of the 1995 Constitution of Uganda and Section 2 of the Land Act there is 4 types of recognised land tenure systems:

- Mailo land tenure
- Freehold land tenure
- Customary land tenure
- Leasehold land tenure

Customary land Tenure is where the land is owned based on the norms and traditions of a given society or community. One can even own land individually under customary tenure as long as it has been handed down from generation to generation using that society's customs. Special protection is accorded to the rights of women, children and persons with a disability to own, occupy or use customary land. (Section 27 of the Land Act). In 2015, the government of Uganda introduced Certificates of Customary Ownership (CCOs) for owners of customary land. Still today, few owners of customary land have the certificate. Some of the land owners have sales agreements to prove ownership and others do not have any document to prove their ownership as they inherited the land from their deceased's relatives.

In Uganda, it is not common that farmers have formal land tenure documents as approximately over 75% of land holdings in Uganda is owned through customary land tenure arrangements, especially smallholder farmers[2].

Most of the farmers participating in the project have dwelled on and cultivated their land for several years and thus fall in the definition of customary land tenure. Even without a formal land title, they fully own the land and hence the 'carbon rights' related to their land.

[2]http://www.fao.org/gender-landrights-database/country-profiles/countries-list/land-tenure-and-related-institutions/prevailing-systems-of-land-tenure/en/?country_iso3=UGA

The government recognises the right and the benefit to this land belongs to the farmers and therefore has the right to transfer benefits (such as credit carbon) to anyone. (see lawyer report for further details)

A customary land owner can apply for a CCO as proof of ownership of the land. Any person, family or community holding land under customary tenure on former public land may acquire a certificate of customary ownership in respect of that land.

Throughout the project, PUR Projet plans to implement activities to sensitise farmers to land tenure topics and help them to get their title through specific training and support.

Transfer of the emission rights

Every farmer participating in the program signs an agreement with one of the implementing partners in charge of tree-planting activities of the project, setting the conditions of their participation in the program, in which they agree to transfer all of their carbon credits rights to the partner.

The contractual relationship for the transfer of rights from the smallholder farmers is managed by the implementing partner.

On the other hand, each implementing partner participating on the project signs a contract with PUR Projet (project proponent), where they agree to transfer all carbon rights they have collected from the smallholder farmers to PUR Projet.

1.7.2 Emissions Trading Programs and Other Binding Limits

The VCUs generated by the GHG emission removal of the project will be sold in the voluntary market, to private or public entities who want to have a positive impact on climate on a voluntary basis.

The Project proponent itself nor its clients have any regulatory limits in Uganda on GHG emissions and does not look for any compliance with any emissions trading program.

To date, there are no laws on carbon ownership rights and no emissions trading program in Uganda. Ugandan NDCs include forestry activities but there is no decision yet on whether the government will provide corresponding adjustment for private projects implemented on voluntary schemes.

1.8 Project Start Date

The start date of the project is 13/04/2016, the date on which the 2016 planting wave started.

1.9 Project Crediting Period

The crediting period is from 13/04/2016 to 12/04/2051. The length of the crediting period is 35 years.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removal (tCO_2e)
2016	0
2017	481
2018	1,088
2019	1,502
2020	2,248
2021	2,254
2022	2,260
2023	2,284
2024	2,324
2025	2,329
2026	2,346
2027	2,348
2028	2,348
2029	2,348
2030	2,348
2031	2,348
2032	2,278
2033	2,033
2034	1,997
2035	1,967
2036	1,938

2037	1,920
2038	1,897
2039	1,550
2040	1,688
2041	1,572
2042	1,370
2043	1,699
2044	1,675
2045	1,673
2046	1,675
2047	1,447
2048	1,461
2049	1,572
2050	1,386
2051	1,559
Total estimated ERs	**65,216**
Total number of crediting years	**35**
Average annual ERs	**1,863**

1.11 Description of the Project Activity

1.11.1 Project's Purpose and Principles

In 2016, PUR Projet started the development of the agroforestry and reforestation project in Uganda in the Rwenzori area with smallholder farmers, focusing on agroforestry, reforestation, as well as other activities such as Good Agricultural Practices training and the start of the distribution of Improved Cook stoves and Gender Mainstreaming explained in Appendix-1

All activities aim at having a positive impact on ecosystems and farmers' livelihoods at the same time.

PUR Projet has been working directly with smallholder farmers in coordination with local project implementers. The project started with one single implementing partner, RFCU in 2016, and has progressively expanded to other partners like Agri Evolve in 2020 and expects to have more partners in the years to come in different regions suitable for coffee, cocoa, and vanilla.

The project is not located within the jurisdiction of the REDD+ program.

Project activities have been rolled out in a coordinated way and correspond to a holistic approach to ecosystem restoration and livelihood improvement in the area. While agroforestry remains the core activities and the source of carbon sequestration, the other activities implemented aim at complementing and reinforcing the effects of agroforestry with key needs of the crop growing community.

Agroforestry

'*Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequenc*e' (FAO, 2015)

For PUR Projet, the principle of agroforestry goes beyond the simple planting of trees in plots; this is a philosophy whereby the farmer implements activities and consequently the farmer household benefits daily.

Therefore, the strategy is to both regenerate local ecosystems and support local communities by protecting and regenerating the parcels with improved shade, while providing additional economic benefits to farmers from agroforestry products (ex: fruit, timber).

In Uganda, a significant portion of the land is deforested, or has been affected by climate change. Moreover, most farmers often cultivate cash crops in a monoculture scheme and fully exposed to the sun.

This impacts crop yields and ecosystems, exacerbates the effects of climate change, and increases the dependence of farmers to one single price-fluctuating crop.

Therefore, the objective of agroforestry is to plant trees around and/or among crops in order to provide multiple ecosystem services such as:

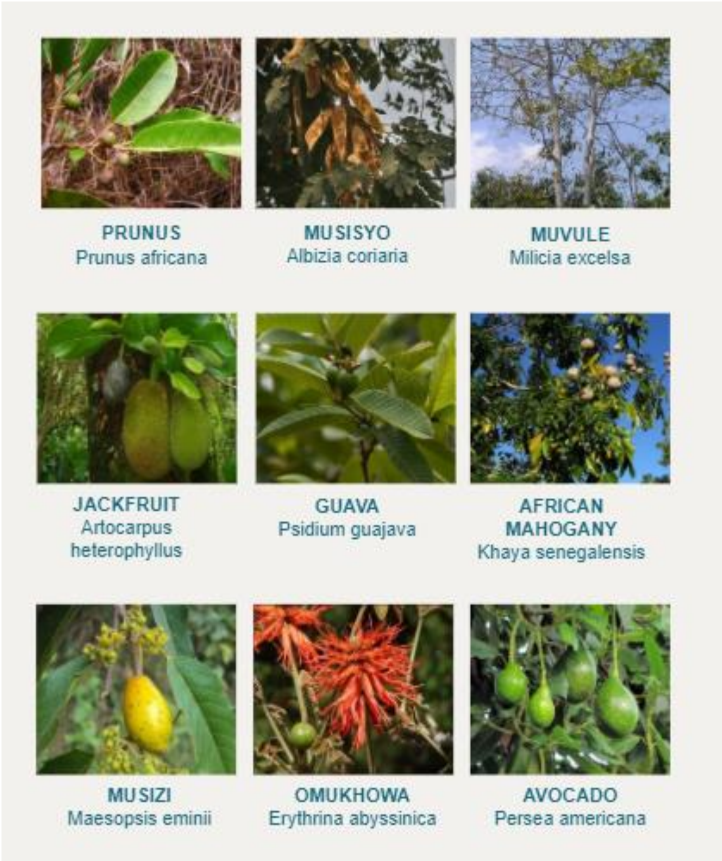
- At the crop level, trees provide much-needed shade for the cash crops and increase crop resilience to climate change.
- At the community level, agroforestry helps secure crop yields, and provides secondary products such as fuelwood, fruit, timber, and fodder.
- At the landscape level, agroforestry models help restore the tree cover and local biodiversity.

Activities

The dedicated technical team hired by the implementing partner and trained by PUR Projet oversees leading group training on agroforestry and monitoring farmers' progress individually.

Farmers and the implementing partner are at the heart of the project: they actively participate in building the project, defining its rules, choosing tree species, etc.

Figure 1: Key tree types



Targeted volume

From 2016 to 2019, around 270,000 trees have been planted over 590 ha and working with over 1,000 farmers.

In 2020 and 2021, the project planted approximately 300,000 trees and plans to continue scaling up to 1,895,000 new trees planted over four years, as well as new partnerships and catchment areas to include in the project.

1.11.2 Agroforestry Project: Plantation models

Four planting models have been proposed to the participating farmers to date

PERIMETER (M1)

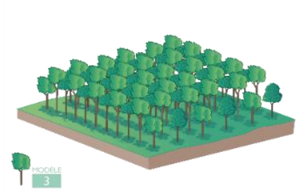
Trees planted on the boundaries of the parcel, or on a line inside the parcel. Trees provide a windbreak; they also limit the spread of diseases and pests among crops. They limit access to people and wild animals and enhance soil stability. Recommended tree-spacing on the project is 3 metres.

INTERCROPPING SHADING (M2a)

Trees are planted among crops with a density that can vary from 8m x 8m to 15m x15m depending on the context and the parcel. Trees provide shade, improve soil quality, prevent soil erosion, regulate water and protect crops from the wind.

INTERCROPPING SHADING + PERIMETER (M2b)

Trees are planted among crops (like for M2a) and on parcel borders (like M1). They provide shade, fertilise the soil, regulate water, provide windbreaks as well as limit the spread of diseases and access to people and wild animals.



PLANTATION FULL STAND (M3)

High tree density (around 3m x 3m) to restore degraded and unused lands, combining slow, medium and fast-growing trees. This model provides ecosystem regeneration and protection at the landscape level, increase biodiversity, prevents erosion and regenerates the soil. This system is optimal for timber or fruit production and carbon storage.

1.11.3 Species and Varieties Selected

The choice of species is based on site evaluations and according to farmers' needs. Tree selection depends on proven suitability for the specific site conditions and purposes of trees in the agroforestry or forestry systems (timber production, shade, soil improvement, etc). Only native or naturalised species are planted.

Tree species were selected based on farmers' knowledge, compatibility with perennial crops (coffee, cocoa and vanilla) timber value, adaptability to the area (e.g. altitude, rainfall). The project remains open to consider other species to include in the future.

Table 1: Species Planted

	Local name	Scientific name	Height (m)
Fruit Trees	Avocado	Persea Americana	10-15
	Guava	Psidium Guajava	
	Lemon	Citrus Lemon	
	Jackfruit	Artocarpus heterophyllus	10-15
	Orange		10-15
	Mango	Mangifera Indica	10-15
Shade/ conservation Trees	Musizi	Maesopsis eminii	40
	Prunus Africana	Prunus Africana	35
	Melia	Melia Azedarach	
	Cedrella	Cedrella Odorata	
	Muvule	Milicia Excelsa	45
	Mucizi	Maesopsis eminii	40
	Uganda flame	Spathodea campanulata	35
	African Mahogany	Khaya Senegalensis	30
	Omukhowa	Erythrina Abyssinica	
	Musisiyo	Albizia Coriaria	20
	Muvule Improved	Bathidavia	30

1.11.5 Technology employed in the activity

PUR Projet implemented its standard procedures for reforestation projects with smallholder farmers.

Identification and free prior informed consent consultation (Socialisation of the activity)

In this beginning phase of the activity, the PUR Projet team with the help of the technicians of the respective implementing partners organised meetings with the farmers. This meeting is referred to as the socialisation of the activity to present the project objectives and concept of the activity to the community as well as train the community regarding tree planting benefits and agroforestry. At the end of this socialisation, farmers register to enter the project voluntarily. It is possible that some farmers will join the project after the meeting through word of mouth in the community by neighbors to others who attended the meeting.

Farm Visits (Pre-registry, Monitoring 1 and Monitoring 2)

During the first two years, farmers receive at least three individual visits from the technicians: one visit before the plantation (pre-registry), one visit a few months after the plantation (registry and monitoring 1) and one visit around 1 year after the plantation (monitoring 2). Then, the technical team visits every parcel at least once a year. During their visits, technicians monitor the plantation and provide technical assistance on maintenance and agroforestry techniques (pruning, shade management, etc.).

Technicians also monitor to ensure the project is under compliance with the plantation contract during the various stages of project implementation. In the case of non-compliance, the technical term refers to PUR Projet's local project coordinator to take further necessary action.

Seedlings Purchase

Seedlings are procured from various locally recognised and accepted suppliers for their experience in the production and logistics of tree seedlings. Seedlings are then delivered by truck to the various locations within the farming's communities.

Pur Projet has also established a community-based nurseries with a sustainability strategy of ensuring continuous availability of tree planting materials. The first four nurseries were established in 2020 at Balimi, Gatyanga, Kajwenge & Kihasa, and three additional were established in 2021 located at Kasemire, Kinyangoko and Nyabwina.

Training and Technical Assistance

Farmers receive training on reforestation/agroforestry and ecosystem benefits, deforestation and its consequences (soil erosion, water availability decrease, landscape degradation, biodiversity decrease, etc.). Training also focuses on planting and maintenance techniques.

Site preparation

Plantation sites are prepared by the farmers to enhance the early growth and development of the seedlings, in accordance with project recommendations:

Weeding: 50 cm-diameter-circle around the planting point.

Pit preparation: 30 cm x 30 cm x 30 cm hole dug by hand, or using a shovel. CO2 emissions during this process are not significant due to the low soil disturbance caused by this form of site preparation.

Planting

Farmers oversee tree plantations.

- They plant trees according to the plantation model suitable for their parcels and the advice they received from the technical team.
- Planting is done by hand, during the rainy season, between September to November.

Maintenance premium

Farmers receive a premium after each of the first two fields monitoring. Field monitoring enables assessment – among other indicators- tree mortality and farmers receive a premium for each tree that are still alive. The premium ensures farmers' commitment in the long run and the good maintenance of trees during the first years. In a period of climate change, severe droughts and irregular rains, it seems more trees are needed than ever. The premium is thus, a way to minimise the cost per living tree – by reducing tree mortality - rather than being a subsidy to beneficiaries.

As defined and collectively approved by farmers' organisations: when the farmers plant trees on their own land, each farmer receives UGX 700 in cash, or in kind (extension services, training, materials and so on) for each tree still alive. The farmers do not pay for the seedlings.

Plantation management

Farmers manage the parcels themselves according to technical recommendations provided by the project's technical team during farm visits and group training.

- Weed control

Weed control is important to ensure the good development of trees. Weeds are controlled manually during the first years of growth.

- Thinning and Pruning

Pruning: to ensure high-quality timber, trees are pruned manually, according to the characteristics of each species.

Thinning: thinning is done manually, with an axe or a chain saw, according to the characteristics of each species and the project's timber management plan.

- Measurements of tree survival in planting waves

Technicians estimate the average height of trees during monitoring visits, by measuring a selection of trees in the planted parcels. These estimations will help the project team to estimate tree growth, biomass increase, and the volume of timber standing.

1.11.6 Transfer of technology/know-how

Capacity building and transfer of technology and know-how are critical for the implementation and the success of the project.

Farmers' organisation empowerment

The project focuses on solid and well-organised implementing partners that will be further trained and empowered by PUR Projet on agroforestry, project proceedings, traceability, monitoring, data management, certifications, forestry. This progressive training and empowerment process, rolled out over several years, is critical for the complete assimilation and appropriation of the agroforestry and forestry activities by the implementing partners and the farmers. Each implementing partner has its own project technical team, trained by PUR Projet and/or by the implementing partner. The size of the dedicated team depends on the size of the plantations managed by each implementing partner.

Community Empowerment

The project is done with organisations and cooperatives that are working with smallholder farmers. The activities also focus in the empowerment of the community through different sub activities:

- Training: that motivate the farmers to be part of the project and understand the project
- Demonstrative plots: that showcase the positive side of planting trees and how to maintain their coffee parcels
- Community tree nurseries: that empowers the farmers to start on an added business service
- Gender training: to improve and support women empowerment and gender equity

The Farmers

Farmers under the implementing partners are the most important stakeholders for the success of the project implementation. The project therefore includes a training curriculum with group training modules done by the implementing partners technical teams, as well as individual technical assistance during individual farm visits.

- **Group training** is both theoretical and practical training on a specific topic. Depending on the topic, it's a two to five hours training, where the farmers in groups share their knowledge on the topics, the technician/engineer teaches using various supporting material (presentations, drawings, posters, videos, games, etc.), and where, for relevant topics, the farmers get to observe and practise in the field. Group trainings are usually done by a cooperative committee, or by the community (for small communities)

- **Individual visits:** In addition to group training, all parcels are individually visited at least 3 times in the first year and a half before planting to assess parcel eligibility, define planting schemes, and choose species after planting. The second time is in the first year to monitor the planted parcel and tree survival. The third time is at least once a year by one of the implementing partner's technicians to check the state of the parcels and provide recommendations to the farmer.

Training Materials & Tools

Agroforestry programs require strong data collection and organisation to ensure proper monitoring, evaluation and impact analysis. PUR Projet uses digital data collection tools such as Doforms and recently transitioned to Kobo Toolbox for data collection in our Projects around the world. Kobo Toolbox is a suite of tools for data collection and is suited to data collection in challenging environments. The tool was developed by the Harvard Humanitarian Initiative and allows field technicians to accurately collect information including GPS tracks and other important social and environmental data. Kobo Toolbox is open source and free to use.

A large-scale vision and strategy

The grouped project targets the area of Uganda suitable for coffee, cocoa & vanilla production as these regions present consistency in terms of ecosystems, agricultural profile (small-scale agriculture – frequently coffee, cacao, vanilla), and economic.

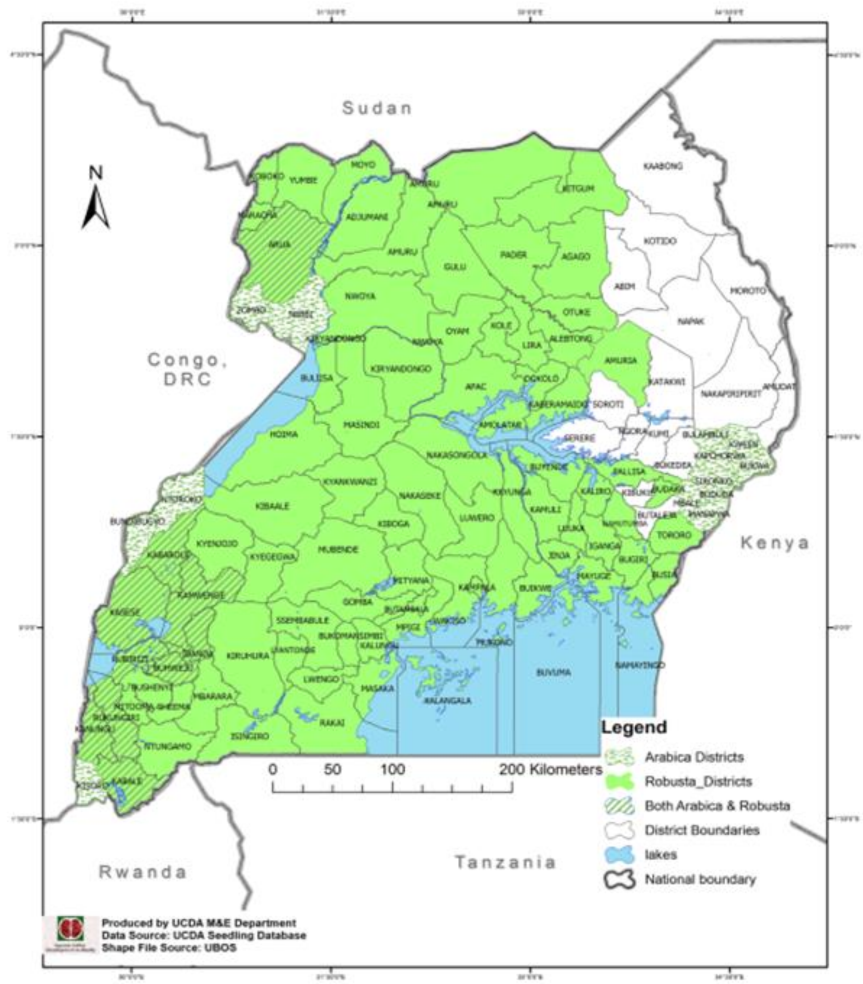
The project is fully integrated into a long-term vision of 50 years, which matches the pace of tree growth and ecosystem regeneration: farmers' organisations will follow-up on the tree plantations, monitor the impacts and ecosystem services, and develop value chains for trees' co-products (fruits, timber, and fuelwood). Technical assistance will be provided for these activities and funded by additional PUR Projet's investments in the long run.

1.12 Project Location

1.12.1 Grouped project location

All project instances will be located in agricultural regions of the Republic of Uganda where perennial crops like coffee can be cultivated (see figure 2). Project location is thus covering a vast portion of the Ugandan territory, excluding lands located at the North-East of the country.

Figure 2: Grouped Project: Regions Suitable for Coffee plantations



Uganda's geography & climate is defined by its location in the basin of the east and western wings of the Great East African Rift Valley. Uganda lies on the elevated basin, which rises between the eastern and western branches of the Great Rift Valley. Most of the country is over 1,000 metres in altitude and topography is generally flat as you move west to east and suitable for coffee production.

The southwest region is the most mountainous part of Uganda. The Rwenzori Mountains form mountain ranges that border the Democratic Republic of Congo and stretch 70 by 30 kilometres making them the highest mountain in Africa with Margherita Peak at 5, 109 metres above sea level.

Similar ecological zones can be observed thanks to the FAO maps (Figure 4) with 2 main ecological zones; tropical mountain and tropical Rainforest.

Figure 3: Ugandan Topography

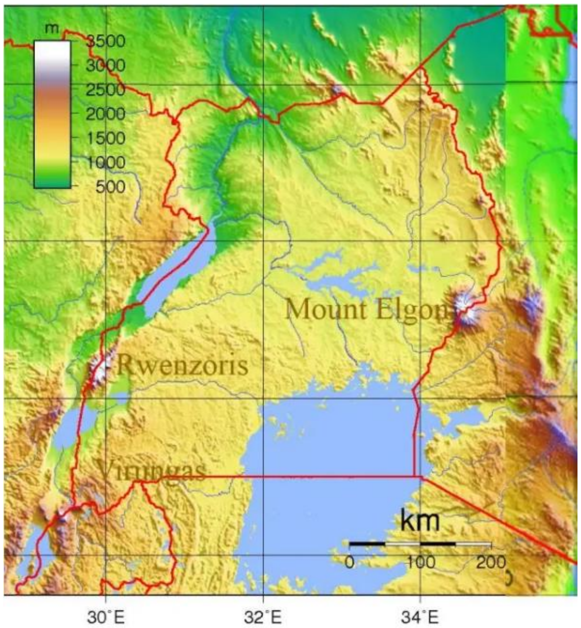
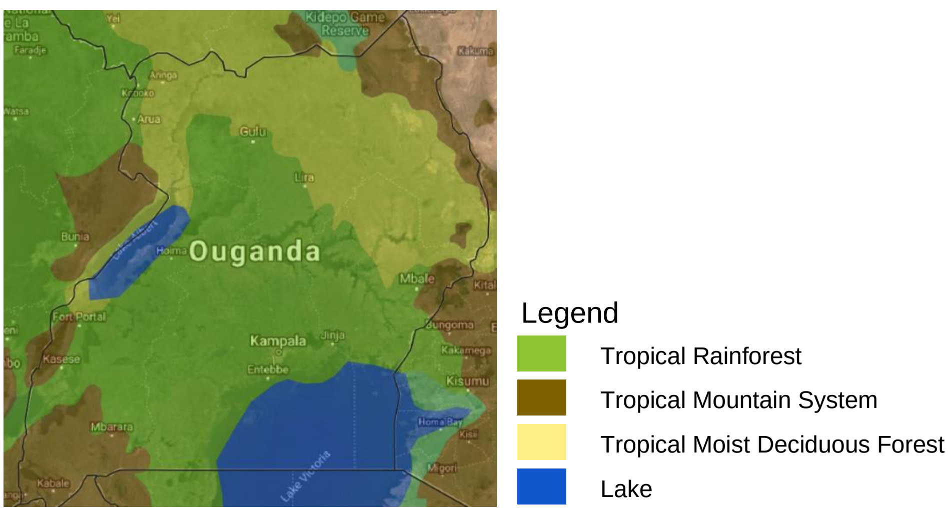


Figure 4: Ugandan FAO ecological Zone

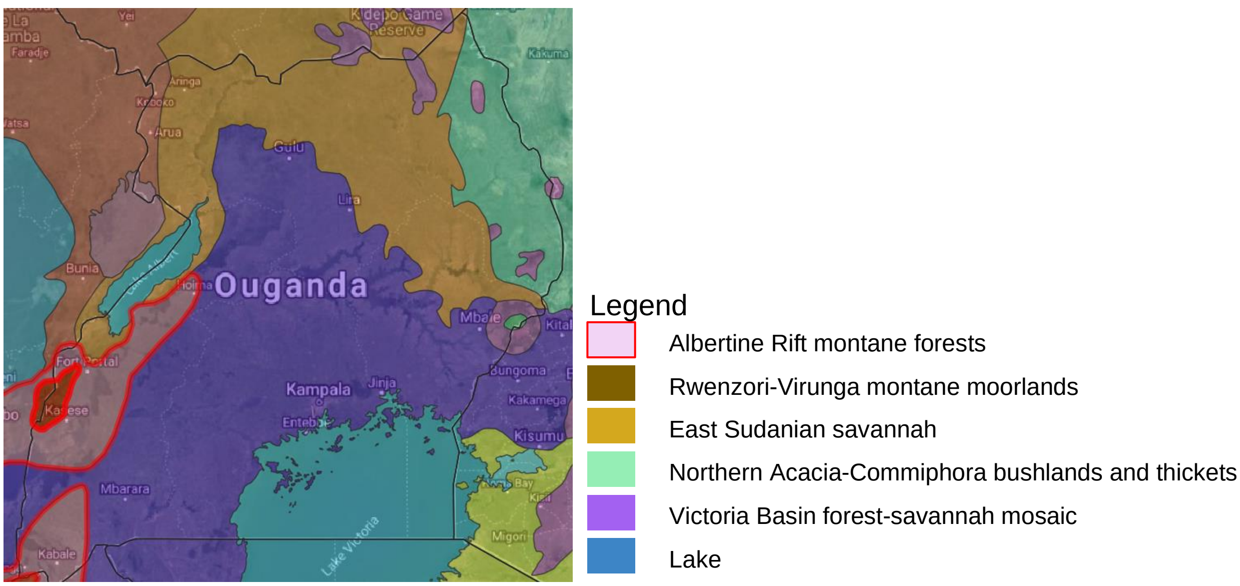


With the exception of the semi-desert in the extreme northeast, most of Uganda is well watered and fertile. Almost 25% of the country's surface area is covered by water. Lake Victoria, the second-largest lake in the world, is shared by Uganda with Tanzania and Kenya. Lakes Albert, Edward and George lie on or close to the DRC border, while the marshy and ill-defined lake Kyoga lie in the centre of Uganda.

1.12.2 Initial Project Instances

The first project instance from 2016 to 2021 is constituted by the reunion of all parcels planted in the Rwenzori region, indicated in the figure below, a few kilometres from the western border with the Congo democratic Republic between Rwenzori National Park and Queen Elizabeth National Park. The Rwenzori Mountains alone stretch for about eighty kilometres on the border between Uganda and the Democratic Republic of Congo (DRC) and the project is located right at the bottom ranges of the mountain. This first region is in a global ecoregion defined as 'Albertine Rift montane forests' by The World Wild Fund for Nature (Figure 5: Albertine Rift montane forests Ecoregion). The complex topography, climate, geology, and biogeographic history of this Global ecoregion have helped create many distinct habitats and biological communities.

Figure 5: Initial project instances: Albertine Rift montane forests Ecoregion



Geographical and Physical Location

Rwenzori, Queen Elizabeth, Kibale & Semuliki National parks that attract different plants and animals, surround the project and many species are restricted to the Rwenzori mountain ranges. The area is illustrative of a typical socio-economic and eco-friendly environment along the slopes of the mountain.

1.13 Conditions Prior to Project Initiation

1.13.1 Land use before planting

As part of the initial field visit, before registering the parcel for the project, the technician of the technical team assesses the historical land-use and farm context in order to determine eligibility and relevance for inclusion in the project.

List of different types of pre-project land-uses in the parcels reforested in the scope of the project:

- **Perennial crops: (Coffee, vanilla, cocoa) Income Parcel**

Coffee parcel owned by Farmer: Kyakimwa Anna, Cooperative: Kasemire, Sub-County: Kyondo Village: Kasemire (Copyright PP)

Perennial crops are also referred to as traditional cash crops such Coffee, Cocoa, Cotton, Sugarcane & Tea. Most Coffee parcels have been harvested for over 10 years therefore produce very low quantities in terms of kilograms per tree therefore require integration of Agroforestry.

- **Annual Crops (maize) Food for the farmer that can also be sold for income**

Annual crops are sometimes referred to as Non-Traditional cash crops such as Bananas, Beans and Maize. Farmers prefer to turn them into Agroforestry parcels because of their benefits to the other crops like providing shade.

Maize intercropped with beans on parcels owned by Farmer James at Nyabwina, Bunyangabu county (Copyright PP)

- **Pasture**

The pastures are generally unproductive with a very limited number of livestock units per hectare. Farmers generally chose steep land where coffee cannot develop. After several years, the soil structure is compacted and degraded which further lowers the productivity.

Pasture field near Kigere kya nyina mwiru crater in Kabarole district (Copyright PP)

- **Degraded land**

These are degraded areas of land that have been over-exploited or heavily degraded by poor land-uses like over cultivation without putting back the soil nutrients. Degraded areas would remain abandoned, as they have unproductive soils. Natural regeneration will not occur in this case due to strong deterioration of soils.

Degraded land in Kaghema Bundibugyo District (Copyright PP)

Project activities are implemented on degraded lands, which are expected to remain degraded or to continue to degrade in the absence of the project; hence the land cannot be expected to revert to a non-degraded state without human intervention.

Parcels reforested are either degraded areas or productive coffee, cocoa or vanilla fields that were deforested and used for agriculture for 15 to 40 years.

As part of the initial field visit, before registering the parcel for the project, the technician of the technical team assesses the historical land-use of the parcel and ensures that the parcel was not deforested for the purpose of replanting trees.

No deforestation activity is therefore triggered by the project with the objective of reclaiming the GHG removals of the reforested biomass. The project is only claiming GHG removals due to reforestation and sequestration of carbon in the trees biomass. The project has therefore not generated GHG emissions for the purpose of their subsequent removal.

1.13.2 Environmental conditions of the project area

Climate

Uganda is located on the Equator and has largely a tropical climate. The average annual temperature is about 26° Celsius. The rainy season is from March until May and September until November[3]. Light rain season falls in November and December. Dry seasons are from December to February and June to August.

Most of the areas receive between 750 mm and 2,100 mm of rain annually[4].

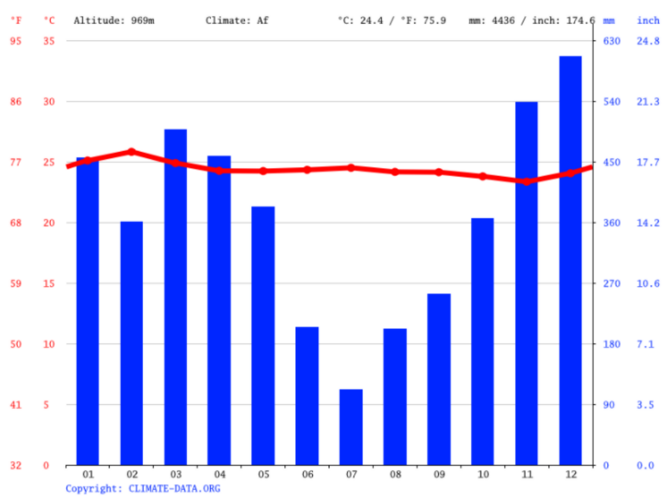
The proposed A/R CDM project activity takes place in the tropical rainforest and lower part of Tropical mountain systems (IPCC, 2006 – Chapter 4: Forest Land; GPG LULUCF 2006, IPCC)[5].

To be more precise:

- The first instance located in Rwenzori region (Around Kasese[6]) is characterised by

- Average month temperature between 24 °C, regular in the year.
- Annual precipitation is around 4400 mm. (Min in July with 112 mm, max in December with 600 mm)

Figure 6: Climate in Rwenzori region (kasese district)



[3]https://climateknowledgeportal.worldbank.org/country/uganda/climate-data-historical#:~:text=Uganda%27s%20climate%20is%20largely%20tropical,May%20and%20September%20to%20December.&text=Overall%2C%20Uganda%20experiences%20moderate%20temperatures,23.9%C2%B0C%20 (February)

[4] http://www.ico.org/documents/cy2018-19/icc-124-8e-profile-uganda.pdf

[5] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf

[6] https://fr.climate-data.org/afrique/ouganda/western-region/kasese-924472/

The Rwenzori region is not known to lack water as it receives variation of rainfall characterised by a bimodal pattern with the first rainy season from March to May and main rainy season from August to November, as well as the rivers that flow from the mountaintop into Lake George & Edward. It has a bimodal tropical climate with a wide variation of climatic conditions including wet lowland, dry savannah, wet mountain forest and alpine forest.

The climate has a big influence on the type of vegetation cover in the area much as the species bear a resemblance to species that normally thrive in desert climates. The reason lies in their similar water economy. Availability of water for the plants is scarce during dry seasons. In order not to lose too much water, most of these plants have adapted by having thorns and narrow leaves to support the plant during transpiration. As you move up the mountain, the elevation increases, the type of vegetation changes accordingly.

The climatic conditions of the area favour agricultural activities and animal rearing

Soil characteristics

In the coffee area in Uganda, generally soils are poor in nutrients. Regarding the first instance area Calcium and nitrogen are the deficient nutrients[7]. In addition, soil erosion can be significant in case of the absence of tree or vegetation cover. Also, repeated washing off of the surrounding bare hills leaves very little soil on those hills, progressively diminishing the source of organic matter for farms lower in the valleys.

The Rwenzori region has a variety of natural resources such as fertile volcanic soils.

Land Use characteristics

In the Rwenzori region, there are various forms of land use namely: cash crop farming, subsistence crops farming and cattle rearing. In regard to cash crop farming all the districts within the region grow Robusta Coffee with the exception of Ntoroko and Bundibugyo, which grows Arabica Coffee, Bundibugyo grows Cocoa, Kyenjonjo and Kabarole - Tea, Kasese grows cotton and coffee. The Basongora of Kasese and Batuku of Ntoroko and Bundibugyo are mainly cattle keepers. These are economically viable undertakings that can be developed through agro-industrialisation as well as promote trade for both local and external markets.[8]

Socio-economic Context

Rwenzori is a border region with the Democratic Republic of Congo, in mid-Western Uganda. The region comprises eight districts, namely Kabarole, Kasese, Bundibugyo, Ntoroko, Kyenjojo, Kyegegwa, Bunyangabu, Kamwenge and Fort Portal Municipality. The region has a population of approximately three million people and the population is expected to grow at a rate of approximately

[7] IITA-LEAD report.pdf

[8] Contextual Analysis of conflicts in the Rwenzori Region report page 19

3% per year. The high population growth rate in the region is also a potential for a large emerging consumer market and human resource that if leveraged can provide significant growth opportunities.[9] The disadvantage, however, with the growing population is that it could decrease land availability per capita for agricultural production. Furthermore, it can cause land fragmentation given the land use patterns and land degradation in densely populated areas within the region. In addition, the land is in use every season without replenishing the soil nutrients.

Biodiversity

Uganda is one of the most biodiverse rich countries in the world (Winterbottom & Eilu, 2006). The diverse flora and fauna of Uganda are distributed across a variety of natural terrestrial and aquatic ecosystems, including; forest, mountain, savannah, wetlands, lake and river ecosystems. It is particularly rich in bird life; over half of all bird species in Africa can be found in Uganda, and has Though one endemic bird (Fox's Weaver), 23 Albertine endemics occur here which are rarely observed elsewhere. These include the Handsome Francolin, Rwenzori Turaco, Rwenzori Nightjar, Dwarf Honeyguide, African Green Broadbill, Archer's Robin-Chat, Grauer's Rush Warbler, Short-tailed Warbler, Grauer's Warbler, Collared Apalis, Regal Sunbird, Strange Weaver, Dusky Crimsonwing, and Shelley's Crimsonwing among others.

To be more specific: in the first instance in Rwenzori region[10]:

- 70 species of mammal, including six Albertine Rift endemics; four are endemic to the park and three are rare species. Other mammals include the elephant, chimpanzee, Rwenzori otter and leopard.
- 217 bird species including several Albertine Rift endemics. Among these are 17 species that are endemic to the park making Rwenzori an important birding area (IBA). The forest zone at 1800m contains a diversity of birds including the Rwenzori Turaco, Barred Long-tailed Cuckoo, Long-eared Owl, Handsome Francolin, Cinnamon-chested Bee-eater, Archers' Robin-chat, White-starred Robin, Rwenzori Batis, Montane Sooty Boubou, Lagden's Bush Shrike, Slender-billed Starling, Blue-headed Sunbird, Golden-winged Sunbird, Strange Weaver and several varieties of Barbets, Greenbuls, Apalises, Illadopsis, Flycatchers and Crimsonwings

Water.

One commonly quoted issue is the diminishing presence of water in the soil as the dry seasons extend, thus limiting the growth and production of permanent crops. Severe deforestation of the hills (bare hills now) surrounding farms reduces drastically the capacity of the soil and vegetation to regulate water flow, and retain water for the dry season. This creates the other opposite extreme in the rainy season

[9] Uganda Bureau of Statistics 2019 Statistical Abstract page 188
[10] https://www.ugandawildlife.org/wildlife-and-birding-summary-rmnp

with major floods whose devastating effects can be observed in the area (bridges destruction, farms destroyed near river beds).

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project operates through legally constituted entities and local partners complying with all applicable laws in Uganda. All workers engaged in the project are hired legally, following all labour laws applicable in Uganda.

There are no laws preventing tree planting activities in Uganda, especially when occurring on private lands. More specifically, the design of our project is respecting all the main rules provided by The National Forestry and Tree Planting Act 8/2003, notably the project is not threatening existing forest nor implemented on forest reserves nor conservation area nor national parks.

1.15 Participation under Other GHG Programs

The project has not been registered under any other GHG programs and is not seeking registration under any other GHG programs.

The project has not participated in any other GHG programs and has therefore not been rejected by any of them.

1.16 Other Forms of Credit

The VCUs generated by the GHG emission reductions of the project will be sold exclusively on the voluntary market.

The Project Proponent itself does not have any binding limits on GHG emissions, and does not look for any compliance with an emissions trading program.

1.16.1 Other Forms of Environmental Credit

There are no other forms of environmental credits included in the project framework.

The project has not participated in any other program of environmental crediting for GHG emissions removal.

The project does not intend to generate any other kind of environmental credit other than through the VCS Program. The Project proponent aims at financing the project through the sales of VCUs issued under the VCS program only to private companies buying VCUs as voluntary offsetting of their emissions. Any other form of environmental credit for GHG removal would not be valued extra by the companies offsetting their emissions voluntarily and would therefore not be foreseen by the Project proponent.

1.17 Additional Information Relevant to the Project

1.17.1 Leakage Management

As mentioned in the AR-AMS0007 methodology (version 3.1), the project will consider the leakage due to the displacement of agricultural activities the year following the plantation.

The assessment of leakage risk and leakage management measures and monitoring are described in section 4.3.

1.17.2 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

1.17.3 Sustainable Development

Coffee is Uganda's most important export accounting for 22% of total exports. At the same time, the demand from different funders has also been increasing to scale their demand in tree planting which is a key strength for the project's financial sustainability.

The majority of the farmers have difficulty implementing good agricultural practice. As a result the project helps them in the short, medium, and long-term by providing complimentary programs such as the Good Agricultural Practices (GAP).

GAP training is provided to farmers as well as support in the implementation of relevant practices which have an impact on coffee yield, coffee quality (and therefore on coffee price), and coffee productivity over the long-term. The aim being to increase the farmers' revenue from coffee cultivation and reduce the risk of land-use switching from coffee parcels to other attractive crops which do not require shade trees. Such training is a key component of our project design and carbon permanence, as they allow better tree management and tree acceptance within agroforestry parcels of the project, and in the end, help mitigate tree mortality over the short and long term.

The project also contributes to achieving the National Adaptation Plan for Agriculture Sector (NAP-Ag) which contributes to the third National Development Plan (NDPIII) priority of strengthening ecologically-sound agricultural research and climate change-resilient technologies and practices. The main objective of the NAP-Ag is to increase resilience of the Agricultural Sector to the impacts of climate change, through coordinated interventions that enhance sustainable agriculture, food and national security, livelihood improvement and sustainable development.

This is aligned to the adaptation actions of the project which are designed to boost production and productivity for Coffee, Cocoa, Vanilla, forestry, land and natural resources.

Moreover, the project is strongly aligned with 4 of these 17 objectives for sustainable development from UNDP (United Nations Development Program)

- SDG 1: End of poverty: Through agroforestry practices, GAP training and improved cookstoves (coming in 2022), the project aims to secure, diversify and increase farmers' income. Until 2019, around 1,000 families have benefited from trees and until 2020 Around 1,400 farmers have participated in GAP training.
- SDG 5: Gender Equality, the objective is to establish a clear framework for the identification, implementation and coordination of interventions to achieve gender equality and women's empowerment among members of the implementing partners and the farming community through gender sensitisation training and strategy development. The strategy is a guide for planning, resource allocation, implementation, monitoring and evaluation of programs with a gender perspective in line with Uganda's national gender policy.
- SDG 13: Action for the climate: The project acts for climate change mitigation through carbon storage in the trees. From 2016 to 2019, around 270,000 have been planted and at least 2,195,000 new trees planted until 2025.
- SDG 15: Life of terrestrial ecosystems: the project aims at protecting the ecosystem and the biodiversity at landscape level.

1.17.4 Further Information

The project is also aligned with the National Coffee Policy 2013 that seeks to increase coffee production and productivity at the farm level in a sustainable way that addresses the social, ecological and economic dimensions and to support and strengthen coffee farmer organisations to participate effectively in the project.

In particular, through the carbon stored in the trees, agroforestry promotes a 'low carbon' growth for the coffee sector, which is significant in Uganda's economy. Furthermore, the project is designed at landscape level, and parcels are reforested around the coffee production area, on degraded land, with a mindset of ecosystem regeneration. This leverages the protection of the natural capital in the coffee regions, and regenerates key ecosystem services for the protection against natural disasters: stabilisation of the soils to prevent landscapes, enhanced water penetration to prevent floods, natural barriers against pest invasion, etc.

Most of the farmers live below the poverty line and the project supports farmers over the short, medium and long term with complementary programs: coffee stumping (a process of rejuvenating coffee plants for better production) and agroforestry at landscape level, gender activities. Besides, Uganda is a significant coffee exporter with an inspiring story, as the birthplace of Robusta coffee. Thus, this project should be very attractive for more finances over the long-term.

PUR Projet conducts all activity with the implementing partners that present within the community. The technicians recruited by the implementing partners are part of the community. The team trains the farmers on reforestation and tree benefits and its consequences.

PUR Project local project manager based in Kampala oversees all the project activities, monitors and consolidates the data. She is leading a team of 2 supervisors and 9 teams who are based within the community.

2 SAFEGUARDS

2.1 No Net Harm

There is no net harm caused by this project as tree planting under the agroforestry model does not have negative impacts on the ecosystems and farms that implement it. On the contrary, agroforestry is known as a vector of positive livelihood impacts (through revenue diversification) and positive environmental impacts (soil protection and enrichment, increased biodiversity, or water conservation).

2.2 Local Stakeholder Consultation

Local stakeholder consultation was conducted by the PUR Projet coordinators on the 20th of April, 2021, at Uhuru 50 hotel in Kasese. Stakeholders were contacted by email, phone call and face to face invitation for those that could not be reached by phone or email between 10th to 13th of April, 2021. Different stakeholders were involved in presenting and proposing the project activities, such as lead farmers, farmers, the nursery managers, local partners, technicians, and local government representatives. The project idea was well received during this visit.

In addition, a grievance system was set up to ensure continuous communication with all stakeholders. Notebooks are available in each primary cooperative for farmers and lead farmers. A phone number and email are available for other stakeholders.

A report has been sent to all stakeholders who participated with the agenda, an attendance list, documentation used during the stakeholder presentation, discussion, and output of the meeting.

Following the stakeholder consultation, no changes were made to the project design. All questions and comments were answered during the meeting. Stakeholders wanted more information about the project, the process and their implications. See report: stakeholder_consulation_report_V0.1

The following table shows the different points addressed during the meeting and the responses given.

Table 2: stakeholder consultation feedback

Comment	Responses/discussion point agreed upon
About incentives: How long will the incentive be given?	- Cash incentive is not for long-term, and therefore, better communication of 'benefits' is needed. Incentives in the form of cash payment is not the only benefit of the PUR Projet. - PUR Projet will make efforts to bring on board other livelihoods-related activities and partners on board during the project. - Important to show/communicate how increased land productivity due to project activity agroforestry/shade trees on crops like coffee/vanilla/cocoa is going to benefit the farmers. - Examples of other projects, where cash incentive is not given to individual farmers, but used to support livelihood related 'projects'/'activities' such as income-generating activity selected by the farmer groups was also communicated in this meeting
Consideration for other types of trees	- Consideration for short-term trees, e.g., fodder trees that can provide food for livestock
Land scarcity/small landholding making tree planting difficult for small farmers	- Project focus is on agroforestry, where trees can be integrated on cropland crops. This is feasible for all farmers, even those with small land holdings. - Farmers with large land holding/extra farm plots can dedicate to woodlots/plantations type of tree planting (planting model M3), but can also integrate crops in between the trees (a system called 'taungya')
Land fragmentation/scarcity and population interaction	- There is a need to address rapid population increase which is causing land fragmentation/scarcity. - This is more a job of local/national government - PUR Projet plans to implement activities to sensitise farmers to land tenure topics and help them to get their title through specific training and support and apply to CCO as proof of ownership of the land
'Bad species,' e.g. Eucalyptus, which has negative impact on environment/water resources	- The project does and will not promote Eucalyptus. It is not an agroforestry species/among the list specifically provided by PUR Projet
Crops are also trees that absorb carbon: will they be considered?	- Focus will only be on project supported trees
Bamboo is one of the fastest species that observe more carbon and yet is not among the project species. Could you please plan to include it on the list?	- Recommendation appreciated
How will the farmers benefit from the audit?	- The audits do not benefit directly to the farmers, but it allows to drive carbon revenues to the project which is spent in activities for the farmers (Free seedling, free training on plantation Free advice during

	farm visits, cash incentive or free materials based on the number of trees alive & more project to be developed)
What will motivate a farmer to keep the tree for 30 years and above?	- The project will focus on developing long-term activities that will keep farmers motivated to keep the trees alive. The contractual agreement we sign with farmers is also there to strengthen this aspect. - Ecosystem services provided by the trees will create value for the farmer and for the community (ex. fruits, water resources, soil protection, etc.) and PUR Projet action aims at educating project participants on these aspects.
Who will develop the sustainability activities of the project	- PUR Project and local partners (RFCU and Agrievovle) will develop sustainability activities

In addition, posters were put up in the Union and primary cooperatives in order to remind the beneficiaries about the objectives of the project, key rules of the project and the certification.

Radio communication and community meetings are also used to communicate to the farmers.

- For Community meetings, farmers across the different primary cooperatives were informed and trained on Carbon credits, farmers project agreements, Carbon right transfer and Audit of the project.
- The cooperative organised with local radio stations (Messiah Radio Station, Ngeya station and guide FM radio station) live talk shows focused on the project and carbon credits.The radio talk shows were interactive, listeners could call and request for clarification after the project presentation by the cooperative. Each talk show had a maximum of 10 calls. After the radio shows the cooperatives/project partners informed the audience that they can come to their office in case the farmers need more clarification.

Furthermore, the project itself is built upon a systematic process of yearly Planting Waves. Each given planting wave starts with a consultative process: project socialisation in each community that will potentially receive the project in that year, and then individual visits to each interested farmer. This visit is called “Pre-registry” and allows to confirm farmer’s interest but also to assess eligibility, geolocalisation of the land, determine the planting models and the choice of species. After tree delivery, the process also includes two individual monitoring visits to each participating farmer, thus allowing on-going communication. On top of the visits, technicians maintain regular contact with the farmers. As a matter of fact, in many cases technical teams settle down in the area they manage for the whole planting wave.

The project procedures include several collective and individual exchange opportunities allowing a clear communication on project modalities, covering risks and benefits. In particular, during the socialisation meetings, the project rules are clearly exposed to the farmers. In addition, during these Training sessions, the farmers are inaugurated and explained about the Agroforestry activities and operational structure. They are given an opportunity to share with already existing farmers in the project who are able to explain and share experience.

The results of project implementation and monitoring are regularly communicated to local stakeholders through the project organisational set up and monitoring system. Project data is collected in the field by project technicians of the implementing partners. All the data is then controlled and consolidated by the implementing partners and then by PUR Projet team. Each implementing partner sends a monthly report to the PUR Projet local team and this is followed up by a meeting to debrief on the activities, the deliverable status and monitoring results. Implementing partners are then sharing the information back with the farmers. This also includes information on the results of the process of VCS Program verification and the validation/verification body's site visit. As no major change of risks, costs and benefits the project may bring to local stakeholders, laws and regulations occurred during the monitoring period, no specific communication was done to stakeholders on that topic.

Special training has been given to implementing partners and technicians about the process of VCS Program validation and verification and the validation/verification body's site visit to make sure all parties are aligned and understand their implication. The validation/verification body's site was organised remotely but interviews with various stakeholders of the project were done and the visit was announced with anticipation so any stakeholder could potentially reach out and address comments. No specific comment was received concerning site visit.

The local coordination is conducted by the PUR Projet team in Kampala and the partner technicians. The partner technicians are employed in accordance with the Uganda Employment Act 2006 to ensure compliance and are responsible to implement the project.

2.3 Environmental Impact

The project was designed to have positive environmental impacts:

Impact on soils: maintenance of soil fertility and erosion prevention

Many conditions contribute to soil fertility, such as:

- an adequate concentration of soil organic carbon and nutrients
- the presence of a range of microorganisms that support plant growth
- the absence of toxic substances

Conventional crops cultivation practices often lead to soil depletion and represent a serious threat to agricultural production and yields.

Many coffee plantations are located on mountain slopes with very steep gradients. Soil is therefore affected by erosion, rainfall and water runoff. Erosion results in significant losses of the topsoil layer, rich in organic matter and nutrients, washed off by the rains. Trees help reduce erosion, thanks to 3 different processes:

- branches and leaves slow raindrops speed and reduce the splash effect (when raindrops hit the ground, soil is exposed with an explosive effect, launching soil particles into the air);
- trees increase soil water holding capacity so fewer soil particles are removed by friction (laminar erosion);
- trees form natural barriers against the wind, thereby decreasing its impacts.

Impact on water cycle and water resources

In agriculture, the trend towards greater intensification and higher productivity during the past fifty years was followed by a significant increase in the use of both inorganic nitrogen and phosphorus fertilisers. This led to excessive amounts of nitrates and phosphate runoff in water bodies, with very serious impacts through increased biological demands such as eutrophication, health danger, destruction of fisheries, etc.

Water regulation provides essential services for the development of cultures such as: fog and water retention, salinity management, resilience to extreme flood and drought events, etc. Mass deforestation tends to disrupt the hydrological cycle: it leads to a much drier soils and climate and threatens crop sustainability. Tropical rainforests produce about 30% of our planets' fresh water, and they are quickly being destroyed by intensive agricultural and manufacturing sectors.

Trees and agroforestry regulate hydrologic cycles in the catchment areas by capturing rain and runoff: interception by the canopy, transfer by capillarity, soil decompaction by roots, etc. Water captured by trees contributes to soil moisture. Trees play a key role in regulating the hydrologic cycle and avoid extreme climatic events: - Increased soil moisture protects plants from drought periods; - Soils can store larger amounts of water and therefore reduce flood risks.

Impact on biodiversity

Functional biodiversity refers to part of the total biodiversity providing (agro) ecosystem services, such as pollination and biological control.

- Pollinators are essential for sustainable yields, as 75% of the world's major crops are dependent on or benefit from them (Carvalheiro et al., 2012).
- Some insects are natural predators for pests and vector-borne diseases and provide natural pest management services. Agricultural pest control by bats is valued at US$22.9 billion per year in the US (Boyles et al., 2011).

Restoring a more diversified and native tree cover would also help recreate more complete ecosystems and benefit coffee cultivation (pollination, organic matter, natural predators and microorganisms).

Additionally, the agroforestry project will have a greater impact for the conservation of precious tree species. For example, some native timber and fuelwood tree species planted with the project are endangered like the Prunus Africana that is being harvested for medicinal purposes.

Climate Change Mitigation

As an A/R project, the project is designed to increase sequestration capacity of CO2, therefore playing a positive role in regulation of climate change. Protection and restoration of natural carbon sinks (forests, oceans, etc.) and reduction of GHG emissions strongly contribute to mitigating climate change effects.

Adaptation to Climate Change

Agriculture is estimated to be the direct driver for around 80% of deforestation worldwide[11]. However, trees provide essential services to adapt to climate change: thermoregulation, shade, protection against wind and adaptation to extreme events. Better local climate regulation can contribute to decreasing the remediation costs of climate change, estimated to US$20 trillion/year by 2100 (WPF).

2.4 Public Comments

No public comment was received.

2.5 AFOLU-Specific Safeguards

As explained in section 2.2, Local stakeholder consultation was conducted by the PUR Projet coordinators the 20th of April 2021, in Kasese. Stakeholders were contacted by email, phone call, or face to face invitation for the people that could not be reached by phone or email between 10th to 13th of April 2021. Different stakeholders were involved in presenting and proposing the project activities, such as lead farmers, communities, the nursery managers, local partners, technicians, and local government representatives. The project idea was well received during this visit. In addition, a grievance system was set up to ensure continuous communication with all stakeholders. Notebooks are available in each primary cooperative for farmers and lead farmers. A phone number and email are available for other stakeholders.

For any conflicts that may arise, PUR Projet will attempt to amicably resolve all grievances and provide a written response to the grievances in a manner that is culturally appropriate. For any grievances that are not resolved by amicable negotiations will be referred to mediation by a neutral third party. In addition, any grievances that are not resolved through mediation will be referred either to arbitration, to the extent allowed by the laws of the relevant jurisdiction or competent courts in the relevant jurisdiction, without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any.

The main risk farmers participating in the projects are economic, and related to the decision to plant trees on their land such as:

- If not well managed, the trees could generate undesired excess of shading or competition.

[11] https://www.sciencedaily.com/releases/2012/09/120925091608.htm

- Planting the trees represents a significant investment in time (or money if they pay some staff to do the work).
- They might have other plans for their land in the future (change of crop) that may not be compatible with a high tree cover.
- The planting of trees can take up some space that were other crops can be planted

Such risks are being mitigated by the projects with the following respective measures:

- For each parcel, the choice of the planting model and species is the result of a dedicated, technical conversation between the project technician and the farmer, taking into account parcel reality, farmer vision and motivation to plant, existing shading, existing crops.

- The project team communicates transparently and repetitively about the implications of the decision to participate in the project and the completely voluntary nature of such decision. Besides, the project procedures include the payment of an in kind or in cash incentive paid per living tree at each monitoring (first monitoring normally happens 3 to 6 months after tree planting while second monitoring happens 6 months to 1 year after tree planting). Such incentive is a contribution to the potential budget invested by the farmer to cover the costs related to the planting and management of the trees.

- The socialisation meetings to introduce the project, the pre-registry visit and the signing of the farmer contract are three key steps of the project procedures to clearly state the carbon sequestration objective of the project and the related long-term permanence necessity. The pre-registry discussion also allows us to identify risks of having the farmer cut the trees in a close future.

- Financial or in-kind incentives are being given to continue to motivate the farmers

Participation in the project is fully voluntary and both the land and the trees remain the entire property of the farmers.

Above mentioned project procedures (socialisation meeting, pre-registry visits, training modules, monitoring 1 and 1 visits, long-term monitoring visits) as well as punctual communication by phone allow to maintain a constant communication between project technical team and beneficiaries.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Methodology applied:

AR-AMS0007: A/R Small-scale Methodology - Afforestation and reforestation project activities implemented on lands other than wetlands – version 03.1[12].

Methodology Tools applied in the document:

CDM – AR TOOL 14 – Version 04.2: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities[13].

Other Tools applied in the document:

AR-AM-TOOL-03 Calculation of the number of sample plots for measurements within A/R CDM project activities – version 2.1.0[14]

AR-AM-TOOL-08 Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity. Version 04.0.0[15]

AR-AMTOOL 15 Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity – version 2.0[16]

3.2 Applicability of Methodology

The project activity meets the applicability conditions of the AR-AMS0007 methodology used by the project.

3.2.1 Activity Eligibility

The Ugandan Government defines forests[17] as land with:

- A minimum area of 0.5 hectares
- A minimum tree crowns cover of 10%
- A minimum tree height of 5 metres.

[12] https://cdm.unfccc.int/methodologies/DB/J6ZHLX1C3AEMSZ52PWIII6D2AOJZUB
[13] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v4.2.pdf
[14] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.1.0.pdf
[15] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-08-v4.0.0.pdf
[16] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-15-v2.0.pdf
[17] http://www.fao.org/3/az362e/az362e.pdf

As described at 1.11, the plantations are done on parcels of one of the following land-use: degraded land, cocoa, coffee or vanilla parcels, pastures and annual crops. These land-uses fall into the grassland or cropland categories and none of them fall in the forest definition (less than 10% over 5 metres or susceptible to grow over 5 metres – cocoa and coffee trees pruned, cleared in rotation schemes or excessively degraded to grow beyond grasses and bushes).

During the first visit to the parcel to be planted, the project technicians collect information on the historical land-use for this specific parcel, and conduct an assessment of the existing tree cover, to ensure the parcel to be planted meets the eligibility criteria. This data is saved in the planting registry.

The proposed planting models include planting forest trees at densities from 70 - 1111 trees/ha (model 1 to model 3, see section 1.11.2), and therefore lead to the restoration of a crown cover above 5 metres and with higher coverage than 10%.

The proposed activity is therefore a reforestation activity, according to the Ugandan definition of a forest, and increases carbon sequestration by establishing vegetative cover through the planting of woody plantations.

a) The land subject to the project activity does not fall in wetland categories;

The proposed project activities are only implemented on croplands, pastures, or fallows and degraded lands.

b) Project activities are implemented on lands where <10% of the total surface project area is disturbed as result of soil preparation for planting;

Land preparation only consists of digging a 30 cm x 30 cm x 30 cm hole for each tree. Maximum soil disturbance is reached with highest planting density in model B – mixed stand (1111 trees/ha). The total area disturbed therefore amounts to 100 m2 per hectare, i.e., 1% of the surface. On top of this, this plantation model is only implemented on 31% of the total project area, the other models leading to even fewer disturbances.

Furthermore, the existing trees will not be removed for soil preparation before planting. Therefore, fewer than 10% of the total surface project is disturbed as a result of soil preparation for planting.

3.2.2 Applicability of Tools used

Applicability	Justification
AR-AM-TOOL-15-v2.0. *https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-15-v2.0.pdf*	
This tool is not applicable if the displacement of agricultural activities is expected to cause, directly or indirectly, any drainage of wetlands or peat lands.	This tool applies to all types of A/R CDM project activities and programs of activities. In the region there are a few wetlands or petlands. In addition, project activities do not

	involve wetlands or peatlands. Thus, there will not be any displacement of agricultural activities nor drainage.
AR-AM-TOOL-14 https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v4.2.pdf	
This tool has no internal applicability conditions	X
AR-AM-TOOL-08 https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-08-v4.0.0.pdf	
The tool is applicable to all occurrences of fire within the project boundary. Non-CO2 GHG emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire which affects an area greater than the minimum threshold area reported by the host Party for the purpose of defining forest, provided that the accumulated area affected by such fires in a given year is ≥5% of the project area.	This tool is applicable to all occurrences of fire within the project boundary. In addition, non-CO2 GHG emissions resulting from any occurrence of fire within the project boundary will be accounted for each incidence of fire which affects an area greater 29.4 ha provided that the accumulated area affected by such fires in a given year is ≥5% of the project area.
AR-AM-TOOL-03 https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.1.0.pdf	
This tool has no internal applicability conditions	x

3.3 Project Boundary

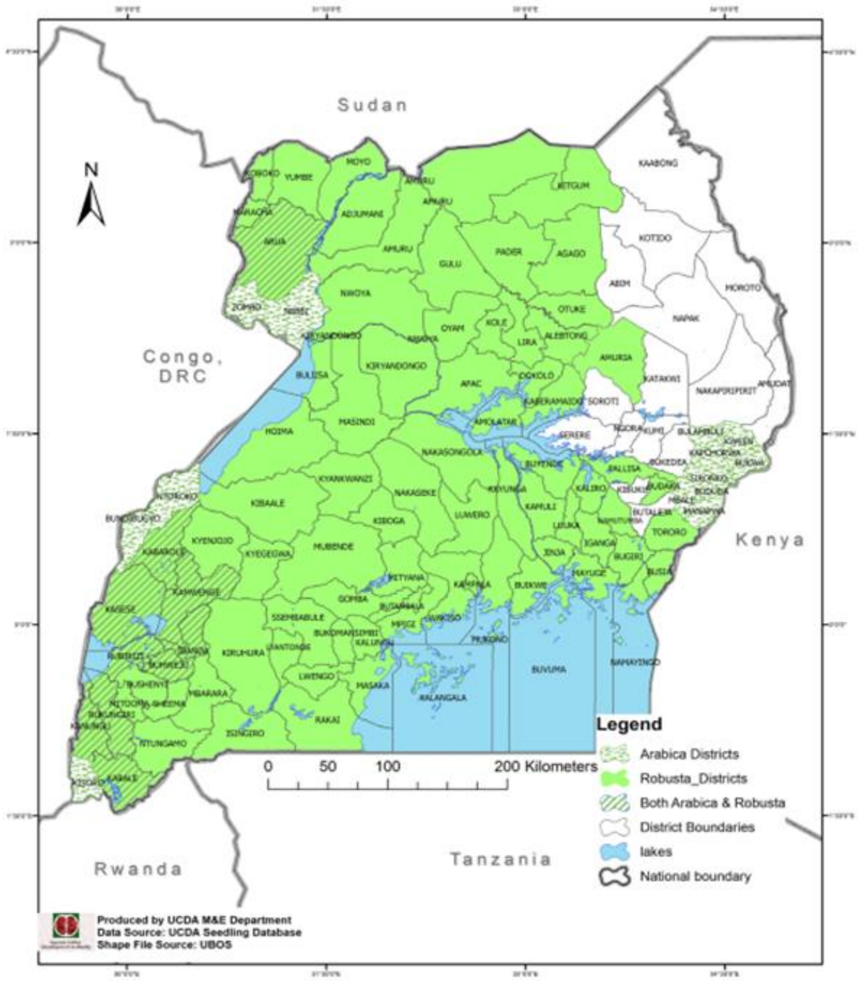
Carbon pools	Included?	Justification/Explanation
Above ground biomass	Yes	According to AR-AMS0007/version 03.1, Section 5.: **'**Carbon pools to be considered by these methodologies are above- and below-ground trees and woody perennial biomass and below-ground biomass of grasslands (i.e. living biomass)**'**
Below ground biomass	Yes	
Dead wood	No	
Litter	No	

Soil organic carbon	No	

Emission sources	Gas	Included?	Justification/Explanation
Burning of woody biomass	CO_2	No	As indicated by AR-AMS007
	CH_4	Yes	According to the methodological tool 'Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity' which identifies three possible sources of non-CO2 GHG emissions: 1. site preparation, 2. to clear the land of the harvest residue prior to replanting and 3. from forest fires Given the pre-planting land-uses and planting models, there is no possible burning of woody biomass for site preparation: • For the following pre-planting land-uses: grassland, annual crops, pastures, there is no woody biomass on the planting site • For perennial parcels, trees are planted in intercropped models and do not require sisal or coffee tree removal. Additionally, the project does not allow for burning to clear any land.
	N_2O	Yes	

The project boundary is shown in green in the figure below (figure 7). Which is the agricultural regions of the Republic of Uganda where perennial crops like coffee can be cultivated. Project boundary thus covers a vast portion of the Ugandan territory, excluding lands located at the North-East of the country.

Figure 7: Project Boundary Regions Suitable for Coffee plantations



The first project instance from 2016 to 2021 is constituted by the reunion of all parcels planted in the Rwenzori region, indicated by the red circle in the figure below (Figure 8), a few kilometres from the western border with the Congo democratic Republic between Rwenzori National Park and Queen Elisabeth National Park.

Figure 8: First instance location where measures are taking place.

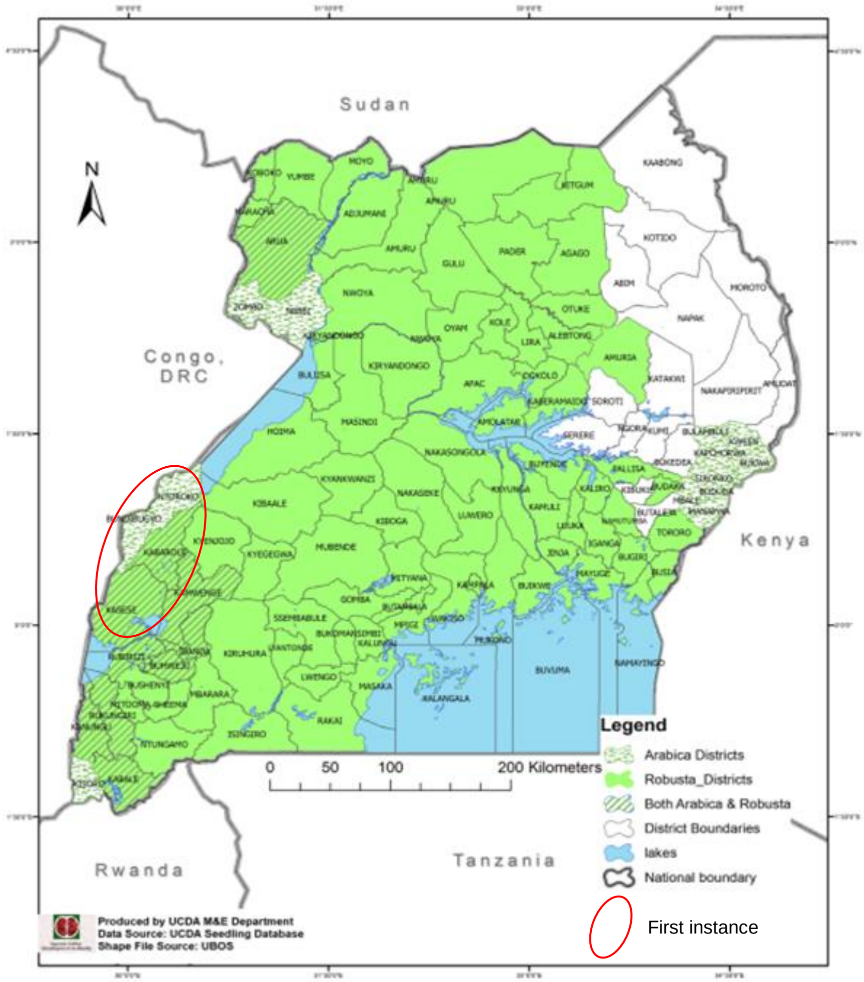
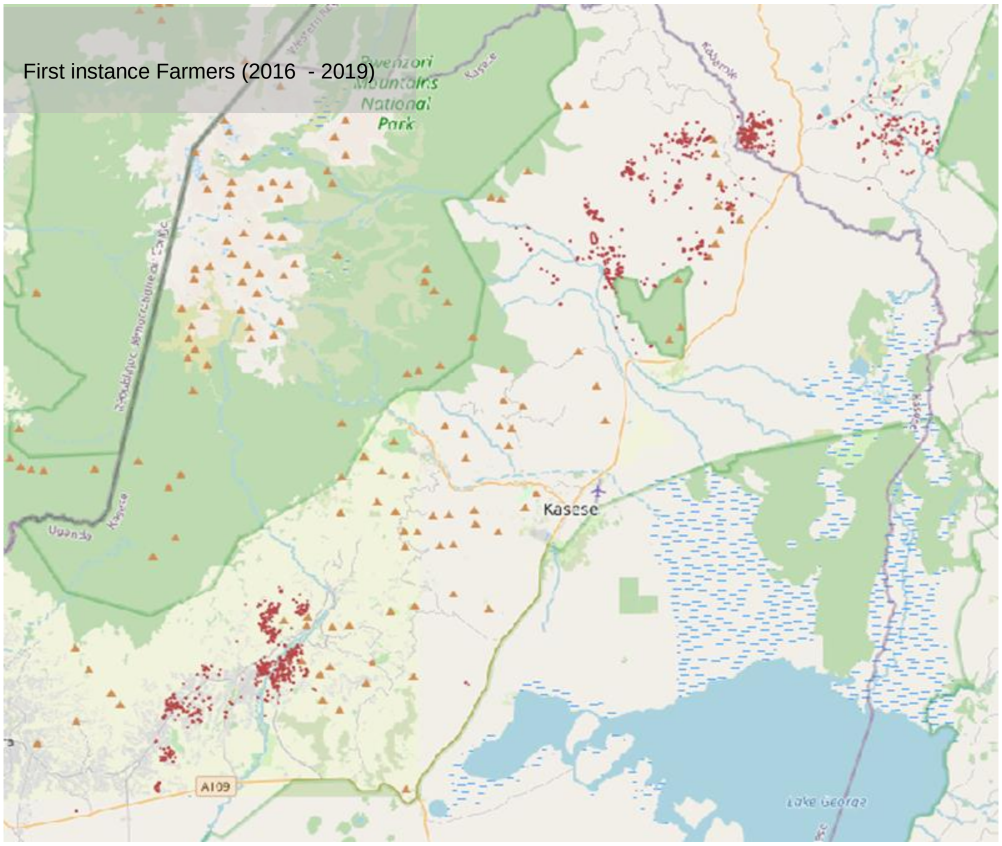


Table 3: Description of the activities and locations

Activities	Location
Preparation, Plantation and Individual technical assistance	In parcels with fewer than 30% of canopy cover and 5m of average tree height, outside conservation areas and parks.
Training, Empowerment	Village of participating Communities
Biomass Inventories	Sample of planted parcels
Project local coordination by local project team	Entities' Headquarters

The monitoring activities and individual training take place in the planted parcels (see the Project Kml).

Figure 9: First instance framers' location



3.4 Baseline Scenario

3.4.1 Baseline stratification

Baseline stratification is done as follows:

- Selected areas are first stratified according to land-use types.
- Each stratum is then further divided in two according to the planting model. Planting model 3 (full stand) is distinguished from the others as it will eventually lead to the disappearance of pre-project biomass, replaced by the trees planted.

The resulting stratification of the baseline area is thus the following:

Table 4: Stratification of baseline area

Stratum	Initial Land-use	Reforestation model
SB1 a	Perennial plantation	Model 1 - 2a - 2b
SB1 b	Perennial plantations	Model 3
SB2 a	Annual Crop	Model 1 - 2a - 2b
SB2 b	Annual Crops	Model 3
SB3 a	Pasture/grassland	Model 1 - 2a - 2b
SB3 b	Pasture/grassland	Model 3
SB4 a	Degraded fallow	Model 1 - 2a - 2b
SB4 b	Degraded fallow	Model 3

- **SB1:Perennial plantations**

This concerned coffee, cocoa and vanilla fields which are in installation (that is to say less than two years old) or already in production. The coffee tree height is from 1 to 3m high and the crown covers up to 100%.

- **SB2: Annual Crops**

The annual crops are typically maize, beans, bananas or other annual crops. Farmers plant trees on the boundaries with an intention to maintain annual crops farming inside the parcel. Yields are not affected as the trees provide additional services such as wind-barriers and limit soil erosion.

- **SB3: Pasture/Grassland**

The practice in the region is extensive and we model pasture as permanent grassland without overgrazing pressure. Farmers generally carry out animals grazing on steep grassland where perennial crops cannot grow

- **SB4:Abandoned Degraded Area**

According to the A/R Methodological tool 'Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R Project activities' and CIFOR, 2006, this stratum corresponds to former agricultural highly degraded land with low height of vegetation (1 to 5 m, crown cover up to 20%). Such lands are cyclically used as annual crops and fallow.

3.4.2 baseline scenario

Degraded Area, Pasture and Annual Crops

The degraded lands are highly unproductive and will not regenerate without a drastic change in farming and land-use practices in the area which is very unlikely to happen without external support and project implementation. Natural regeneration is very slow due to strong deterioration of the soils, and even when the soils are left over a long period and could start regeneration, parcels are reused for an annual crop cultivation cycle. Leaving their land unproductive for many years for regeneration purposes is a luxury that smallholder farmers targeted by the project cannot afford.

- Traditional cultivation patterns and historic land use is to periodically slash and burn these areas (typically 2-3 years of maize cultivation, then 5-10 years left as fallow for regeneration), thus preventing any growth of carbon stocks on these parcels above the average carbon stock of grasslands.

No significant changes in the carbon stocks, and the belowground biomass of grasslands, are therefore expected to occur in the absence of the project activity.

Perennial crops

As the farmers' main income source, the coffee, cocoa & vanilla plantations will be sustained over time. No crop switches are expected to consider the historic importance of this area, particularly noting that it is one of the biggest Arabica coffee-producing areas in the country. Coffee bushes are pruned regularly and maintained at a given height.

As a result, in the absence of the reforestation project, no changes in carbon stocks in the living biomass of woody perennials and below-ground biomass are expected to occur.

3.5 Additionality

The demonstration and assessment of additionality is done hereafter using the Appendix 1 of the ARMS0007 - A/R Small-scale Methodology: "Afforestation and reforestation project activities implemented on lands other than wetlands".

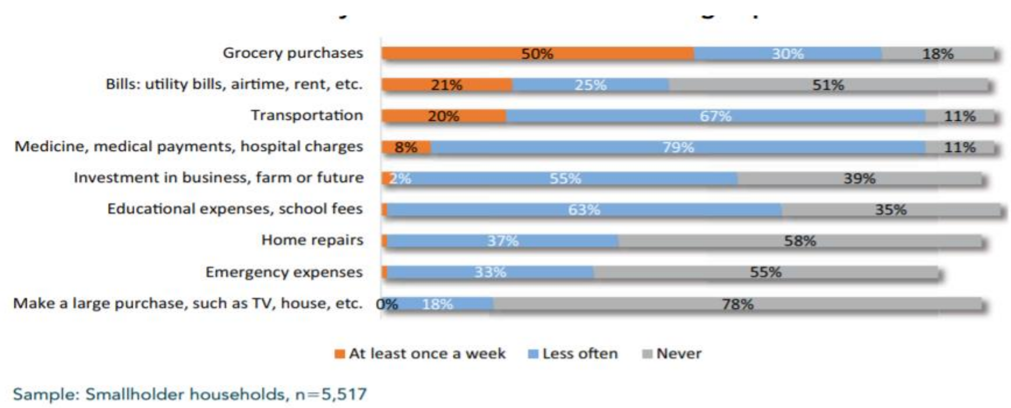
Investment barriers

An internal study made in the region says that about 95% of the farmers sampled depend on farming as their main source of livelihood, specifically on coffee (93.8%). Fewer than 10% across the categories are engaged in off-farm sources of income. Results further showed the average annual coffee income for the project beneficiaries (UGX 1,806,774 or US$516.2[18]). Another study estimated that a smallholder farmer in Uganda earns 0.85 USD[19] daily on average, while the poverty line, as of 2021 is 1.90 USD [20].

In addition, 77% of the population in rural Uganda have no access to banking systems. Another study (Jamie Anderson et al., 2016)[21] shows that 70% have never been to a bank, 90% don't have a bank account because they do not have money, or they do not have enough money to make transactions. Smallholder farmers don't have assets in order to be able to benefit from debt services as well.

Furthermore, this study shows that investing in their farm is not even the producer's priority. (Figure 10.) Grocery purchase, paying bills, transportation and medicine expenses come before investing in the farm.

Figure 10: Farmer's priorities expenses



(Source of the table: Jamie Anderson et al., 2016)

Due to their lack of cash availability and capacity to invest, it is very unlikely that smallholder farmers in Uganda invest time and money (around 50c USD per tree) in tree planting that will take decades to deliver impacts. Considering their size and subsistence pattern, few farmers have the possibility, or put as a priority, to purchase seedlings and invest some time and money for benefits that will be generated over years.

Barriers Relating to Local Tradition

Most farmers have been growing vanilla, cocoa, coffee without shade (apart from high banana shade sometimes). Farmers have little knowledge of potential tree species with high benefits that would combine well with the crops. Also, most farmers to date, think of their farms with a short-term vision.

[18] Change rate: US$1 =UGX 3501 (17/01/2022)
[19] https://cgspace.cgiar.org/bitstream/handle/10568/101331/Uganda%20Coffee%20brief.pdf?sequence=1
[20] https://www.worldvision.org/sponsorship-news-stories/global-poverty-facts
[21] National Survey and Segmentation of Smallholder Households in Uganda, Understanding Their Demand for Financial, Agricultural, and Digital Solutions, Jamie Anderson, Colleen E. Learch, and Scott T. Gardner, 2016

These farmers do not have the resources and training to consider the value of investing in seedlings purchase and planting now, for medium to long-term benefits. A reforestation project would help considerably switch the farmer vision from a short term to longer-term perspective.

Technical knowledge: Many farmers have little knowledge on agroforestry systems, planting techniques, maintenance techniques for timber or fruit trees. This lack of knowledge discourages them from planting these trees.

Laws & regulations: trees are planted on private land under the customary right.

Technological Barriers

Availability of seeds/seedlings: Although farmers still have some knowledge on which indigenous species could be of interest, there are very few nurseries in the project area, and the existing ones only sell perennial crops, Eucalyptus and Pine trees. Seeds and seedlings providers for the indigenous timber species are very difficult to find in the region, and smallholder farmers don't have transport facilities allowing them to travel far away to find seedlings.

3.6 Methodology Deviations

There is no methodology deviations.

4 Quantification of GHG Emission Reductions and Removals

4.1 Baseline Emissions

Each reforested parcel is stratified under 8 baseline strata described in section 3.4.1, for which steady-state biomass/carbon stocks are calculated (Table 5: Parameters used for the calculation of carbon stocks in baseline carbon pools).

The baseline emissions are therefore calculated for each parcel according to its strata. We calculated the evolution of carbon sequestration in the baseline scenario ΔCbsl (t), t CO2e

ΔCbsl (t) = Cbsl (t) - Cbsl (t-1)

ΔCbsl (t) = Net annual Baseline GHG removals. It is calculated in Sheet 1_GHG Credits, column H Cbsl (t) is the cumulated carbon sequestration in the baseline scenario the year t (tCO2e) It is calculated on sheet 5_summary per Category line 9.

Cbsl (t-1) is the cumulated carbon sequestration in the baseline scenario the year t-1 (tCO2e)

Cbsl (t) = ∑ Cbsl (t, i, j)

Cbsl (t, i, j) is the carbon sequestration of the parcel j in strat i in year t (tCO2e). It is calculated on sheet 3_Baseline from column BB to EC.

Cbsl (t, i, j) = B(ss) (i) * S (t, i, j) * 44/12 * CF

S (t, i, j) is the area of the parcel j in the baseline scenario in the baseline strata i the year t (ha)

B(ss) is the total (aboveground and belowground) biomass (tdm.ha-1) and is calculated as follow, B(ss) = M(ss) above + M (ss) below

Where

- M (ss) above is the biomass per hectare aboveground (tdm.ha-1)
- M (ss) below is the biomass per hectare belowground (tdm.ha-1)

This calculation can be seen on sheet 3_Baseline from column BB to EC. The total above ground and below ground biomass per parcel (tdm/parcel) calculated as follow B(ss) (i) * S (t, i, j) is done separately on column AW.

Table 5: Parameters used for the calculation of carbon stocks in baseline carbon pools

Stratum	Initial Land-use	Reforestation model	**M(ss) above**	**R**	**M(ss) below**	**B (ss)**	**B (ss)**	**Baseline removed**	**Source**
			tdm/ ha	tdm/tdm	tdm/ha	tdm/ha	tC/ha		
SB1 a	Perennial plantations	Model 1 - 2a - 2b	-	-	-	22	10,3	No	Henk Rikxoort, Götz Schroth, Peter Läderach, Beatriz Rodriguez Snchez. Carbon footprints and carbon stocks reveal climate-friendly coffee production. Agronomy for Sustainable Development, Springer Verlag/EDP Sciences/INRA, 2014, 34 (4), pp.887-897
SB1 b	Perennial plantations	Model 3	-	-	-	22	10,3	Yes	
SB2 a	Annual Crops	Model 1 - 2a - 2b	-	-	-	-	-	No	Transient carbon stocks
SB2 b	Annual Crops	Model 3	-	-	-	-	-	Yes	
SB3 a	Pasture/grassland	Model 1 - 2a - 2b	6,2	1.6	9,8	16	7,5	No	IPCC 2006 Chapter 6 Grassland; IPCC 2003; M(ss) above: Table 6.1 R: Table 6.4
SB3 b	Pasture/grassland	Model 3	6,2	1,6	9,8	16	7,5	Yes	
SB4 a	Degraded fallow	Model 1 - 2a - 2b	6,2	1.6	9,8	16	7,5	No	IPCC 2006 Chapter 6 Grassland; IPCC 2003; M(ss) above: Table 6.1 R: Table 6.4
SB4 b	Degraded fallow	Model 3	6,2	1,6	9,8	16	7,5	Yes	

For annual crops, carbon stocks are ignored since they are considered transient.

For degraded fallows, carbon stocks are considered similar to those of grasslands, as these are abandoned crop plots that become degraded fallows and look like grasslands where natural regeneration is very slow due to severe soil deterioration, and which will not regenerate without a radical change in agricultural and land use practices

4.2 Project Emissions

4.2.1 Calculation of project GHG removals

We calculated the annual net removals by sinks ΔCactual (t) (t CO_2/yr)

ΔCactual (t) (t CO_2/yr) = Cactual (t) - Cactual (t-1)

Cactual (t) is the GHG removals by sinks the year t (tCO_2)

Cactual (t-1) is the GHG removals by sinks the year t-1 (tCO_2)

This calculation can be seen in Sheet 1_GHG Credits, column F

Cactual (t) = Cbslp (t) + C (t)

Cbslp (t) is the GHG removals in the baseline sinks in the year t (tCO_2)

C (t) is the stock of carbon in the standing trees planted in the project area the year t (tCO_2e) This calculation can be seen in Sheet 1_GHG Credits, column E

Carbon stock calculation

Ex-ante estimation of GHG removals Cbslp (t) in the baseline carbon pools (tCO_2):

For the GHG removals in baseline sinks (grassland, annual crops, coffee trees), according to the Table 5: Parameters used for the calculation of carbon stocks in baseline carbon pools, we consider that:

For strata SB1a, SB2a, SB3a and the strata SB4a: the baseline carbon pools are unaffected by the tree planting. The trees are planted around the parcel or in an intercropped model, etc.

For the strata SB1b, SB2b, SB3b and the strata SB4b the biomass will disappear:

- for strata SB1b, SB2b: we consider that bushes of baseline pools will disappear (over 4 years) as the trees (planted at high densities) grow on the parcel
- for strata SB3b: we consider that the grasses of baseline pools will disappear (over 1 years) as the trees (planted at high densities) grow on the parcel

- for strata SB1b: the abandoned coffee trees will degrade slowly over 8 years as the planted trees grow

Cbslp (t) = ∑ Cbslp (t, i, j)

Cbslp (t) is the baseline sinks that stays untouched in the project scenario the year t (tCO2e) It is calculated on sheet 5_summary per Category line 8.
Cbslp (t, i, j) is the baseline sinks that stays untouched in the project scenario in the parcel j in strat i in year t (tCO2e). It is calculated on sheet 3_Baseline from column EE to HF.

Cbslp (t, i, j) = [1-Min (1, Dp) * B(ss) (i) * S (t, i, j)]* 44/12 * CF

S (t, i, j) is the area of the parcel j in the baseline scenario in the baseline strata i the year t (ha)

B(ss) is the total (aboveground and belowground) biomass (tdm.ha-1) and is calculated as follow, B(ss) = M(ss) above + M (ss) below

Dp , The degradation percentage is calculated as follow:

Dp = [(1/ Number of degradation years) * age of the parcel].

As explained above, the degradation of the baseline only concerned strata SB1b, SB2b, SB3b and the strata SB4b

Ex-ante estimation of GHG removals C (t) in planted trees (tCO2):

Estimation by modelling of tree growth (in accordance with CDM- AR Tool 14- Version 04.2: Estimation of carbon stocks and change in carbon stocks of trees and shrubs [...])

C (t) = ∑ C (t, j)

C (t) standing is the stock of carbon in the standing trees planted in the project area the year t (tCO2e); see section below (Tree growth estimation)

For each parcel, we calculate the carbon remove from the tree’s growth planted in the project area:

C (t;j) = C (t;i;j) * Sj

C (t;j) standing is the stock of carbon in the standing trees planted in the project area the year t in the parcel j (tCO2e); see section below (Tree growth estimation)

- Sj is the total planted area of the parcel j (ha)

C (t, i;j) = 44/12 * CF * (1 + R) * MIN [(C (t-1;i;j) * (1 – H * Tj)) + (MAI x SRj); Maximum tdm per ha]

C (t-1;i;j) is the stock of carbon per hectare of the parcel j of the project strata i in the standing trees the year t-1 (tCO2e/ha)

- We consider that the year of the plantation and the year following the plantation C (0;i;j) is nil.
- MAI is the Mean Annual Increment of above ground biomass per hectare (in tdm/(ha*yr))
- H is the harvesting rate/year equal to 1% estimated forest management plan of the project & guidelines provided to farmers.
- Tj is the share of timber trees in the parcels j (information from the planting database)
- SRj = MIN (1; Density # trees/ha (j)/500[22])
- SRj is the ratio of the maximum mean increment value of the parcel j
- Density # trees/ha (j) is the number of trees per hectare in the parcel j (information from the planting database)
- We consider that the maximum mean increment value (6 tdm/ha/year) is reached for a planted density above 500 trees/ha.

In sheet 4_Tree GHG removals per parcel of the GHG calculation ex ante excel file calculation are done as follow:

- From column AY to DY, Above ground biomass is calculated per parcel and per year M(ss) (t,i,j), using this formula :

M(ss) above (t,i,j)= MIN [(C (t-1;i;j) * (1 – H * Tj)) + (MAI x SRj); Maximum tdm per ha]

22 https://www.researchgate.net/publication/227696732_Density_and_species_diversity_of_trees_in_four_tropical_forests_of_the_Albertine_rift_western_Uganda

- From column EA to HA, Root to shoot is calculated, R (t,i,j), IF M(ss) <125 tdm/ha, R= 0.835 M(ss) Above >125 tdm/ha, R= 0,532 as it can be seen on the table below.
- From column HC to KC, B(ss) tdm is calculated as follow

B(ss) = Mss above (t,i,j) (tdm)*[1+R (t,i,j)]

- From column KE to NE (t, i;j) = B(ss) * 44/12 * CF

The following parameters were used to model and estimate the growth of planted trees within project area:

Mean annual increment (above ground biomass)	tdm / (ha*yr)	6	2019 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 AFOLU, Chapter 4 Forest Land, Table 4.10, ABOVEGROUND NET BIOMASS GROWTH IN TROPICAL, tropical rainforest, Africa other.
Maximum above ground biomass per ha	tdm/ha	150	2019 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 AFOLU, Chapter 4 Forest Land, Table 4.8, ABOVEGROUND BIOMASS IN FOREST PLANTATIONS, tropical rainforest, Africa Broadleaf, The report says that for parcel: >20 yr - 300 tdm/ha <20 yr - 100 tdm/ha As the crediting period is 35 years, we decided to use 150 tdm/ha to be conservative
R (root to shoot ratio)	tdm/tdm	ABG <125 tdm/ha, R=0.825 ABG >125 tdm/ha, R= 0.532	2019 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 AFOLU, Chapter 4 Forest Land, Table 4.4. ratio of below-ground to above-ground biomass, Tropical rainforest, Africa
CF	tC/tdm	0.47	Carbon Fraction - AR TOOL 14
CC	Age	15	Age of the first commercial cut

H	%	1	Harvesting rate/year estimated from the forest management plan of the project & guidelines provided to farmers

The mean annual increment was applied on a linear basis starting year 2 (consistent with observations in the field, no significant biomass gains in year 1), until reaching the Maximum quantity of biomass per hectare for the given climatic conditions.

Ex-post estimation of GHG removals in planted trees

For the ex-post calculation of the project biomass, the equation is the following:

C (t, i;j) = 44/12 * CF * (1 + R) * MAIr (i) * t (j)

C (t;i;j) is the stock of carbon per hectare of the parcel j of the project strata i in the standing trees the year t (tCO_2e/ha)

- We consider that the year of the plantation and the year following the plantation C (0;i;j) is nil.
- MAIr (i) is the real Mean Annual Increment of above ground biomass per hectare (in tdm/(ha*yr)) really observed on the field from biomass inventories for parcels of starta i. It comes from a statistical extrapolation of MAI observed on parcels of strata i.

t (j) is the age of parcel j since planting.

Stratification of the project for calculation of project GHG removals

For the ex-post calculation of the project biomass, the project area is stratified according to the planting model and year of planting:

<u>Plantation models:</u>

- Model 1 ‘Lines’: Trees in lines, around the parcels, water streams and roads, every 3 metres.
- Model 2A ‘Intercropping perennial crops ’: Trees planted intercropped in perennial crops fields, 70-80 trees/ha
- Model 2B ‘Agroforestry perennial crops Installation’: Trees intercropped in perennial crops fields, 70-250 trees/ha

Model 3 ‘Full stand’: Dense plantation on unproductive or degraded lands, 1111 trees/hectare

<u>Plantation year:</u>

First plantations started in April 2016. As a result, 16 strata were defined for ex-ante calculation of project GHG removals

Table 6: First plantations Project Strata

Strata	Year	Model
S1	2016	M1
S2	2016	M2a
S3	2016	M2b
S4	2016	M3
S5	2017	M1
S6	2017	M2a
S7	2017	M2b
S8	2017	M3
S9	2018	M1
S10	2018	M2a
S11	2018	M2b
S12	2018	M3
S13	2019	M1
S14	2019	M2a
S15	2019	M2b
S16	2019	M3

Sampling plot selection

The protocol for biomass inventory was designed according to CDM A/R methodological tools: 'Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities'.

Size of permanent plots

- For planting model 2A and 3 (area planting): 500m2 circular plots
- For planting model 1 (perimeter/line planting): 100 metres' line following planted line
- For planting model 2b, (area planting): 500m2 circular plots and perimeter/line planting): 100 metres' line following planted line

Plots selection

- Planted parcels registered in the database are filtered by strata (planting year and model). For each stratum, a first arbitrary number of parcels will be randomly selected (using a random number generator). This first number of parcels per stratum is chosen arbitrarily based on the size of the stratum (less in smaller strata) and expected biomass quantity (less in more recent waves).

- After the first inventory wave, the results will be plugged in the calculation workbook to compute the variance and uncertainty, and deduct the theoretical number of plots to measure. This will lead to the random selection of additional parcels for each stratum. This process may be repeated several times until reaching the appropriate level of uncertainty below 10%

Plot demarcation.

- The centre point of the plot (model 2A, 2B or 3) or the end of the sample line (model 1) are recorded with GPS and marked in the field with a wood stick.
- In model 2A, 2B, or 3, the boundary of the sample plot is marked measuring radiuses of the sampling circle with a measuring tape (implementing slope correction factors when appropriate). In model 1, the two extremities of the sampling line are marked using a measuring tape.
- All trees falling inside the plot boundaries were marked with aluminium plates nailed or attached to the trees.

Inventory team trainings

- Biomass inventory team members will be trained several times by PUR Projet before the biomass inventories will be done for the VCS verification of the Agroforestry project.
- In each session, PUR Projet will ensure that all the technical will apply the procedures in the same way to ensure the consistency of the data collection, will verify the team's skills and will go through the issues specifics to biomass inventory in reforested parcels.

Estimation of project emissions

The project activities do not include mechanised land preparation nor utilisation of chemical fertilisers or pesticides, transportation attributable to the project activity shall be considered insignificant. As a consequence and according to AR-AMS0007 Section 5.5, project emissions are considered as not significant and are accounted as zero in calculations.

GHG (E, t) = 0

4.3 Leakage

According to AR-AMS0007/version 03.1, Section 5.5, leakage due to the displacement of agricultural activities shall be assessed.

The project area was stratified based on the initial land-use and planting model

Stratum	Initial Land-use	Reforestation model
SB1 a	Perennial plantations	Model 1 - 2a - 2b
SB1 b	Perennial plantations	Model 3
SB2 a	Annual Crops	Model 1 - 2a - 2b
SB2 b	Annual Crops	Model 3
SB3 a	Pasture/grassland	Model 1 - 2a - 2b
SB3 b	Pasture/grassland	Model 3
SB4 a	Degraded fallow	Model 1 - 2a - 2b
SB4 b	Degraded fallow	Model 3

Strata SB1a, SB1b, SB2a, SB2b, SB3a and SB4a:

There is no risk of displacement of pre-project activities for the following stratum

Displacement of agricultural activities in Section 4.7 of AR-AMTOOL 15 refers to displacement from both crop cultivation activities ('human induced activities, occurring on land, that are aimed at vegetation control for producing food, forage, fiber, oilseed crops, etc., including harvesting of the produce' and grazing activities 'human induced activities, occurring on land, that are aimed at livestock production'. Per AR-AMTOOL 15, Section 6.9

Displacement of an agricultural activity by itself does not result in leakage emission. Leakage emission occurs when the displacement leads to an increase in GHG emissions relative to the GHG emissions attributable to the activity as it exists within the project boundary.

- SB1a: Perennial crops

Trees are planted around the farmers’ plot or among crops, therefore not displacing any farming activity. On the contrary, the trees will precisely benefit the perennial crops (vanilla, cocoa, coffee), acting as wind-barriers and/or limitation of erosion, as well as shade for the main crop.

- SB2a: Annual crops

Trees are planted around the farmers’ plot or among crops, therefore not displacing any farming activity. On the contrary,_the trees will precisely benefit the existing crops, acting as wind-barriers and/or limitation of erosion.

- SB4a and SB4b: Degraded Fallow

Plots are not farmed, there is therefore no agricultural activity to displace. On the contrary, trees will contribute to regenerate the soils and provide additional arable land (hence lower relative pressure upon available land).

- SB3a and SB3b: Pasture/grassland
    - In SB3a, trees are planted around the grazing area, which precisely intends to mix trees with pastures, therefore not displacing any grazing activity.
    - In SB3b, trees are planted to replace pastures. This happens when farmers have grazing areas in excess of their need for the number of cattle heads. In that case, the planting will not trigger pasture displacement as the existing cattle will be moved to other existing grazing areas. This case is very unlikely in Uganda.

In all these cases, the best land-use practices implemented will, on the one hand, regenerate arable land and help secure and increase existing crop production yields, and, on the other hand, give back value to unproductive degraded land. Sustainable crop and timber production will generate income in the short, mid, and long-term, thus lowering the risk of farmers to move to other places.

Strata SB1b, SB2b:

- SB1b: Perennial crops

In strata SB1b, farmers usually decide to plant timber trees in model 3 because they do not want to cultivate their permanent crops anymore.

Most often it is because they have too much area of the perennial crop and cannot maintain and harvest all of it; in that case, there is no risk of the displacement of the perennial crop plantations.

In other cases, it is because the perennial crop is not adapted to the area or old age, and not productive enough for the farmer to keep cultivating it. In that case, there could be a risk of the displacement of pre-project activity, which could be considered as leakage only if the farmer deforests another area to replant the perennial crop (but as explained in 3.5, he would face investment barriers and most likely he would move the coffee to a degrade land).

Displacement of the perennial crop to a forested area is therefore very unlikely. Still, there will be monitoring for leakage, as required in AR-AMS0007 Version 03.1.

- Strata SB2b: Annual crops

Annual crops are part of the farmer's additional income or are considered subsistence farming.It is considered the household's first source of revenue.

There are different ways of seeing the intercropping of trees and annual crops:

- Farmers may decide to plant trees in Model M3 (full stand tree planting) however the farmers will keep their annual crops in the same parcel in order to keep some additional income or for household consumption. There is no risk of the displacement of the annual crop plantations.
- On the other hand, it is also possible that farmers decide to plant trees in Model 3 (full stand tree planting) because the farmer has an adequate income from the perennial income or other income Hence the plot will not be having any crops on it. There is no risk of the displacement of the annual crop plantations.
- It is also possible the farmers will stop cultivating the annual crop since it is not adapted to the area, and it is not productive enough. In that case, there could be a risk of the displacement of pre-project activity, which could be considered as leakage only if the farmer deforests another area to replant the annual crop (but as explained in 3.5, he would face investment barriers).

Displacement of the Annual crop to a forested area is therefore very unlikely. Still, there will be monitoring for leakage, as required in AR-AMS0007 Version 03.1.

Displacement of agriculture activities can thus be considered insignificant and leakage considered as nil.

As a result, **the overall leakage for the project is considered as nil.** Still, there will be monitoring of leakage, as required in AR-AMS0007 Version 03.1.

4.4 Net GHG Emission Reductions and Removals

The ex-ante net anthropogenic GHG emission reductions and removals are calculated using equation 5 of the methodology AR-AMS0007:

∆CÆR–CDM,t = ∆CÆCTUÆL.t — ∆CBSL,t — LKt

Where:

- ∆CÆR–CDM,t = Net anthropogenic GHG removals by sinks, in year t; t CO2-e
- ∆CÆCTUÆL.t = Actual net GHG removals by sinks, in year t; t CO2-e
- ∆CBSL,t = Baseline net GHG removals by sinks, in year t; t CO2-e
- LKt = GHG emissions due to leakage, in year t; t CO2-e

Year	Estimated baseline emissions or removals (tCO_2e) CBSL	Estimated project emissions or removals (tCO_2e) CÆCTUÆL	Estimated leakage emissions (tCO_2e) LK	Estimated net GHG emission reductions or removals (tCO_2e) CÆR–CDM
2016	0	0	0	0
2017	5,094	5,575	0	481
2018	4,850	5,938	0	1,088
2019	2,692	4,194	0	1,502
2020	4,019	6,267	0	2,248
2021	0	2,254	0	2,254
2022	0	2,260	0	2,260
2023	0	2,284	0	2,284
2024	0	2,324	0	2,324
2025	0	2,329	0	2,329
2026	0	2,346	0	2,346
2027	0	2,348	0	2,348
2028	0	2,348	0	2,348
2029	0	2,348	0	2,348
2030	0	2,348	0	2,348
2031	0	2,348	0	2,348

2032	0	2,278	0	2,278
2033	0	2,033	0	2,033
2034	0	1,997	0	1,997
2035	0	1,967	0	1,967
2036	0	1,938	0	1,938
2037	0	1,920	0	1,920
2038	0	1,897	0	1,897
2039	0	1,550	0	1,550
2040	0	1,688	0	1,688
2041	0	1,572	0	1,572
2042	0	1,370	0	1,370
2043	0	1,699	0	1,699
2044	0	1,675	0	1,675
2045	0	1,673	0	1,673
2046	0	1,675	0	1,675
2047	0	1,447	0	1,447
2048	0	1,461	0	1,461
2049	0	1,572	0	1,572
2050	0	1,386	0	1,386
2051	0	1,559	0	1,559
TOTAL	**16,655**	**81,871**	**0**	**65,216**

5 MONITORING

5.1 Data and Parameters Available at Validation

Data/Parameter	**Carbon Fraction of dry matter**
Data unit	tC/tdm
Description	Total carbon in weight per ton of tree fresh matter.
Source of data	CDM AR Tool 14
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of Data	• Calculation of baseline emissions • Calculation of project emissions
Comments	

Data/Parameter	**CO2 fraction**
Data unit	T (CO2)/tC
Description	Total CO2 in weight per ton of C in trees.
Source of data	Universal constant[23]
Value applied	44/12
Justification of choice of data or description of measurement	Reference value

[23] https://ecometrica.com/assets/GHGs-CO2-CO2e-and-Carbon-What-Do-These-Mean-v2.1.pdf

methods and procedures applied	
Purpose of Data	- Calculation of baseline emissions - Calculation of project emissions
Comments	

Data/Parameter	**Root to shoot ratio**
Data unit	Ton dry matter/Ton dry matter
Description	Ratio between belowground and aboveground
Source of data	2019 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 AFOLU, Chapter 4 Forest Land, Table 4.4. ratio of below-ground to above-ground biomass, Tropical rainforest, Africa IPCC 2006 Chapter 6 Grassland; IPCC 2003; Table 6.4
Value applied	For parcel with tdm.ha <125:0.825 For parcel with tdm.ha >125:0.532 For grasslands: 1.58
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of Data	- Calculation of baseline emissions - Calculation of project emissions
Comments	

5.2 Data and Parameters Monitored

Data/Parameter	Area planted per strata
Data unit	Hectares

Description	Area planted under each model, in each plantation wave
Source of data	Field Measurement (GPS)
Description of measurement methods and procedures to be applied	Area planted is measured by the project team's technicians, at first parcel monitoring. For model 1, the distance planted is measured, and area is recalculated using the assumption of 5 metre width for the line of trees planted.
Frequency of monitoring/recording	Once
Value applied	See GHG calculation model
Monitoring equipment	GPS device included in smart phones and tablets of technicians, using backcountry software. In some cases, Garmin devices can be used.
QA/QC procedures to be applied	Data is cross-checked in the field by PUR Projet during each visit.
Purpose of data	● Calculation of baseline emissions ● Calculation of project emissions
Calculation method	N/A
Comments	- Stored electronically - 100% of project area to be recorded

Data/Parameter	Mean Annual Increment per planting model/strata
Data unit	tdm/ha/year
Description	Stock of biomass observed in biomass inventory samples divided by the age of the parcel.
Source of data	Calculation based on measurement of the diameter of trees and converted to tons of dry matter thanks to an allometric equation, (Kuyah et al., 2012: $AGB =$

	0.091xDBH^2.472)[24] relevant for the context of the project
Description of measurement methods and procedures to be applied	Field visits and measurement with tape
Frequency of monitoring/recording	After each biomass inventory
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	• Calculation of project emissions
Calculation method	Allometric equations are used to calculate above ground biomass in sampling plots. Root to shoot ratio is used to compute below ground biomass. The total is extrapolated to total project area based on the area ratio per strata between sampling plots and total project area.
Comments	

[24] Shem Kuyah, Johannes Dietz, Catherine Muthuri, Ramni Jamnadass, Peter Mwangi, Richard Coe, Henry Neufeldt, Allometric equations for estimating biomass in agricultural landscapes: I. Aboveground biomass, Agriculture, Ecosystems & Environment, Volume 158, 2012, Pages 216-224, ISSN 0167-8809, https://doi.org/10.1016/j.agee.2012.05.011.

5.3 Monitoring Plan

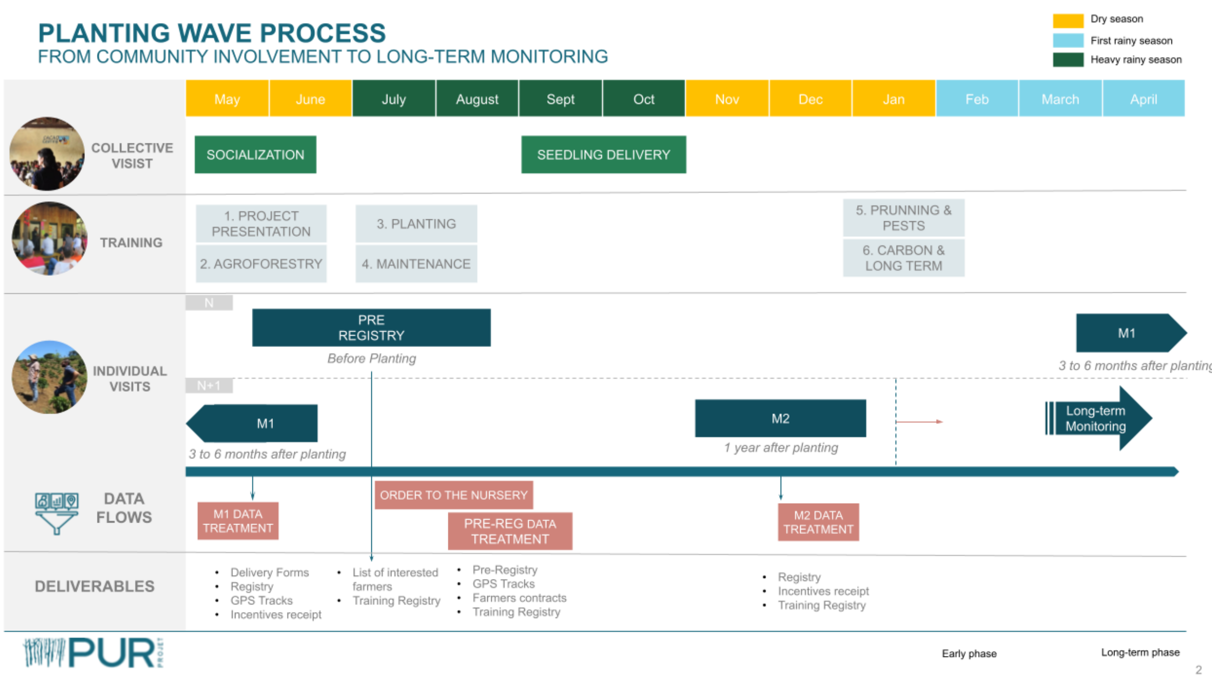
Table 7: Monitoring plan

Topic	Elements to be monitored	Procedure of monitoring	Scope	Responsibility and field participants	Frequency over the project lifetime	Output
Plantations	Pre-identification of parcel to be planted	Individual visit of each farmer by project technicians prior to plantation. Objective is to define relevant planting models, parcels eligible, and number of trees to be distributed. For each parcel, general information is collected on the context and characteristics and a preliminary GPS track is performed to estimate the surface to be planted. Most often contractual agreement with the farmer and land tenure info is collected during that visit too.	All parcels	- Training and coordination: PUR Projet - Execution : technicians specifically hired and trained for this activity (implementing partners) - Quality control (data) / Interpretation : PUR Projet	Once before planting	Pre-registration form / Farmer's order
	Number of trees distributed	Registration during distribution through distribution lists. Each farmer receiving trees is also signing a delivery voucher.	All parcels		Once at distribution	Planting registry
	Number of trees planted and alive	After plantation of the trees received by the farmer, a monitoring visit is performed by technicians of the implementing partner. During this visit, the technician will evaluate if the farmer respected the planting guidelines and update the registered information with what is observed in reality on the field. A new GPS track of the surface actually planted is collected and replaces the one taken at pre-registration stage. Finally, the technician will count one by one all the trees planted and still alive on the parcel, and report the data species by species in the planting registry of the project.	All parcels		Once over the 2 first years following the plantation	Updated planting registry
Emissions reductions	Area of each strata (ha)	- GPS mapping of all planted areas - Consolidation in planting registry	All parcels	- Training and coordination: PUR Projet - Execution : technicians specifically hired and trained for this activity (implementing partners) - Quality control (data) / Interpretation : PUR Projet	At first monitoring of each planting wave	Updated planting registry
	Carbon stock per ha, for each strata (tCO_2/ha)	Field measurements (biomass inventory plots) based on a sample of parcels. Results are extrapolated to the whole project following statistical analysis.	Stratified sampling approach (described in section 4.2)		At least once before each periodic verification of the project (every 5 years)	Biomass inventory forms and carbon calculation files
Leakage	Displacement of pre-project crops	If parcels with a risk of leakage represent more than 5% of total project area, leakage surveys will be conducted on related parcels in order to detect if leakage occurred and quantify it.	All parcels at risk (if significant)		Once, 5 years after planting.	Survey forms
Non-permanence risks and long term survival	LT permanence of the trees	- Continuous contacts between project implementing partner and farmers allow to raise alert if non permanence risk appear - Each parcel will be visited by project technicians at least every 10 years for long term monitoring visits with specific questionnaires covering tree permanence topics. This monitoring will focus on estimating survival rate of trees on the parcel and detect/evaluate risks of non-permanence.	All parcels		At least every 10 years for each parcel of the project.	Updated planting registry

Most of the data collection performed in the project is done through electronic questionnaires developed using android technology. Due to this usage, project technicians collect field data directly on their smartphone or tablet and get access to consolidated data in a digital format with few manual treatments: this significantly reduces manual data entry mistakes.

Carbon monitoring of the project is fully integrated in the project life cycle and organised by yearly planting waves:

Figure 11: Ideal planting wave process

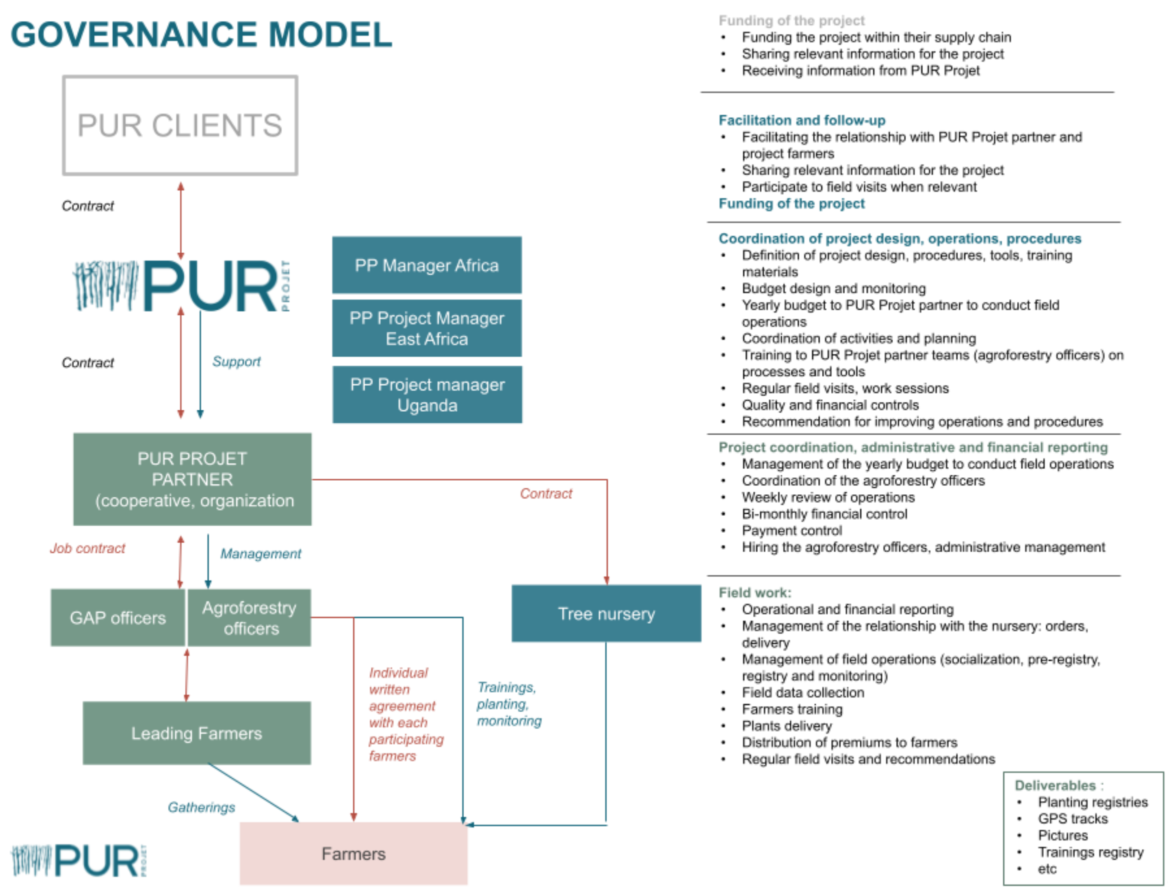


5.3.1 Organisational structure for monitoring

The grouped project is based on the relationship between PUR Projet, the Project proponent and coordinator, fundraiser and carbon offset traders of the project and the implementing partners. The implementing partners have developed internal dedicated teams to operate the project and implement monitoring activities.

PUR Projet will check each year through an internal audit the state of the project (documents, plantations, knowledge, benefits, actual GHG removals by sinks…) and pay the implementing partner to implement the monitoring activities.

Figure 12: Generic project implementation structure



A Local **Project Coordinator** is in charge of the Reforestation and Carbon sequestration in each implementing partner. The Local Project Coordinator's responsibilities include overall daily **planning**, **coordination** of plantation and **monitoring** activities, and checking each area's results. According to the size of the implementing partner, one or several Engineers can be responsible for the technicians' and farmers' training, plantation designs, seedlings distribution; he/she will check the monitoring results presented by the technicians for quantity, quality and coherence. **Field Technicians** trained by the Project Coordinator and/or the Forest Engineer(s), and/or other external partners of the project, will conduct the registration and monitoring activities in the field.

5.3.2 Quality control and quality assurance procedures

A quality control and quality assurance (QA/QC) plan describes all procedures and includes instructions related to:

- Collecting reliable field measurements;

- Verifying methods used to collect field data;
- Verifying data entry and analysis techniques;
- Data maintenance and archiving

Data collection

Monitoring will be done by trained project technicians hired for the project, who understand the importance of accurate data collecting.

This technical team will receive training about field measurements, both theoretical and practical, before every new wave of measurement, and at least twice a year. During this participative workshop, each technician will measure the same sample in order to ensure harmonised monitoring practices, share good practices for the reporting of key indicators and the entering of data in the database. These frequent training ensures that all technicians have standardised monitoring and reporting practices.

Moreover, the engineer responsible for monitoring will evaluate each of the members in the monitoring team to identify errors in the field's techniques, verify measurements processes and correct any identified problems before they carry out the measurements.

Verification of data collection

Data collected will be controlled by The Local Project Coordinator first, and then by PUR Projet to identify both systematic and isolated errors. Identification of systematic errors will help improve the training and/or the monitoring methods to avoid future monitoring errors.

Data Analysis

Field data (pre-registry; monitoring) are collected on field forms and will progressively be done through an online application. Systematic consistency checks and analysis are performed to detect inconsistencies and systematic errors. Furthermore, field data is cross-checked with reported data and, where necessary, systematic consistency tests are included throughout the spreadsheets to ensure data reliability. Continuous communication between the staff involved in the data collection and the staff responsible for the analysis ensures the quick resolution of any apparent anomalies before the final analysis is conducted.

Moreover, consistency checks with the previous years' data are systematically performed.

Storing and maintenance information

The information will be stored and made available upon request to all authorised stakeholders. ,

Because of the long-term nature of forestry activities, data archiving (maintenance and storage) is a key component of a project. Copies of all data analysis and models, the final estimate of carbon sequestration, GIS products and all measurements and monitoring reports will be securely stored, electronically (PUR Projet server) and physically (paper), with the relevant backups and safeguards.

Given the time frame of the project, and the evolution rate of data storage technologies, electronic copies of data and reports will be periodically updated or converted in order to be kept in an up-to-date format.

5.3.3 Adaptive management plan

All the procedures described in the documents are already the results of recurrent corrections and adaptations of precedent procedures.

More generally, the project has an adaptive approach, in which the project proponent and the local management team regularly document the feedback from the previous experiences and continuously work on identifying improvements for the project procedures.

After field visits to the project of the Project proponent, and yearly after the plantation waves, a progress report including feedback and suggested improvements is drafted, discussed, and approved by the Project Proponent and the Management team. Examples of such reports, proceedings, or meeting minutes. These reports lead to the continuous adaptation of project procedures to constantly improve the quality of the project.

5.3.4 Monitoring plan follow-up

All implementing partners will be reminded on an annual basis about how the monitoring plan is expected to be followed based on the documented procedures. In the case that the plan is not followed and there are non-conformances, all implementing partners will be subjected to quality checks as indicated above, announced or unannounced internal audits of randomly sampled farmers.

A database review will be conducted for selected farmers from different waves followed by an on-farm field visit to verify the information for a given percentage of the farmers.

6 Appendix

6.1 Appendix Coffee Good Agricultural Practices

Context

According to the Uganda National Coffee Platform (2018), coffee production in Uganda is affected by poor canopy management (pruning and stumping) and threatened by pest and disease.

In the Rwenzori area, coffee trees are suffering from the lack of shade and agricultural management. Furthermore, many coffee parcels are showing decreasing yields and revenues and require rejuvenation.

Objectives

PUR Projet has developed a comprehensive training curriculum for smallholder coffee farmers consisting in 10 modules covering topics from land preparation to post-harvest practices in order to promote sustainable farming practices aiming to increase coffee yields and quality for potential higher incomes and ensure coffee tree maintenance over the long term.

Activities

Group training is carried out by the technician team (250 farmers under 1 technician).

These trainings are complemented by a system of Lead Farmers. Each Lead Farmer receives intensive training and oversees a group of 30 farmers: they are responsible for setting up demonstration plots, visiting the parcels of his group, and organizing informal sessions to review the practices learned during the training.

A baseline is established prior to the implementation of GAP training in order to monitor adoption after the training has been rolled out.

6.2 Appendix Awareness Raising - Community theatre

Context

At the beginning of February community plays were performed in 15 different areas.

The play raised awareness about socio-economic and environmental challenges such the following:

Tree planting: encourage people from the communities to plant by themselves, ‘do it on your own and we’ll support you in that way (nurseries, trainings on density, planting)’

Conservation: raise awareness about communities’ reliance on national parks and the importance to keep protecting it, while mentioning that communities could benefit from them through MoUs with National Park authorities

Income diversification: insist on the importance of revenue diversification ‘important not to earn money only from vanilla, take care of coffee as well

Vanilla: highlight the situation with thieves in a fun way

The plays were a great success with more than 18 000 people attending the shows, of which 30% were children.

The audience widely recognised the ongoing severe deforestation in the area and showed enthusiasm to plant themselves.