



EL ARRIERO AFFORESTATION ON DEGRADED GRASSLANDS UNDER EXTENSIVE GRAZING PROJECT

Document Prepared by



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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project comprises a total of 4,636.53 hectares (ha) of land previously under extensive grazing by beef cattle, on which afforestation to obtain high-value, long-lived timber products and sequester large amounts of carbon dioxide from the atmosphere was established.

The project began on April 30, 2009, and is currently on its 14th year. Forests are based on a 22–25-year rotation of Loblolly Pine (*Pinus taeda*) and Hybrid Pine (*P. caribea* x *elliotti*) plantations, managed with three pruning and two thinning operations, to obtain knot-free, high-diameter logs suitable for saw-milling.

Plantation was completed by the second year of the project and the forests will be replanted after clear-cut harvest. The baseline study was determined at validation, and it is the perpetuation of extensive grazing is the most likely use of the land. Additionality is demonstrated by the fact that the expected internal rate of return of the proposed project activity without considering carbon finance is lower than the benchmark internal rate of return for this type of investment in Uruguay. In addition, barrier analysis and common practice analysis showed that afforestation in the year of project initiation and the area of the proposed project activity is not likely to occur without carbon financing.

Forestal El Arriero is owned, managed and controlled by COFUSA since October 2022. COFUSA is a Uruguayan company dedicated to the forestry production. Practices applied under their management system, and applicable to the entire patrimony, follow FSC standard¹ as the company is FSC certified since 2001. Its brother company URUFOR dedicates to the industrialization and selling of high-quality timber in overseas markets. Their purpose is to be recognized by their high-quality products, which are obtained from sustainably managed forests and by means of a high-quality industrialization process: all of which in an economically viable way. They also aim to meet the expectations of clients, suppliers and members of the company; and thus enhance the well-being of our community.

Planted forests removed carbon dioxide from the atmosphere and stored it in different carbon pools (living above-ground and below-ground biomass, soil, litter, and dead wood). In this fourth monitoring event the carbon stock in different pools is measured and compared to the previous monitoring event. The total carbon stock in the different pools amounts to 2,274,614 tCO_{2e}. Having in consideration the previous verification events and the long-term average, this fourth verification of the project will issue 292,276 tCO_{2e}.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/Verification	30-April-2009 to 25-March-2013	VCS	SCS Global Services	4
Verification	26-March-2013 to 19-January-2018	VCS	EcoCert	6

¹ Ver [aquí](#)

Verification	26-January-2018 to 22-December-2021	VCS	Aenor	3
Verification	23-Dec-2021 to 12-Oct-2023	VCS	KBS	2

1.3 Sectoral Scope and Project Type

Sectoral scope	Agriculture, Forestry and Other Land Use
AFOLU project category ²	Afforestation, Reforestation and Revegetation (ARR)
Project activity type	Forest plantations (pinewood) on degraded grasslands in Uruguay.

1.4 Project Proponent

Organization name	Forestal El Arriero SRL
Contact person	Andrés Gómez
Title	Forest Manager
Address	Puntas de Santiago 1604 Montevideo, Uruguay.
Telephone	+598 2 6025759
Email	There is no email address for El Arriero. But, as it can be seen in different section of this monitoring report, Cia Forestal is the owner of Arriero: agomez@ciaforestal.com.uy

1.5 Other Entities Involved in the Project

Organization name	Compañía Forestal Uruguay SRL
Role in the project	Forest Management Administrator. Since 2022 Forestal El Arriero belongs to the same economic group dedicated to the forestry industry, all the forest management activities are planned, implemented, contracted or supervised by COFUSA.
Contact person	Andrés Gómez
Title	Forest Manager

² See Appendix 1 of the VCS Standard

Address	Ruta 5, km 495, Rivera
Telephone	+598 99829856
Email	agomez@ciaforestal.com.uy

Organization name	CLIMIT
Role in the project	Data processing, archiving and preparation of the VCS documents
Contact person	Agustin Inthamoussu
Title	CEO & Founder
Address	Av.de las Americas 8200
Telephone	+59893739393
Email	info@climit.net

1.6 Project Start Date

Project start date	30 – April – 2009
Justification	Date when the activities that lead to the generation of GHG emission removals (preparing land for planting) were first implemented

1.7 Project Crediting Period

Crediting period	100 years
Start and end date of first or fixed crediting period	30 – April – 2009 to 29 – April - 2109

1.8 Project Location

The project is in East Uruguay, in Cerro Largo and Treinta y Tres departments. It comprises several sites, which are classified in four regions based on geographic location. The areas are homogeneous in terms of soil types, climate, land use history and socio-economic conditions. The map in Figures 1 and 2 shows the exact location of the project, as well as the cadastral units owned by 'Forestal El Arriero SRL', and figures 3 to 6 shows the 4-region project area division mentioned above.

Project area was stratified to homogenize the population and achieve more accurate results in the variables measured. The preliminary stratification was done prior to the implementation of the

measurements and was established in the Monitoring Plan of the Project Design. The strata were defined with three main variables: tree species, plantation date and region.

Nevertheless, the actual number of strata can always vary. Project strata can be constantly re-defined after plantation if disturbance events take place or in the case the carbon stock calculation results in a very low uncertainty value. In the first monitoring event the strata were maintained as defined in the Project Description. In previous monitoring event, the carbon stock was calculated with a very low uncertainty value (below 3%), demonstrating that the subdivision of strata based on such variables was excessive. However, it was decided to increase the number of plots to 198 because the project developer decided to homogenize the sampling intensity over the entire project area.

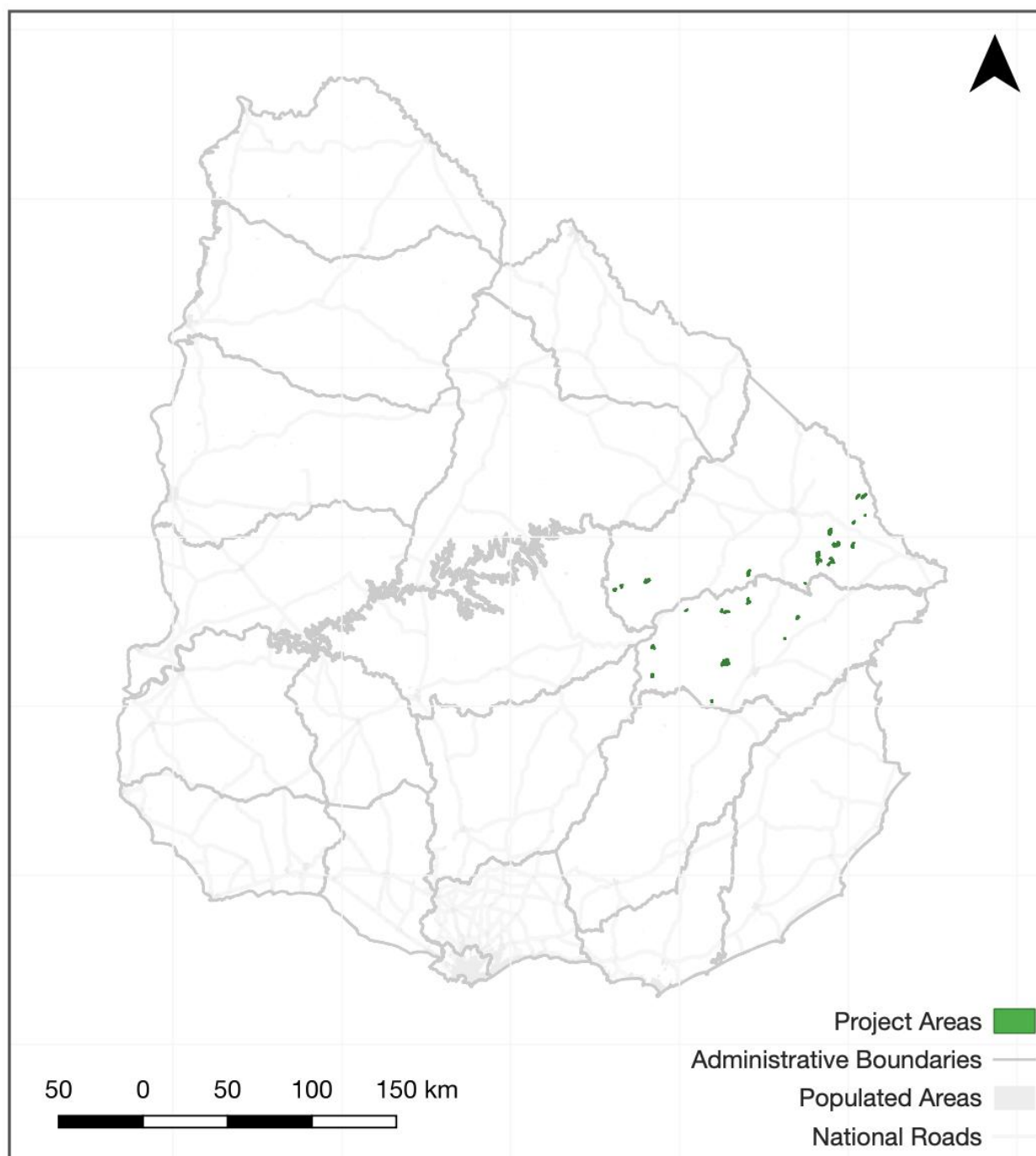


Figure 1. Map of Forestal 'El Arriero' SRL project boundaries.

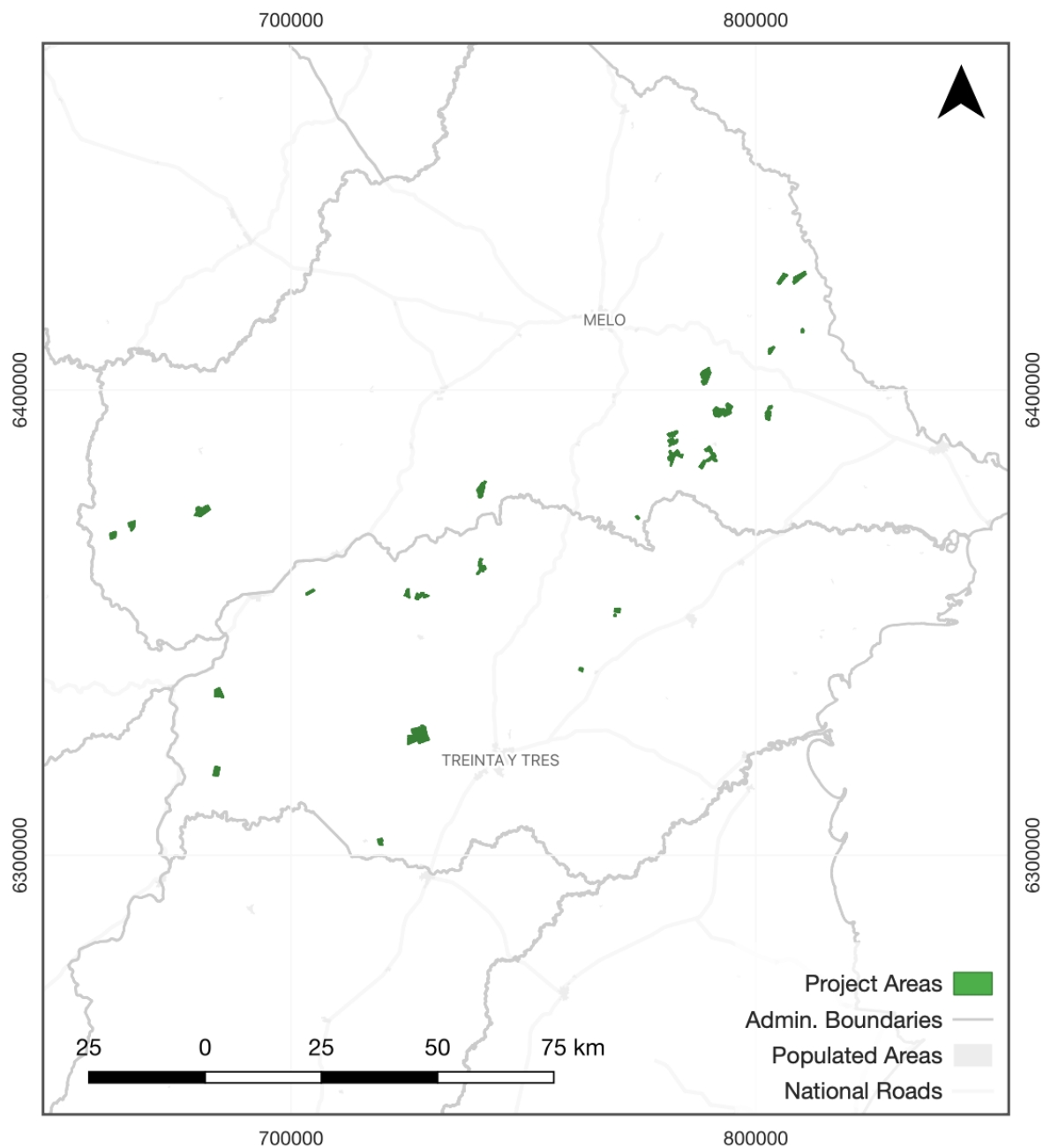


Figure 2. Map of Forestal 'El Arriero SRL' project boundaries. Plane coordinates in WGS 84 / UTM zone 21S (EPSG 32721).

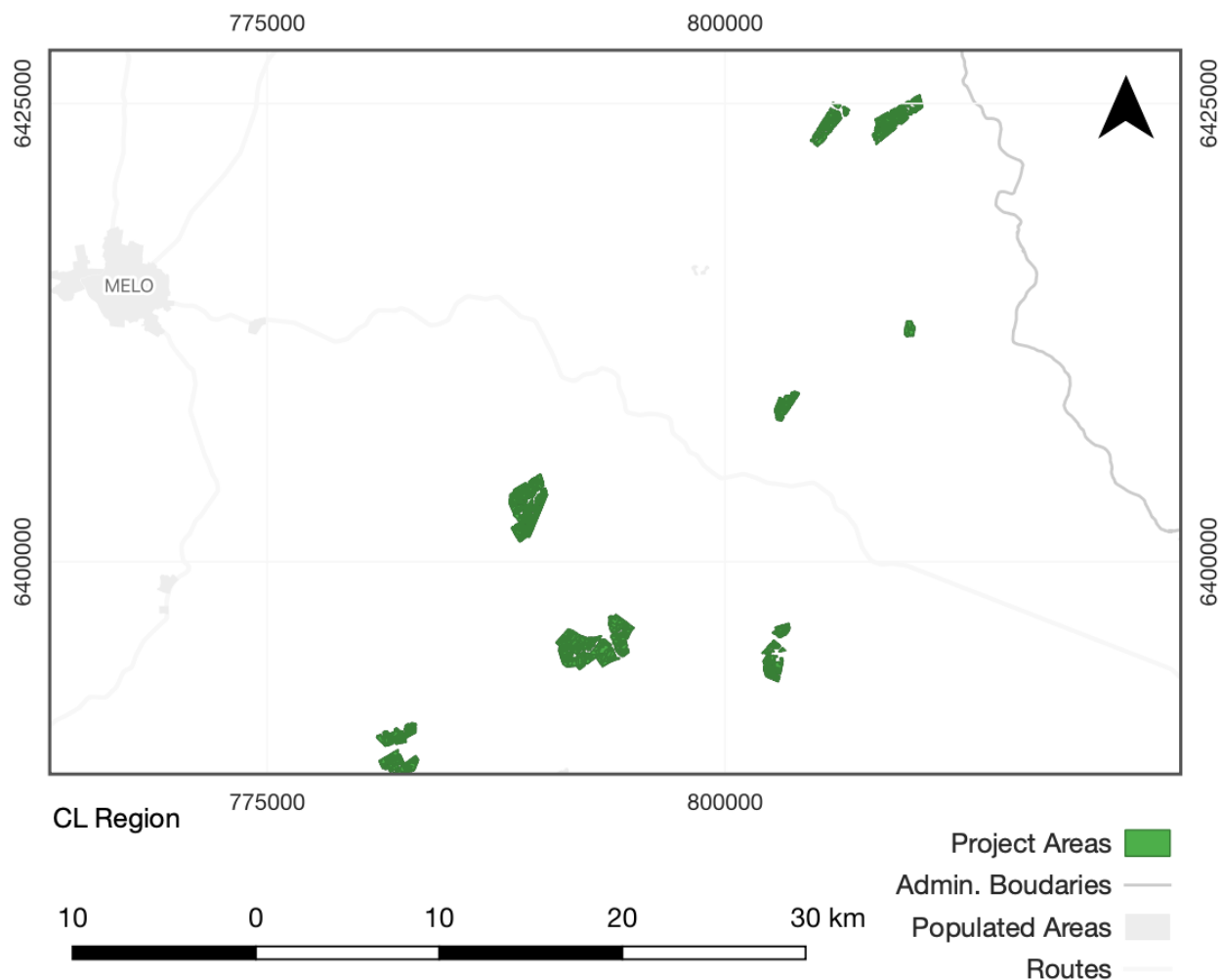


Figure 3. Location of properties belonging to Forestal 'El Arriero SRL' corresponding to the region CL (Cerro Largo). Plane coordinates in WGS 84 / UTM zone 21S (EPSG 32721).

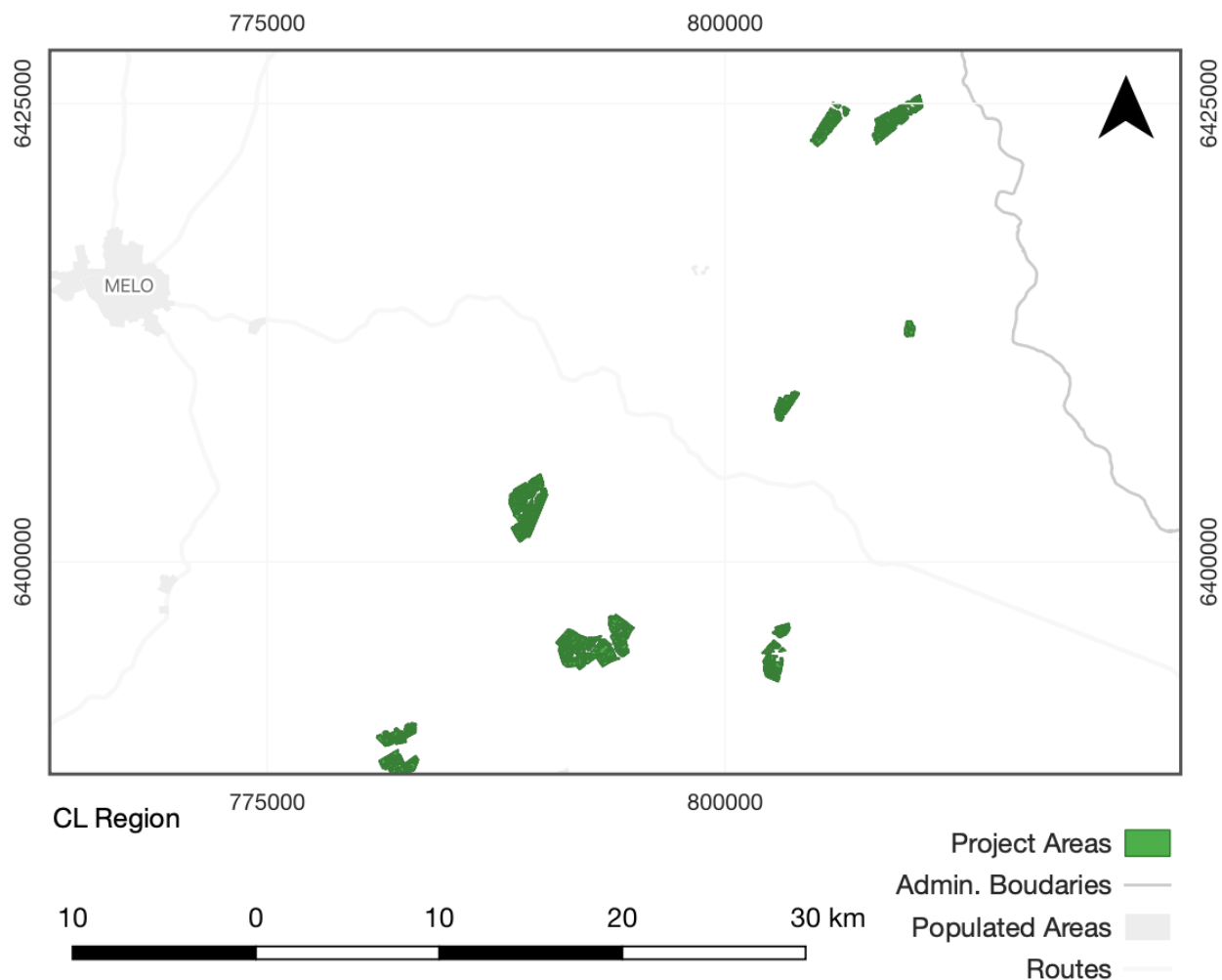


Figure 4. Location of properties belonging to Forestal 'El Arriero SRL' corresponding to the region CL-TT1 (Cerro Largo-Treinta y Tres). Plane coordinates in WGS 84 / UTM zone 21S (EPSG 32721).

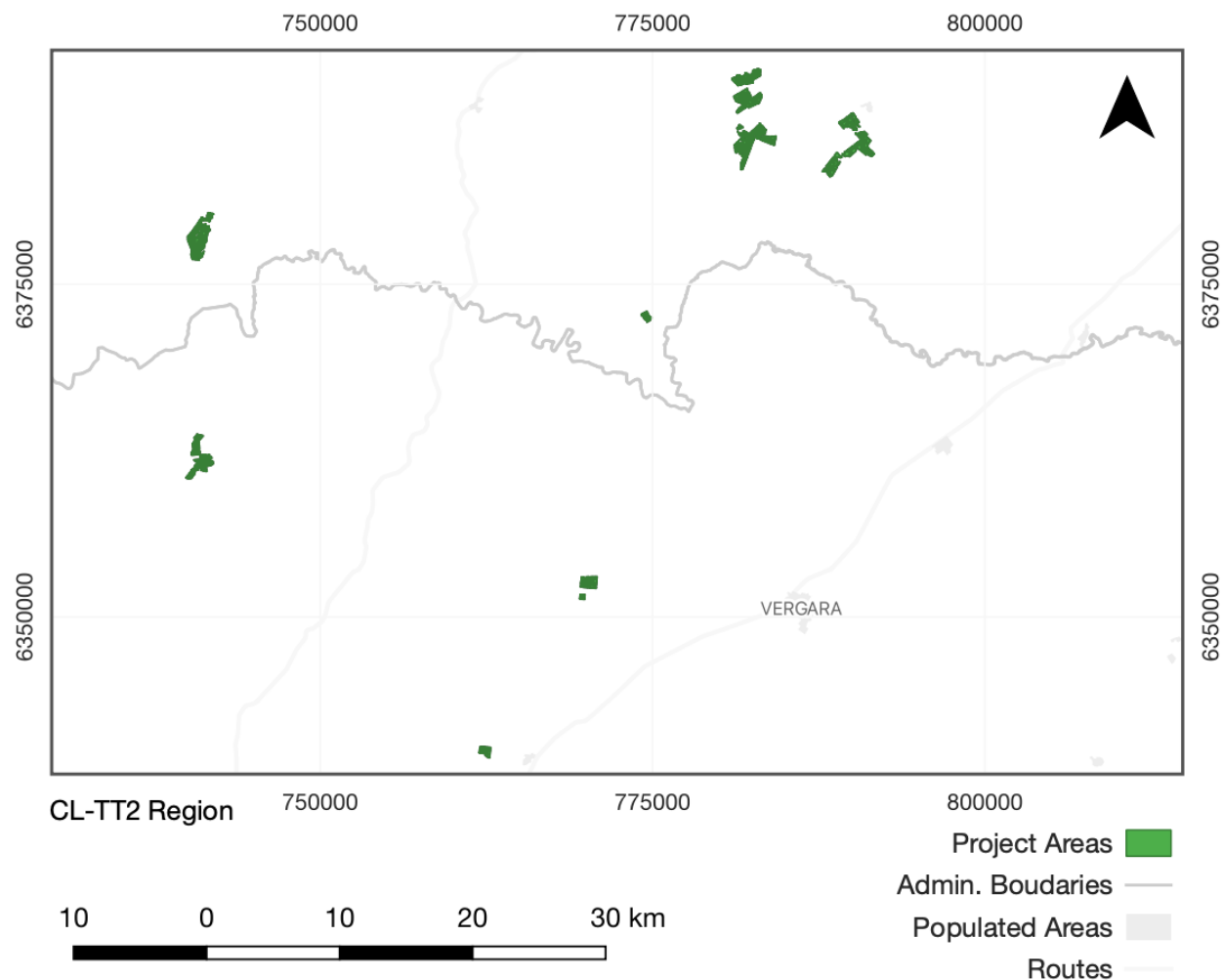


Figure 5. Location of properties belonging to Forestal 'El Arriero SRL' corresponding to the region CL-TT2. Plane coordinates in WGS 84 / UTM zone 21S (EPSG 32721).

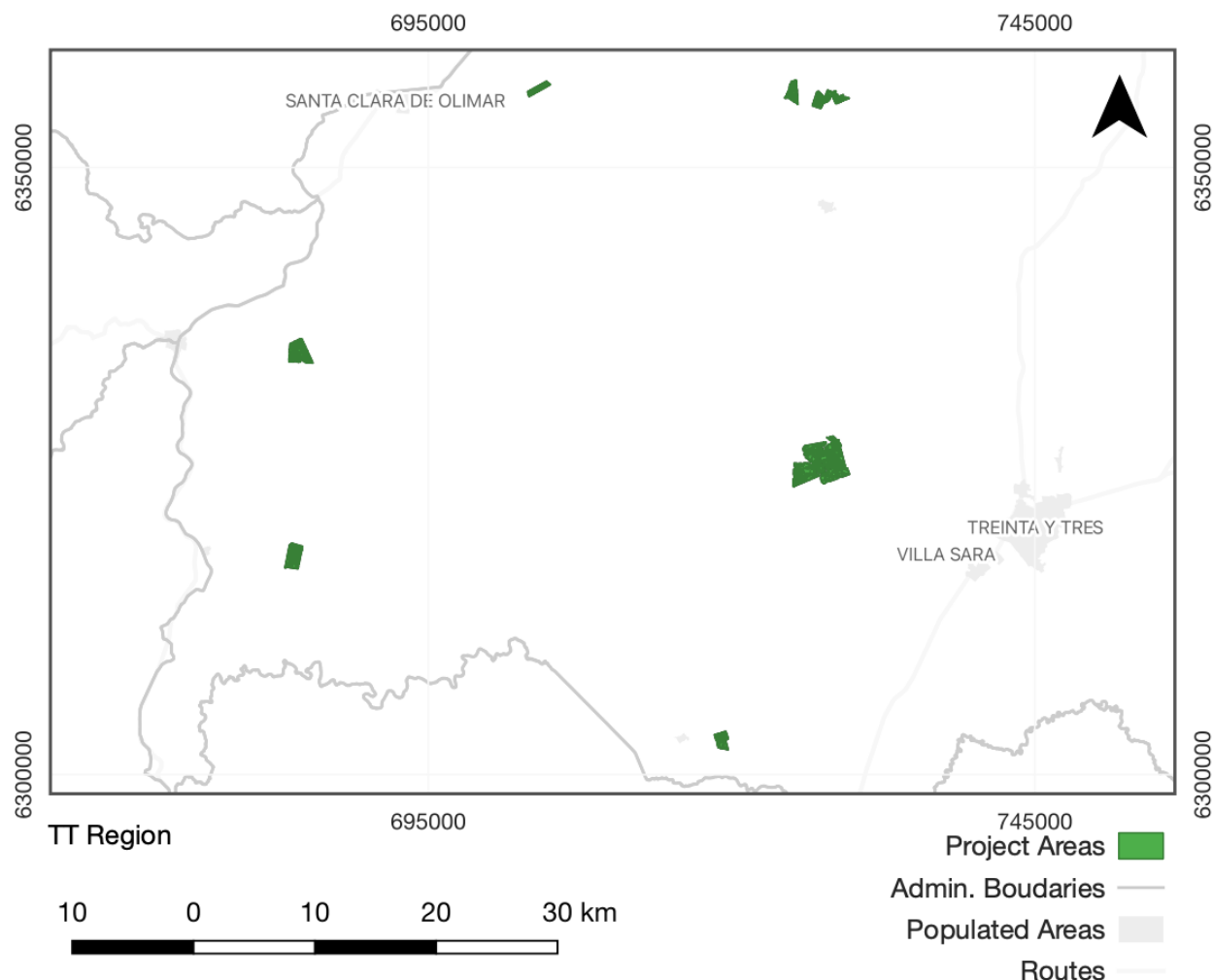


Figure 6. Location of properties belonging to Forestal 'El Arriero SRL' corresponding to the region TT (Treinta y Tres). Plane coordinates in WGS 84 / UTM zone 21S (EPSG 32721).

The geographic coordinates (in decimal degrees) corresponding to each farm of the El Arriero project are described below:

Table 1. Geographical coordinates of the El Arriero project establishments

Region	Farm	Latitude	Longitude
CL (Figure 3)	Los Martines	-32.2761	-53.7156
	El Sarandi	-32.2808	-53.7543
	El Terco	-32.37977	-53.7040
	Tres Panes	-32.41926	-53.77535
	Altiro	-32.5436	-53.7762
	El Germano	-32.5411	-53.8764
	El Pedregoso	-32.4716	-53.9211
	El Betty	-32.5312	-53.7728
	Cat	-32.8085	-55.2723

CL-TT1 (Figure 4)	Pochotito	-32.7880	-55.2297
	Sandobayu	-32.7582	-55.0680
	La Calera	-32.7059	-54.4302
	La Sierra	-32.9163	-54.5728
	Depardieu	-32.904348	-54.592824
	Picoroco	-32.839186	-54.427793
	San Fermin	-33.1841	-54.5605
CL-TT2 (Figure 5)	El Enloquecido	-32.619	-53.989
	Tres Cuartos	-32.631	-53.905
	Rita Rita	-32.7505	-54.0699
	Caburga Lake	-32.934	-54.104
	Dionisio Diaz	-33.049	-54.189
	La Guadalupe	-32.6035	-53.9923
	Las Viboras	-32.6289	-53.9909
TT (Figure 6)	Eeepectacula	-33.110;	-55.025
	Pisoteado	-33.263;	-55.029
	Vamoarriba	-33.392;	-54.646
	Reloco	-32.913;	-54.816

All properties of 'El Arriero SRL' are legally owned and are covered by deeds duly registered with the National Records, registered with the corresponding number for the Registration of Real Estate. There are no conflicts related to tenure or use rights over the land affected by the project or its products as demonstrated during validation.

Project boundaries have been identified using GPS and aerial photographs and have been laid on a geographic information system. No visible landmarks have been established on the field. Maps with exact project boundaries and its coordinates will be available for the verification team.

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	AR-ACM0001	Afforestation and reforestation of degraded land	05.2.0
Tool	Tool 02	Combined tool to identify the baseline scenario and demonstrate the additionality in A/R CDM project activities	01
Tool		Tool for testing significance of GHG emissions in A/R CDM project activities	01

Tool	AR Tool 08	Estimation of non-CO2 GHG emissions from burning of biomass attributable to a A/R CDM project activity	04.0.0
Tool		Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities	01
Tool	AR Tool 12	Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activity	02.0.0
Tool	AR Tool 14	Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity	03.0.0
Tool	AR Tool 16	Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities	01.1.0

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

If yes:

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

If yes:

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through the Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."

☐ Yes ☒ No

1.12 Sustainable Development Contributions

The project has contributed to the following SDGs:

- Sustainable Development Goal N° 12: Ensure sustainable consumption and production patterns.
- Sustainable Development Goal N° 13: Climate Action.
- Sustainable Development Goal N° 15: Life on Land.

Further detail and explanation of how the project has achieved to contribute to each SDG is provided in Appendix 2 which also includes El Arriero's monitoring plan of fauna and flora.

Table 2: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	12	12.1.1 and 12.6.1	By sticking to FSC principals and guidelines, the project demonstrates its responsibility to carry out a responsible activity with the environment.	4,636.53 ha (100%) of the project area is managed under the FSC principles	Total area (4,636.53 ha) managed under the FSC principles
2)	13	13.2.2 Tonnes of CO ₂ removed from atmosphere	Carbon removal through photosynthesis by the growing forests.	By growth of the 4,636.53 ha of pine forest planted in 2009, Project 'El Arriero' has sequestered 336,214 tonnes of carbon from the atmosphere during this monitoring period (December 2021 – October 2023)	It is estimated that over the project lifetime carbon removals will amount to 2,230,676 tonnes of CO ₂ . The project has now reached the long-term average

4)	15	15.2.1 and 15.3.1 Progress towards sustainable forest management and proportion of land that is degraded	4,636.53 ha of degraded land were afforested and are now producing timber that is managed sustainably, under FSC guidelines. Some of the sustainable forest management practices include: - Species selection: Pines were selected because this species is well-adapted to site conditions and does not threat biodiversity. - Soil and water conservation: contour planting, maintenance of buffer zones, minimal soil disturbance. - Thinning and pruning to improve the stand structure, reduce fire risk, improve timber quality - Also, the project conserves 420 ha of native forest which are not affected by the project activities.	Forest growth contributes to the accumulation of biomass and deadwood covering the soil, promoting the incorporation of C to soil, and preventing the soil erosion. The project has contributed to store 18,588 tCO₂ during this monitoring period	At the end of the project lifetime the soil organic carbon will be increased by 216,928 tCO₂. The cumulative contributions of SOC from the start of the project and up to the last monitoring period has been 154,760 tCO₂.
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1.13 Commercially Sensitive Information

N/A

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

The project has already identified stakeholders during validation and the permanent monitoring of them resulted in no modifications of the list of stakeholders in the last four years. Further information is provided below:

SCHOOLS

Rural schools play a pivotal role in Uruguay's interior regions, serving not only as educational institutions but also as central hubs for community interaction and cohesion. In the departments of Cerro Largo and Treinta y Tres, these schools are integral to the social fabric, often acting as the primary gathering points for families engaged in agriculture and forestry.

In the last four years, the network of rural schools within its area of influence has remained consistent in terms of location and operation. According to the Anuario Estadístico de Educación 2021 published by the Administración Nacional de Educación Pública (ANEP), Cerro Largo had 19 rural schools, while Treinta y Tres had 13. These figures have remained stable over recent years, indicating no significant changes in the educational infrastructure that serves as a proxy for community presence and engagement.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	As part of the permanent and open communication with stakeholders, the project participant has defined that online channel (elarriero@ciaforestal.com.uy) and mobile phones (098950480), are the most appropriate since the internet and cellphones network in Uruguay has reached 100% population.
Date(s) of stakeholder consultation	Permanent. But there has been distribution of brochures in late 2023 and early 2024 (see below the list of stakeholders contacted).

	This has been done to make all the stakeholders know about the new verification process started in 2024.
Communication of monitored results	Since there has not been any communication during this monitoring period, the project participant did not need to give any feedback. If there had been, the project participant records all communication and document the response given in the email account.
Consultation records	Since there has not been any communication during this monitoring period, the project participant does not have any consultation record.
Stakeholder input	Since there has not been any communication during this monitoring period, the project participant has not considered any stakeholder input.

As part of the ongoing communication, contact was established (by the project proponent) with neighbors and institutions located in the influence area of Forestal El Arriero properties during the months of January and February 2024.

The objective was to promote dialogue and exchange with various stakeholders through in-person visits, aiming for effective engagement. An informative brochure about the company was provided at each visited site, containing general information about carbon footprint, carbon capture, and carbon emission offsetting. See figure N° 20.

Dialogue was open, allowing people to inquire about the project and other forestry-related topics that arose.

Twenty-seven stakeholders were visited in the departments of Cerro Largo and Treinta y Tres, considering projects located in the following properties:

1. Tres Cuartos and Las Víboras, Cerro Largo department.
2. Al Tiro, El Betty, and El Germano, Cerro Largo department.
3. El Terco, Cerro Largo department.
4. El Pedregoso, Cerro Largo department.
5. La Sierra, Treinta y Tres department.
6. Depardieu, Treinta y Tres department.

Of the total visits, twenty were to neighbors, four to public schools, one to a community service center, one to an ASSE clinic, and one to a police station.

Between 2013 and 2022, Forestal El Arriero carried out an Environmental Education Program in schools No. 72 in Micaela, No. 85 in Puntas de Amarillo, and No. 125 in Cuchilla del Paraíso. This program was

conducted on a monthly basis, aiming to engage children and promote environmental awareness and conservation actions at home, school, and in the community.

As an extension of the Environmental Education Program, Productive Projects were developed with rural women, aiming to foster harmonious relationships with communities surrounding the plantations and promote the productive and social development of the residents.

The proposal for productive projects emerged in 2013 as a way to promote and integrate the relationship between participating schools in the Environmental Education Program and the neighboring communities. Two productive groups emerged, one in Puntas de Amarillo and the other in La Micaela, developed between 2014 and 2019.



Figure 7. Escuela N° 72, La Micaela, Cerro Largo



Figure 8. Escuela N° 85, Puntas de Amarillo, Cerro Largo



Figure 9. Escuela N° 125, Cuchilla del Paraíso, Cerro Largo



Figure 10. Escuela N° 3, Isla Patrulla, Treinta y Tres



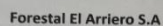
Figure 11. Centro de Cercanía, Treinta y Tres

Below are the field sheets as visit verification checklists.

 **Forestal El Arriero S.A.**

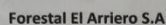
Planilla de visita a vecinos y partes interesadas

Campo	Vecino	N° teléfono	Ubicación	Firma
El Terco	Judith Sabetta	098190723	S 32° 21' 12" N W 053° 42' 50" O	<i>Judith Sabetta</i>
El Terco	Hector Caldas	098070764	S 32° 21' 12" N W 053° 41' 9" O	<i>Hector Caldas</i>
El Pedregoso	Miriam Acaña	092071939	S 31° 16' 14" N W 055° 39' 46" O	<i>Miriam Acaña</i>
El Pedregoso	Esuela N° 85 Patricia Rodríguez	098547702	S 31° 16' 14" N W 055° 39' 46" O	<i>Miriam Acaña</i>
El Pedregoso	Julio Duarte - La Concepción	093604436	S 31° 16' 14" N W 055° 39' 46" O	<i>Julio Duarte J.</i>
El Pedregoso	Osiris Rodríguez (Esposa Jenter)	092178940	S 32° 29' 82" N W 053° 55' 85" O	<i>Osiris Rodríguez</i>
El Pedregoso	Fernando Rodríguez (La Tuna vieja)	094133441	S 32° 30' 49" N W 053° 55' 76" O	<i>Fernando Rodríguez</i>
El Pedregoso	Abanjo de Villo de Rosa	092399660	S 32° 30' 07" N W 053° 56' 06" O	<i>Abanjo de Villo de Rosa</i>
La Sierra Depardeau	Seccional Sta William de Brun	44502045	S 32° 59' 73" N W 054° 33' 70" O	<i>William de Brun</i>
La Sierra Depardeau	Esuela N° 3 Isla Patrulla	099677558	S 32° 59' 67" N W 054° 33' 84" O	<i>Esuela N° 3</i>
La Sierra Depardeau	Centro de Cercanía Isla Patrulla	098433642	S 32° 59' 46" N W 054° 33' 89" O	<i>Centro de Cercanía</i>
	Gabriela Silva			



Planilla de visita a vecinos y partes interesadas

Campo	Vecino	N° teléfono	Ubicación	Firma
Tres Cuartos Las Víboras	Liliana de Souza	045263325	5 31° 01, 832' W 055° 30, 346'	Liliana de Souza
Tres Cuartos Las Víboras	Esc. N° 125 Cuchilla del Barroso	099 496 515	5 32° 39, 067' W 055° 46, 259'	Liliana de Souza
Tres Cuartos Las Víboras	Est. EBEN EZE		5 32° 39, 193' W 053° 55, 320'	Depto folleto en el establecimiento
Tres Cuartos Las Víboras	La Redomona Argentina Souza	093484041	5 32° 39, 235' W 053° 55, 605'	
Tres Cuartos Las Víboras	Hermes Delepiane	095557505	5 32° 38, 995' W 053° 56, 259'	Ruy Pinaup
Al Tirol / El Betty El Germano	Escuela 72 Micaela Mhg Claudio Jorani G	091754344	5 32° 36, 211' W 053° 54, 080'	
Al Tirol / El Betty El Germano	Sandra Arias	091970906	5 32° 36, 203' W 053° 53, 661'	Sandra Arias
Al Tirol / El Betty El Germano	Paola Mena Polinica Micaela y vecina Promotora Salud.	099 387-626	5 32° 36, 281' W 053° 53, 658'	
Al Tirol / El Betty El Germano	(Betty) Mª Elizabeth Mena	092561296	5 32° 36, 250' W 053° 53, 667'	Elina Mena
El Terco	Cliver Leonardo Lopez	099991879	5 32° 23, 199' W 053° 42, 854'	
El Terco	Otto Marquez Oropen	098350760	5 32° 22, 364' W 053° 43, 590'	Depto folleto en establecimiento + contacto al vecino por teléfono



Planilla de visita a vecinos y partes interesadas

[illegible]

EL SECTOR FORESTAL ACTUAL

Uruguay dispone de suelos con aptitud forestal que por sus características -estructura del suelo, superficialidad, baja fertilidad, pedregosidad- no serían empleados en agricultura. Además, la integración de la forestación con la ganadería está en crecimiento y ofrece múltiples beneficios. Al mismo tiempo, existen regulaciones del Ministerio de Ganadería, Agricultura y Pesca y el Ministerio de Ambiente, el extendido cumplimiento del Código Nacional de Buenas Prácticas Forestales y certificaciones internacionales, que garantizan una supervisión adecuada para cualquier tipo de plantación buscando mitigar cualquier efecto ambiental.



El sector es ejemplo de economía circular, y tiene un papel clave para reducir las emisiones netas de CO2 del país. Liderado por empresas de gran porte que deben cumplir con estándares al más alto nivel, con demanda internacional que se espera que aumente en los años venideros, y ante un incremento en las inversiones en el sector, la industria forestal se posiciona como un poderoso impulsor para el desarrollo de la economía uruguaya.



¿QUIENES SOMOS?

FORESTAL EL ARRIERO S.A.

Proyecto forestal distribuido en los departamentos de Cerro Largo y Treinta y Tres con plantaciones de Pino establecidas a partir del año 2009.

Plantaciones manejadas (podas y raleos) para obtener productos aserrables en rotaciones de largo plazo.

CONTACTOS



+598 98 950 480



elarriero@ciaforestal.com.uy



Accede al listado de predios escaneando el código QR



FORESTACIÓN EN URUGUAY

Noviembre 2023





IMPACTO POSITIVO DEL SECTOR EN OTROS RUBROS DEL PAÍS

El impacto económico de incrementar la actividad de un sector no se reduce únicamente al monto en que se aumenta la producción, sino que también debe considerar los efectos generados en el resto de la economía. Para aumentar la producción de una actividad es necesario utilizar insumos de muchas otras para abastecer el aumento.

El sector forestal es una de las áreas de la economía con mayor multiplicador de impacto indirecto.

El multiplicador de un sector es una medida de los encadenamientos productivos que la actividad genera en el resto de la economía.

La producción de madera sólida tiene un multiplicador indirecto de 1,27; el más alto de la economía. Esto da muestras de la oportunidad de seguir impulsando este subsector, con encadenamientos productivos de mayor magnitud que los que generan otras actividades relevantes del país.



SILVOPASTOREO

A la actividad conjunta de forestación y ganadería en un mismo terreno se le llama "silvopastoreo". Tanto los sistemas silvopastoriles donde ambas actividades se integran, como aquellos casos donde simplemente conviven, son prácticas que están en aumento en el país. Los registros de la Sociedad de Productores Forestales (SPF) indican que hay 200 mil cabezas de ganado pastoreando en terrenos forestados.

LA HUELLA DE CARBONO

La huella de carbono mide la cantidad total de gases de efecto invernadero (GEI) emitidos directa o indirectamente por una actividad o un proceso, de manera tal de cuantificar su impacto en el ambiente. Reducir la huella de carbono es muy importante para la mitigación del cambio climático.

CAPTURA DE CARBONO

Cada vez más empresas, de una amplia gama de rubros, deciden implementar políticas de responsabilidad social empresarial vinculadas a reducir su impacto ambiental.

La expansión de plantaciones forestales, por su potencial de captura, tiene un rol clave en lograr abastecer la alta demanda de productos sustentables. En la preparación, plantación y mantenimiento se generan emisiones de GEI, pero significativamente menores a la cantidad de carbono que los árboles absorben a medida que crecen. Durante su crecimiento, en el proceso de fotosíntesis, el carbono absorbido de la atmósfera es almacenado en el tronco, ramas, raíces y hojas.

Es por esto que el incremento de las plantaciones forestales en Uruguay ha jugado un papel clave en la captura de CO₂ y, por ende, en la reducción de GEI.

FLORA Y FAUNA NATIVA

Los cultivos forestales son ecosistemas donde viven especies que se relacionan entre sí y con su medio físico, y las plantaciones implican cambios sobre el ambiente original. Por esta razón, a las empresas se les exigen criterios de sustentabilidad ambiental para conservar los recursos naturales de cada predio, y un sistema de monitoreo que permita detectar posibles cambios.



LOS NÚMEROS DEL SECTOR FORESTAL

El complejo forestal es uno de los principales rubros de exportación del país, con ventas al exterior por casi USD 2.500 millones en 2022 presentando una evolución creciente en los últimos 15 años.

En 2021 se cuantificaron más de 1,1 millones de hectáreas dedicadas a la forestación, lo que representa aproximadamente el 6% del área del territorio nacional, sin incluir las más de 800 mil hectáreas de bosque nativo (MGAP, 2023).

Actualmente el sector emplea de manera directa a más de 17 mil personas y, si se incluyen aquellos empleos generados de manera indirecta, el número asciende a cerca de 25 mil. Representa casi el 4% del Producto Bruto Interno (PBI) y su aporte impositivo ronda los USD 280 millones (Uruguay XXI, 2022).

Figure 12. Informative brochure about the company

The project proponent does also promote sustainable development with social projects with the neighbors to the project sites.

The social program is aimed at the population of communities located in the areas influenced by the company's forest plantations (children, women, and agricultural producers), with the main objective of contributing to the sustainable development of the communities and the area.

The program has three areas of work:

- The Environmental Education program aimed at children, which has been in operation since 2011 and is carried out in public schools located in the vicinity of the plantations.
- Work with groups of women in productive projects since 2013, with the aim of promoting the formation of associative productive groups involving women and individuals in varying degrees of social vulnerability (single mothers and people living in poverty).
- Work with small-scale agricultural producers and herders in the area influenced by the plantations. Starting in 2017, the program includes work with agricultural producers, involving herders from the company's fields, with the aim of formulating productive proposals for properties in agreement with the Ministry of Livestock, Agriculture, and Fisheries

As an example, El Arriero assisted the rural women from the community of “Micaela” to improve productive infrastructure, increase the number of laying hens to expand the marketable volume of eggs. The production phase will take place in three henhouses, two of which are currently operational, where they will be grouped together and share the workload.

2.1.3 Free, Prior, and Informed Consent

The project is not affecting property rights; thus, a free, prior, and informed consent is not required. There are no ongoing or unresolved conflicts over property rights, usage, or resources.

2.1.4 Grievance Redress Procedure

The project proponent has developed a grievance redress procedure to address disputes with stakeholders that may arise during project planning and implementation.

El Arriero is keen on maintaining good relations with the community. This is achieved in part through effective communication on a day-to-day basis with neighbors.

Communications include:

- Any potential impacts generated by the operations carried out within the heritage managed by the company.
- Any requirements the community may have. These requirements may include requests for water, grazing, firewood extraction, beekeeping, training in various subjects, visits to forest operations, etc.

In this interaction, communications can be classified as:

- Request: It is a request for information or something specific from institutions or neighbors to the company.

- Complaint: Requirement or complaint from institutions or individuals affected by our activity or heritage, from contractor personnel, in the event of a problem. Complaints can be of two types:
 - 1) Verbal: They will be answered verbally, except when the issue requires a certain formality. Within these complaints, we can distinguish:
 - Complaints from neighbors that are quickly resolved because they are very simple. It will not be necessary to record this type of complaint.
 - Complaints or claims from neighbors where resources need to be managed (moving machinery, requesting support from a contractor, where there is an expense on the part of the company), or requesting authorization from immediate management.
 - 2) Written: They must be answered in writing. A record will also be kept along with the response letter.

Complaints must be addressed following the Grievance Redress Mechanism for El Arriero project.

It is important to manage and respond to all complaints correctly and within reasonable timeframes. An unaddressed complaint or claim can become a major problem in the future.

2.1.5 Public Comments

Summary of comments received	Actions taken
N/A	N/A
N/A	N/A

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

Management team has vast experience to successfully undertake all the project activities. COFUSA is a Uruguayan company dedicated to the forestry production. Practices applied under their management system, and applicable to the entire patrimony, follow FSC standard as the company is FSC certified since 2001; being a pioneer in certification in Uruguay. Additionally, Agustín Inthamoussu, CEO of CLIMIT has a vast experience in the management of carbon credits projects under the VCS Standard and has gone several times through the process of validation, verification and monitoring of carbon projects.

2.2.2 Risk assessment

	<i>Risk identified</i>	<i>Mitigation or preventative measure(s) taken</i>
Natural and human-induced risks to	No risks identified	Uruguay's forestry sector operates in a stable environmental,

stakeholders' wellbeing		political, and social context that minimizes the risk of adverse impacts on stakeholders' wellbeing. Some of these are presented below: - Uruguay benefits from a relatively stable climate with low incidence of extreme natural disasters such as hurricanes, earthquakes, or severe droughts that could threaten stakeholders' safety, livelihoods, or access to resources in forestry areas. While some localized climate variability exists, it is not severe enough to pose systemic risks to wellbeing - Uruguay has a clear legal framework regarding land tenure and use rights. Conflicts over land ownership or use are rare compared to other regions, which reduces the potential for social conflict or displacement. - Worker and community health is protected through strong labor laws, health care access, and safety protocols specific to forestry activities. Forestry companies are required to provide appropriate safety training and equipment, further reducing risks to physical wellbeing. - The forestry sector in Uruguay has well-
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		developed fire prevention and emergency response systems, which are regularly updated and coordinated with national agencies to protect both workers and neighboring communities from natural events like wildfires. Most forest companies in Uruguay are adhered to this plan and COFUSA is part of the national forest prevention plan.
Risks to stakeholder participation	No risk identified	The project proponent is in permanent communication with stakeholders and can be easily reached by any of them.
Working conditions	No risk identified	In Uruguay, the forestry sector operates within a robust legal and institutional framework that ensures the protection of workers' rights and the maintenance of safe and fair working conditions. National labor laws, including the Labor Code and sector-specific regulations, are strictly enforced through by the Ministry of Labor and Social Security (MTSS) . Strong Legal Protections: Uruguayan labor law mandates clear standards on minimum wage, maximum working hours, rest periods, health and safety conditions, and the right to organize and bargain collectively. These regulations are applicable across all sectors, including forestry.

		Effective Enforcement Mechanisms: The MTSS has the authority to carry out unannounced inspections and audits in order to verify compliance with labor laws. Any non-compliance is subject to sanctions, creating strong incentives for employers to maintain high standards. Additionally, the company has internal audit mechanisms in place to monitor compliance with labor laws. Occupational Health and Safety Programs: There are specific national programs in place aimed at improving health and safety conditions in forestry work, including training programs, use of personal protective equipment (PPE), and guidelines to prevent occupational hazards. Voluntary Certifications: Most forestry operations in Uruguay pursue voluntary certifications such as FSC® (Forest Stewardship Council), which require compliance with rigorous labor and social standards, beyond local legal requirements. COFUSA is aligned with FSC certification principles. Stable Socioeconomic Context: Uruguay enjoys high levels of political stability, low levels of corruption, and strong rule of law, which collectively contribute to a working environment where labor
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		rights are respected and enforced.
Safety of women and girls	No risk identified	- Strong Legal Framework for Gender Equality and Protection: Uruguay has comprehensive legislation to protect the rights and safety of women and girls, including laws on gender-based violence, workplace discrimination, and harassment. Enforcement mechanisms are active, and breaches are subject to strict penalties. - The regions where forestry operations are conducted are characterized by low levels of violence and social conflict, particularly compared to global averages. Uruguay has one of the lowest rates of violent crime in Latin America, and forestry areas are generally rural, stable, and closely monitored. - Companies certified under schemes such as FSC, such as COFUSA, must demonstrate compliance with strict social safeguards, including measures specifically addressing the protection and inclusion of women in the workforce and nearby communities.

		- Uruguay is a country with a strong tradition of upholding human rights, including gender equality. Women's participation in the workforce, education, and leadership roles is widespread, reducing social vulnerabilities often seen in other contexts.
Safety of minority and marginalized groups, including children	No risk	There is no child labor on the project area.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk	Chemical products are used only during planting activities and only when necessary. Herbicides and fertilizers are applied in minimal, localized doses. For example, when fertilization is required, it is carried out directly at the base of each seedling during planting, minimizing waste and environmental impact.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	<i>Risks identified³</i>	<i>Mitigation or preventative measure(s) taken</i>
Discrimination	No risk identified	the risk of discrimination within forestry projects is considered low or insignificant due to the country's strong legal protections, social norms promoting equality,

³ The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

		and industry practices aligned with human rights standards. - Uruguay has robust anti-discrimination laws that prohibit unequal treatment based on race, gender, age, religion, disability, or other protected characteristics. Key legislation includes the General Anti-Discrimination Law (Law No. 17,817) and labor regulations that guarantee equal opportunity and treatment in employment and service provision. - Labor inspections can be conducted by the Ministry of Labor and Social Security (MTSS) in order to verify compliance with non-discrimination regulations. Workers have clear and accessible mechanisms to report grievances, and violations are subject to legal penalties - COFUSA is adhered to voluntary sustainability certifications (FSC), which include strong social safeguards prohibiting discrimination and requiring equal employment opportunities.
Sexual harassment	No risk identified	The risk of sexual harassment of the project is considered low due to a combination of strong national legal protections, active enforcement, corporate policies,

		and prevailing social norms that reject such behavior. - Uruguay has specific legislation prohibiting sexual harassment in the workplace, including Law No. 18,561 (Law on Prevention and Punishment of Sexual Harassment), which establishes clear definitions, sanctions, and mechanisms for complaints both in private and public sectors. - The Ministry of Labor and Social Security (MTSS) has the authority to monitor workplace conditions, and workers have access to both internal grievance mechanisms and external legal channels to report cases of harassment safely and confidentially. - Project is aligned with FSC certification which requires strict compliance with social safeguards, including the prevention of harassment and protection of worker dignity and safety.
Gender equity in labor and work	No risk identified	Refer to legislation provided above
Forced labor	No risk identified	Refer to local legislation provided above
Child labor	No risk identified	Uruguay strictly prohibits child labor through national laws, including the Labor Code and specific legislation (Law No. 17,823, Código de la Niñez y la

		Adolescencia) that establishes 15 years as the minimum age for employment, with additional protections for young workers. COFUSA operates under formal employment contracts, where worker documentation (including proof of age) is a legal requirement. This formalization minimizes the risk of underage employment.
Human trafficking	No risk identified	Uruguay has clear legal prohibitions against human trafficking under Law No. 19,643 (Comprehensive Law against Trafficking in Persons), which criminalizes all forms of trafficking and provides strong protections for victims. Also, the project proponent employs local workers under formal contracts, with clear wage and working condition regulations. Recruitment practices are transparent, documented, and subject to inspection, leaving no room for exploitative labor practices associated with trafficking. FSC requires explicit compliance with labor rights, including the prohibition of forced labor and human trafficking.

2.3.2 Human Rights

<i>Risks identified</i>	<i>Mitigation or preventative measure(s) taken</i>
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No risks identified	In Uruguay, the forestry sector operates within a robust legal and institutional framework that ensures the protection of workers' rights and the maintenance of safe and fair working conditions. National labor laws, including the Labor Code and sector-specific regulations, are strictly by the Ministry of Labor and Social Security (MTSS). Strong Legal Protections: Uruguayan labor law mandates clear standards on minimum wage, maximum working hours, rest periods, health and safety conditions, and the right to organize and bargain collectively. These regulations are applicable across all sectors, including forestry. Effective Enforcement Mechanisms: The MTSS has the authority to carry out unannounced inspections and audits in order to verify compliance with labor laws. Any non-compliance is subject to sanctions, creating strong incentives for employers to maintain high standards. Additionally, the company has internal audit mechanisms in place to monitor compliance with labor laws. Occupational Health and Safety Programs: There are specific national programs in place aimed at improving health and safety conditions in forestry work, including training programs, use of personal protective equipment (PPE), and guidelines to prevent occupational hazards. Voluntary Certifications: Most forestry operations in Uruguay pursue voluntary certifications such as FSC (Forest Stewardship Council), which require compliance with rigorous labor and social standards, beyond
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	local legal requirements. COFUSA is aligned with FSC certification principles. Stable Socioeconomic Context: Uruguay enjoys high levels of political stability, low levels of corruption, and strong rule of law, which collectively contribute to a working environment where labor rights are respected and enforced.
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2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified	There are no indigenous people or local communities in the project area.

2.3.4 Property Rights

<i>Risks identified</i>	<i>Mitigation or preventative measure(s) taken</i>
No risks identified	Uruguay has a well-established and reliable land registration system where land ownership and tenure rights are clearly documented, legally protected, and publicly recorded. All forestry project areas are established on privately owned land with formal legal titles, ensuring that no customary or undocumented claims are infringed. Regarding indigenous people, there are no IP in Uruguay nor local communities holding customary land or resource rights in the project area.

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	N/A as there are no impacts on property rights
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Benefit sharing during the monitoring period

N/A as there are no impacts on property rights

2.4 Ecosystem Health

Risk identified		Mitigation or preventative measure(s) taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified	The project adheres to Uruguay's strict environmental regulations, which govern forest management, land use, and biodiversity conservation. These laws ensure that forestry activities do not disrupt natural ecosystems or harm native species. Additionally, the project is aligned to FSC guidelines which require biodiversity conservation and ecosystem protection as part of a sustainable forest management.
Soil degradation and soil erosion	Soil erosion when doing soil preparation and harvest activities	Mitigation measures include: - Work by cutting the slope for soil preparation - Creating buffer zones along water bodiesAfter harvesting, retaining organic material such as fallen branches and leaves on-site which help protect the soil.
Water consumption and stress	No risks identified	The project is not established in areas where water scarcity is a major issue. Silveira, L et al. (2006) suggest that well-managed plantations in

		Uruguay do not cause significant impacts on water resources⁴. Also, a study by the Forestry Research Institute (INFOREST) assessed the relation between water consumption and the growth of pine plantations in Uruguay. It concludes that pine plantations, when properly managed, maintain water balance and do not cause water depletion or significant stress to local water resources.
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2.4.1 Rare, Threatened, and Endangered species

Species or habitat	N/A, the project is not located in areas of rare, threatened or endangered species.
Areas needed for habitat connectivity	N/A, the project is not located in areas of rare, threatened or endangered species
...	...

	<i>Risks identified</i>	<i>Mitigation or preventative measure(s) taken</i>
Habitats for rare, threatened, and endangered species	No risk identified	N/A, the project is not located in areas of rare, threatened or endangered species
Areas for habitat connectivity	No risk identified	There are buffer zones and areas of conservation within the project area.

⁴ Silveira, L.; Alonso, J.; Martínez, L; EFECTO DE LAS PLANTACIONES FORESTALES SOBRE EL RECURSO AGUA EN EL URUGUAY; Agrociencia. (2006) Vol. X N° 2 pág. 75 - 93

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Pinus taeda	Non native	Productive uses	This species has been used in Uruguay for decades, and it has not shown negative effects.

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
N/A	N/A

	<i>Risks identified</i>	<i>Mitigation or preventative measure(s) taken</i>
Invasive species	N/A	N/A

2.4.3 Ecosystem conversion

	<i>Risks identified</i>	<i>Mitigation or preventative measure(s) taken</i>
Ecosystem conversion	No risk identified	As proved in validation and previous verification events, the project area was not cleared of native ecosystems,

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Forestal 'El Arriero SRL' first areas were planted in 2009 and the last ones in 2011. The project has recently completed its 14th year.

Pruning activities have been held in the project area at different stages reaching heights of 7,85 meters.

Thinning activities have taken place in this monitoring period in farms “San Fermín” and “El Pisoteado.”

As it has been stated in the project description (PD), the project implementation does not and did not cause any displacement of activities. The only activity in the project area prior to the start date is extensive grazing by beef cattle, which continues to occur after project start. This can be audited by the verification team during verification and validation.

During this monitoring period there has not been changes in the project. Everything continued as planned in the Project Description. The forest continued growing, with lower rates as expected given the last four summers of droughts. There have not been any losses in area neither in carbon stocks: there has not been any land sold or extreme event that provoked any loss, as it can be seen in the Geographical Information System.

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodology deviations.

3.2.2 Project Description Deviations

In the monitoring report carried out in 2013, it is mentioned that the project had a deviation with respect to the original project area.

Between the validation/verification carried out by SCS and the second verification conducted by EcoCert, the company name changed from “Forestal El Arriero S.A.” to “El Arriero S.R.L.” This change refers solely to the legal structure of the company. All assets, employees, financial records, and ownership remain exactly the same. This change was confirmed during EcoCert’s second verification and again during the third verification conducted by AENOR. For the current, fourth verification, it can be verified that all documentation is now issued under the name “El Arriero S.R.L.”

In the second verification of the 'El Arriero', the project had a deviation with respect to the forest area. This was due to the fact that the 'Obdulio' field/stratum was not approved by the environmental directorate (former DINAMA), so the plantation area had to be reduced. During third verification a new actualization of project boundaries based on more accurate information resulted in the actual area being currently used.

During this monitoring period, the project area has been updated compared the previous verification to reflect the current situation of the project which is 4,636.53 ha. This area difference is explained due to the improvement of the geographic information system that detects area changes that were not identified with the previous technology.

In the validated PD, only Cambium Forestal Uruguay SA was included as other entities involved in the project. In the previous monitoring period, CLIMIT and Bosques Servicios Forestales were also included as other entities. In this monitoring period, the two other additional entities are: CLIMIT (which was already included) and Compania Forestal Uruguay S.A.

3.3 Grouped Projects

Forestal 'El Arriero SRL' afforestation on degraded grasslands under extensive grazing is a single GHG Project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes

☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	A_i
Data unit	ha
Description	Area of stratum i
Source of data	Monitoring of strata and stand boundaries is done using a Geographical Information System (GIS) which allows for integrating data from different sources (including GPS coordinates and Remote Sensing data)
Value applied	Variable depending on stratum
Justification of choice of data or description of measurement methods and procedures applied	A description of the measurement methods is available upon request.
Purpose of data	Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions
Comments	GPS is the most important tool used for measuring geographical variables or parameters: project boundaries and predefined stratum boundaries, forest area, area of disturbances (fires, droughts, harvesting, etc.). All information collected is immediately integrated to the GIS. Each plot coordinates are charged on the GPS before the field visit in order to reach the exact location of each sample plot. The operator selected on the GPS the following steps: "Destiny > Waypoints." The waypoint of interest is selected by pressing "Go." Exact procedures to locate plots on field are described in the Terms of Reference described in chapter 3.3 Monitoring Plan.

Data / Parameter	BEF_{2,j}
Data unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above-ground biomass for tree species or group of species j

Source of data	IPCC default values (e.g., Table 3 A.1.10 of IPCC GPG-LULUCF 2003)
Value applied	From 1.15 to 3.4, depending on the tree age
Justification of choice of data or description of measurement methods and procedures applied	The values applied are the unique source of information for such variable. No local or national values exist.
Purpose of Data	Estimation of aboveground biomass carbon content
Comments	N/A

Data / Parameter	CF_j
Data unit	t C t ⁻¹ d.m.
Description	Carbon fraction of tree biomass for species or group of species j
Source of data	The IPCC default value of 0.5 t C t ⁻¹ d.m.
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	The values applied are the unique source of information for such variable. No local or national values exist.
Purpose of Data	Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions
Comments	N/A

Data / Parameter	D_j
Data unit	t d.m. m ⁻³
Description	Basic wood density for species or group of species j
Source of data	IPCC 2003. Table 3 A.1.9-1 Basic wood densities of stem wood
Value applied	0.44
Justification of choice of data or description of measurement methods and procedures applied	The value is from a reliable source of information and coherent with national values
Purpose of Data	Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions
Comments	N/A

Data / Parameter	R_j
Data unit	Dimensionless
Description	Root-shoot ratio for species or group of species j
Source of data	Tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs"
Value applied	Ranges from 0.2 to 0.4 as a result of the equation suggested in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs" (see section 5.2). The values depend on the aboveground biomass as input (specific values are presented in the ex-post carbon estimations), therefore as the trees grow and accumulate biomass the parameter is updated with the equation.
Justification of choice of data or description of measurement methods and procedures applied	The values applied are the unique source of information for such variable. No local or national values exist.
Purpose of Data	Determination of baseline scenario, calculation of both baseline and project emissions
Comments	The equation used to obtain R is in chapter 4.2 of this Monitoring Report

Data / Parameter	$V_{TREE_{j,p,i}}$
Data unit	m ³
Description	Stem volume of trees of species or group of species j in plot p in stratum i
Source of data	Local Growth Models (INIA 2021)
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Value used to determine the project ex - ante carbon sequestration
Comments	In the ex-ante calculation, growth was estimated using average growth rates based on specific site conditions and actual on-site measurements collected during this monitoring period, as presented for each farm and stratum within the project area. Since the model outputs volumes as under-bark, these were converted to over-bark volumes by applying a 15% adjustment, in

	line with IPCC guidelines. According to the IPCC (2003, Chapter 3: LUCF Sector Good Practice Guidance, Section 3.2.1.1.1.2), “unless country-specific data are available, 15% should be used as a default value, and the FAO over-bark volume can be estimated by dividing the under-bark estimate by 0.85.”. Local growth models were used for ex-ante estimation to describe the yield curve and determine the Long-Term Average of available carbon credits. Local growth models will not be used for ex-post estimation which were based on field measurements: tree's DBH and height
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Data / Parameter	SOC_{REF}
Data unit	t C ha ⁻¹
Description	Reference SOC stock corresponding to the reference condition in native lands (i.e. non-degraded, unimproved lands under native vegetation, normally forest by climate region and soil type applicable to stratum i of the areas of land under High Activity Clay soils (HAC)
Source of data	Table 3 of “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project” activities.
Value applied	88
Justification of choice of data or description of measurement methods and procedures applied	There are no local, regional, or national values for that variable.
Purpose of Data	Used to estimate the carbon sequestration in soils (Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions)
Comments	N/A

Data / Parameter	$f_{LU,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline land-use in stratum i of the areas of land; dimensionless
Source of data	Tables 6 of “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project” activities.
Value applied	1
Justification of choice of data or description of	There are no local, regional, or national values for that variable.

measurement methods and procedures applied	
Purpose of Data	Used to estimate the carbon sequestration in soils (Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions)
Comments	N/A

Data / Parameter	$f_{MG,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline management regime in stratum i of the areas of land, dimensionless
Source of data	Table 6 of “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project” activities.
Value applied	0.95
Justification of choice of data or description of measurement methods and procedures applied	There are no local, regional, or national values for that variable.
Purpose of Data	Used to estimate the carbon sequestration in soils (Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions)
Comments	N/A

Data / Parameter	$f_{N,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline input regime (e.g., crop residue returns, manure) in stratum i of the areas of land
Source of data	Tables 6 of “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project” activities.
Value applied	0.7
Justification of choice of data or description of measurement methods and procedures applied	There are no local, regional, or national values for that variable.
Purpose of Data	Used to estimate the carbon sequestration in soils (Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions)
Comments	N/A

Data / Parameter	Dead Wood
Data unit	t C ha ⁻¹
Description	Conservative default factor expressing carbon stock in dead wood as a percentage of carbon stock in tree biomass
Source of data	Tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”
Value applied	8% of carbon stock in trees biomass
Justification of choice of data or description of measurement methods and procedures applied	There are no local, regional, or national values for such pool in this type of forest
Purpose of Data	Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions
Comments	N/A

Data / Parameter	Litter
Data unit	t C ha ⁻¹
Description	Conservative default factor expressing carbon stock in litter as a percentage of carbon stock in tree biomass
Source of data	Tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”
Value applied	4% of carbon stock in trees biomass
Justification of choice of data or description of measurement methods and procedures applied	There are no local, regional, or national values for such pool in this type of forest
Purpose of Data	Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions
Comments	N/A

4.2 Data and Parameters Monitored

Data / Parameter	A _i
Data unit	ha
Description	Area of stratum i

Source of data	Monitoring of strata and stand boundaries was done using a Geographical Information System (GIS)
Description of measurement methods and procedures to be applied	Strata areas were measured based on cartography documents, related with GIS.
Frequency of monitoring/recording	Every time the project boundaries are modified, when disturbance events take place, the project participants shall re-build the stratum and add the area of the project under disturbance in the GIS.
Value monitored	4,636.53
Monitoring equipment	Leica GPS, model Zeno 20
QA/QC procedures to be applied	N/A
Purpose of the data	Determination of baseline scenario, calculation of baseline emissions and Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	<i>DBH</i>
Data unit	cm
Description	Diameter at Breast Height of tree
Source of data	Field measurements
Description of measurement methods and procedures to be applied	DBH is measured at 1.3 m above ground, over the bark. In case of stem deformation at this level, measurement was done over the deformation once the stem took its normal shape, with the purpose of being conservative. DBH was measured in all trees within the plots.
Frequency of monitoring/recording	Every tree within sample plots

Value monitored	5,083 values in fifteen strata in 198 plots
Monitoring equipment	A diametric tape for measuring DBH. 
QA/QC procedures to be applied	A quality control procedure consisted in staff member periodical training. The staff members were trained to make DBH measurements without errors: using firstly a measuring tape (to determine exactly where 1,3 meters height is located in their own bodies). Afterwards, they measured DBH in front of experts and member's staff to achieve procedure consistency. Instruments were checked and assessed before starting the verification process. Items checked: Correct visualization of numbers in the measuring tape. Lack of mechanical problems. The measuring tape length is not a problem since it is impossible that it stretches. Bark that was not stuck to the stem was removed before measuring.
Purpose of the data	Calculation of project removals
Calculation method	N/A
Comments	The trees are considered inside the plot if more than 50% of DBH is inside the plot.

	Exact procedure to measure this variable is described in the ToR for the quotation of consulting firms to perform the field measurements.
Data / Parameter	<i>H</i>
Data unit	m
Description	Height of trees within sample plot
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Every tree inside the plot is measured in height. The measurement was done according to the following procedure: Identification of the individual tree to measure. At the same level (independently that the measuring equipment corrects the value according to the slope). The expert always tried to be situated at a certain distance to the tree equivalent to the height of the tree.
Frequency of monitoring/recording	Every tree inside the plot
Value monitored	5,083 values in fifteen strata in 198 plots

Monitoring equipment	Vertex   
QA/QC procedures to be applied	When referring to this electronic device, it is recommended to check the correct visualization of the display. The clinometer was always kept in safe places in order to avoid display rupture. The equipment batteries were always in full charge and back up batteries were always available in case of emergency. Control measurements were made using all involved equipment (human error should be minimized at minimum with professionally training and cross-checked control measurement activities).
Purpose of the data	Calculation of project removals
Calculation method	N/A
Comments	N/A

Data / Parameter	Ap_i
Data unit	m ²
Description	Area of sampling plot

Source of data	Field measurement
Description of measurement methods and procedures to be applied	The centre of the plot was marked with the assistance of a GPS. One staff member stayed at the centre of the plot taking notes of the diameters and heights measured while the other expert of the team walked inside the plot measuring them. Both experts were always connected with a measuring tape, and every tree measured was previously checked to determine if the distance to the centre was minor to 12.62 m (radius of a circular plot of 500m ²).
Frequency of monitoring/recording	Every plot measured in El Arriero, 198 in total
Value monitored	500m ²
Monitoring equipment	Measuring tape
QA/QC procedures to be applied	In order to avoid over and under-estimations, every tree was considered inside the plot when the mark of 12.62 m overpassed the 50% of the diameter of every tree.
Purpose of the data	Calculation of project removals
Calculation method	$500m^2 = r^2 * (12.62) * \pi$
Comments	Sample plots are permanent and circular. The plots were laid down in a shapefile, positioned systematically with a random start. The location of the plots within the forest plantation was done with a GPS. The area of each plot is not a variable but a fixed value but must be measured by its radius in order to determine the variable "number of trees within the plot".

4.3 Monitoring Plan

The aim of the Monitoring Plan is to record and monitor the necessary parameters to ensure that the project followed the corresponding methodology in the validated and registered PD and that the inputs to the carbon calculations are both accurate and up to date.

Monitoring was done according to the consolidated methodology AR-ACM 0001 “Afforestation and reforestation of degraded lands” (version 05.2.0, EB 65). The PD was registered mentioning the version 5.1.1 of the referred methodology, but the applicable version is the one stated above. Analysis of its applicability conditions have been developed in section 2.2 of the PD.

Monitoring stage comprised gathering information, performing calculations, and making estimations of GHG removals. In this monitoring event, it is ensured that commonly established principles of forest inventory and management were put into practice with the elaboration of a Monitoring Plan. Strictly speaking the document is called “Terms of Reference” (used in an open tender to receive monitoring services quotations) but it is used as a Monitoring Plan. This Monitoring Plan is a document prepared by CLIMIT with the purpose of specifying the procedures and standardization for the measurement of each variable. This document is in Spanish. COFUSA followed CLIMIT’s instruction to perform a forest inventory by its own. COFUSA has plenty of capacity in permanent staff performing forest inventories all year round.

All data gathered as part of the monitoring plan was archived electronically and will be kept at least for two years after the end of the crediting period.

According to the methodology applied, monitoring covered carbon stock changes for living above-ground. Below ground biomass was estimated indirectly based on above-ground biomass measurements and litter and dead wood were finally estimated as a percentage of carbon stock in tree biomass.

Monitoring event took place between September 25th, 2023, and October 12th, 2023.

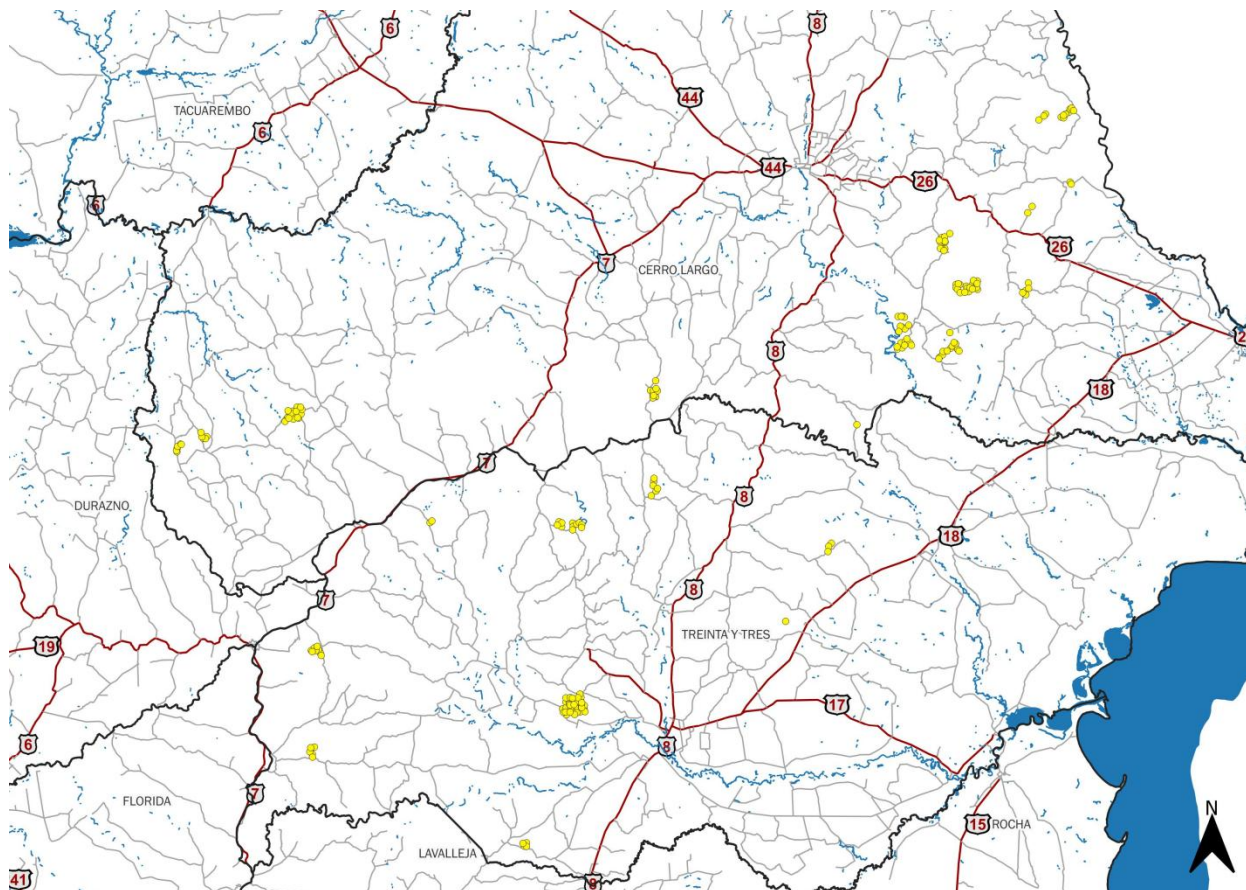
Sampling design and stratification

Project boundaries were defined at the beginning of project activity and the same geographic boundary will be maintained, according to VCS AFOLU requirements. However, the project area will be permanently monitored along the crediting period, since new strata may be created after potential disturbances effects (pests, droughts, fire). There have been updates to the project area which have been disclosed in this document and described in more detail in previous monitoring reports.

Geographic coordinates are established, recorded, and archived. A Geographic Information System was implemented for the validation and is updated for verification. All the geographical information will be available for the verification team.

With the purpose of developing the monitoring plan, Forestal 'El Arriero SRL' was classified into fifteen strata. Stratification was done considering region; age class (plantation date); and species planted (*Pinus taeda* and Hybrid pine *P. caribea x elliotti*). The project boundaries suffered no disturbances and the strata remained unaltered even when insignificant intra-stratum variability was detected in some strata, meaning that the number of strata was found to be higher than needed. The first verification resulted in a measurement error of less than 3% and new estimations indicated that the number of plots could be reduced to less than 60. However, in the previous verification El Arriero decided to maintain the number of strata and plots (124 plots) to ensure the error of estimation was minimal, even if it was much lower than required. For this verification, the number of plots was increased to 198.

The plots’ location is presented in the following figure.



Permanent sampling plots are selected since these are considered more efficient for estimating changes in carbon stocks by filtering out any variance due to plot effect. The plots allocation is registered in a GIS and can always be located. The plots were established at the field with a stick painted in red at the centre of the plot, every tree at the beginning or end of every row is also painted in red (with its number in the plot). These marks are proved to be seen after four or five years.

The location of the plots followed the guidance given by the corresponding methodological tool, as well as IPCC Good Practice Guidance for LULUCF (2002), chapter 4.3. The points for the permanent sampling plots were generated at random within the planted areas in the Geographic Information System. The map with the location of the sampling plots was loaded on the GPS receptors used by forest inventory crews, so that they can reach the plots accurately. An example of the software output for two contiguous strata is shown in *Figure 7*.

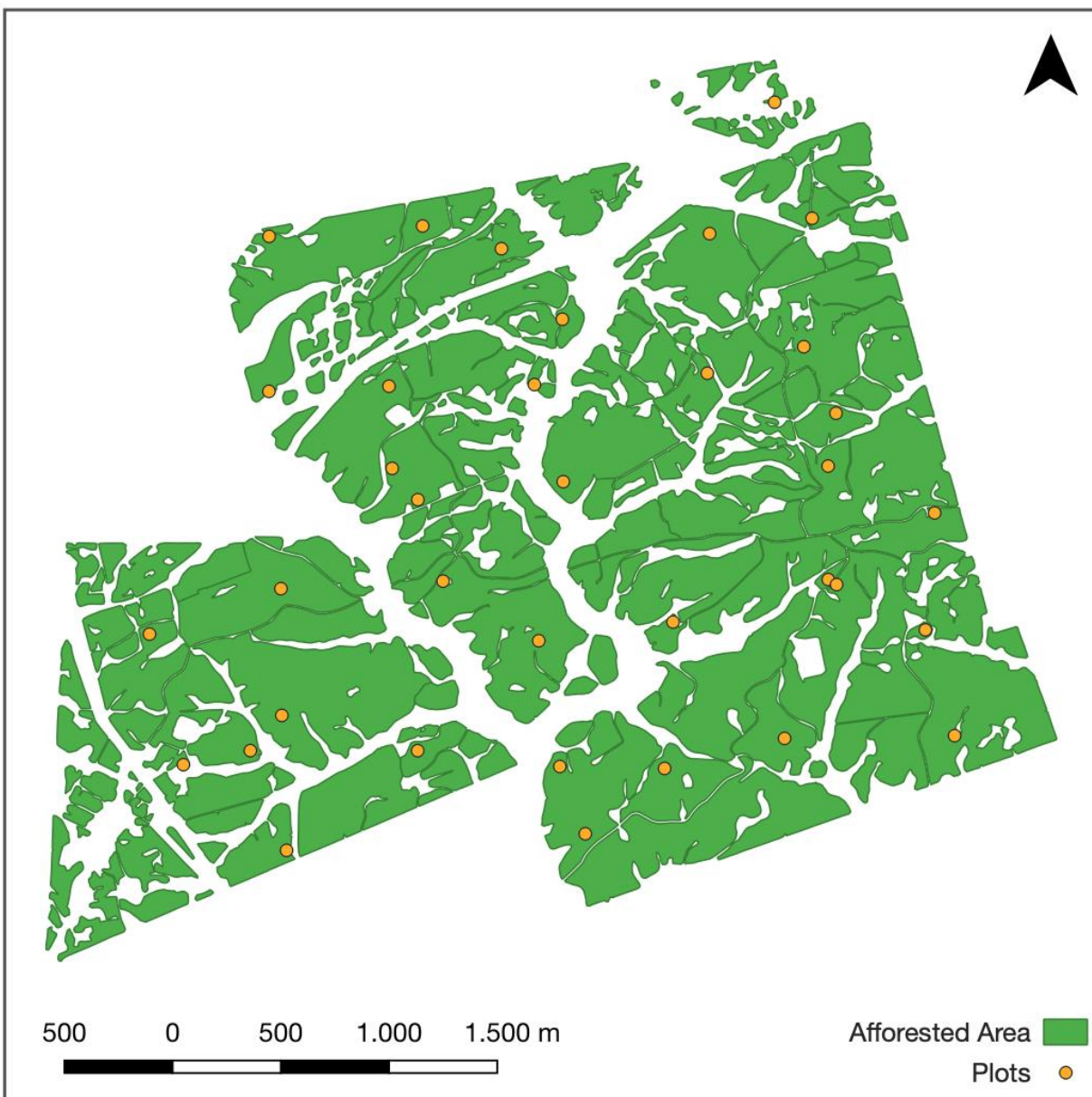


Figure 13. Example of location of permanent sampling plots.

Above ground carbon pool was measured following the methodology procedures and IPCC Good Practice Guidance for LULUCF (2003) established in the PD and Monitoring Plan. Carbon stocks in above ground biomass of trees are estimated by applying the BEF method, which calculates the biomass of trees of each species per unit area in each stratum at a given point of time, based on the following three dimensions: diameter at breast height (DBH), basal area and height, obtained from field measurements. By applying the BEF method, volume equations are used to convert tree dimensions to stem volume of trees based on DBH and height measurement in each plot. Stem volume of trees is then converted to above-ground and below-ground tree biomass using basic wood density (D) and root-to-shoot ratio (R). Default carbon fraction (CF) value was used to estimate the carbon stock.

Prior to the start of the inventory, all equipment used during field work was checked and calibrated.

Managing data quality

A Quality Control System will be implemented for routinely checking for data consistency, correctness, and completeness; for identifying and correcting errors and omissions; and for properly documenting and archiving data and documentation related with the monitoring activities. Quality Assurance measures will be implemented, to verify that data quality objectives are met, and in general, to support the effectiveness of the QC system.

QA/QC plan includes various activities aiming at achieving accuracy and precision of data, and transparency of procedures, such as:

- development of Monitoring Plan for field measurements, clearly defining all staff responsibilities and raising awareness about the importance of each task for producing reliable results.
- proper training of field measuring teams as the training all staff's members received prior to the field data collection.
- periodical check and maintenance of measuring instruments; all mechanical, optical, and electronic instruments were periodically checked by qualified personnel. In addition, consistency on field data will be permanently monitored, to detect any malfunctioning. The equipment was calibrated periodically. The calipers, diameter and meter tapes were weekly contrasted with a master tape.
- collection of information directly in electronic format to avoid errors when passing information from paper to computers.
- fully document and archive field and processed data, as well as all procedures used; to ensure data preservation, all relevant data, data analyses, static factors, photos, images, GIS output and other data shall be stored in electronic and paper format. The information is kept in servers which are weekly backed up in an external drive.
- establish procedures for eliminating inconsistent or erroneous field data; perform random checks of field measurements in order to detect measurement errors or systematic biases; some of such measures were: 1) during field work 10% of measurements were carried out by an independent party; 2) establish procedures to ensure representativeness of PSPs (i.e., if a plot was located in a non-representative area, the plot was relocated some few meters until finding a representative area); the allocation of samples in the field will be systematic with random start, so, the differences between population and sample mean and variance tend to be neutralized; identification of plots in the field are coded and recognizable only to the monitoring team

Operational and management structure

The monitoring was coordinated and implemented by the property manager.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the methodology, the baseline net GHG removals by sinks will be determined as:

$$\Delta C_{BSL} = \sum_{t=1}^{t^*} (\Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t})$$

Where:

ΔC_{BSL} : Baseline net GHG removals by sinks; t CO₂-e

$\Delta C_{TREE_BSL,t}$: Change in carbon stock in tree biomass in baseline within the project boundary in year t, as estimated in the tool 'Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities'; t CO₂-e

$\Delta C_{SHRUB_BSL,t}$: Change in carbon stock in shrub biomass in baseline within the project boundary in year t, as estimated in the tool 'Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities'; t CO₂-e (Under the applicability conditions of this methodology, changes in carbon stock of aboveground and below-ground biomass of shrub vegetation may be conservatively assumed to be zero for all strata in the baseline scenario)

Since continuation of an activity that has been applied without changes for more than 20 years has been selected as the baseline scenario, it is assumed, in agreement with IPCC GRASSLANDS (2006) – Chapter 6.2.1.1 Tier 1: “A Tier 1 approach assumes no change in biomass in Grassland Remaining Grassland. In grassland where there is no change in either type or intensity of management, biomass will be in an approximate steady-state (i.e., carbon accumulation through plant growth is roughly balanced by losses through grazing, decomposition and fire)” that the net GHG removals by sinks in the baseline equals zero.

Also, AR-Tool 14 (paragraph 11) was applied and, as there were no trees on the project area before its project start date, the carbon stock in trees is accounted as zero.

5.2 Project Emissions

Forestal 'El Arriero SRL' project activity does not have GHG emissions. However, this chapter refers to the removals of GHG performed by this project activity.

Net anthropogenic GHG removals by sinks is estimated as the actual net GHG removals by sinks minus the baseline net GHG removals, minus leakage. The following general formula described in the methodology is used to calculate the net anthropogenic GHG removals by sinks of an A/R project activity, in t CO₂-e:

$$C_{AR-CDM} = \Delta C_{ACTUAL} - \Delta C_{BSL} - LK$$

Where:

C_{AR-CDM} Net anthropogenic GHG removals by sinks; t CO₂-e.

ΔC_{ACTUAL} Actual net GHG removals by sinks; t CO₂-e.

ΔC_{BSL} Baseline net GHG removals by sinks; t CO₂-e.

LK Total GHG emissions due to leakage; t CO₂-e.

The actual net greenhouse gas removals by sinks were estimated using the following equation described in the methodology:

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E$$

Where:

ΔC_{ACTUAL} Actual net greenhouse gas removals by sinks; t CO₂-e.

ΔC_P Sum of the changes in above-ground and below-ground tree biomass, dead wood, litter, and soil organic carbon stocks in the project scenario; t CO₂-e.

GHG_E Increase in GHG emissions because of the implementation of the proposed A/R CDM project activity within the project boundary; t CO₂-e.

The following formula described in the methodology is used in order to estimate GHG emission:

$$GHG_E = \sum_{t=1}^{t^*} GHG_{E,t}$$

Where:

GHG_E Increase in GHG emissions as a result of the implementation of the proposed A/R CDM project activity within the project boundary; t CO₂-e.

$GHG_{E,t}$ Increase in non-CO₂ emissions due to biomass burning of existing vegetation as part of site preparation in year t; t CO₂-e.

t 1,2,3, t* years elapsed since the start of the A/R CDM project activity.

The tool for “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity” has been considered. The use of fire for site preparation and/or to clear the land of harvest residue prior to replanting is specifically excluded from the project management and therefore project emissions are estimated as zero.

Carbon stock changes

ΔC_P is the sum of the changes in above-ground and below-ground tree biomass, dead wood, litter, and soil organic carbon stocks in the project scenario. In the ex-ante estimation, all pools were accounted for. Following is presented the equation for the estimation of ΔC_P . Calculations are described below.

$$\Delta C_P = \Delta C_{TREE} + \Delta C_{LI} + \Delta C_{DW} + \Delta C_{SOC}$$

Where:

ΔC_P Change in carbon stock in all selected carbon pools in the project scenario, t CO₂-e.

ΔC_{TREE} Change in carbon stock in tree biomass in project, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities;” t CO₂-e.

ΔC_{DW} Change in carbon stock in dead wood biomass in project, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities;” t CO₂-e.

ΔC_{LI} Change in carbon stock in litter biomass in project, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities;” t CO₂-e.

ΔC_{SOC} Change in carbon stock in SOC in project, in areas of land meeting the applicability conditions of the tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities,” as estimated in the same tool; t CO₂-e.

Biomass carbon pools

Above and below ground biomass have been estimated according to the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity.” Carbon estimations in trees are based on field measurements of monitored parameters, chapter 3.2 of the Monitoring Report. Estimations are archived as part of the project verification and will be available for the verification team.

The aboveground biomass corresponds to tree biomass, no shrubs are considered for estimation. The method used for estimating change in carbon stock in trees is the “stock change method.” Change in carbon stock in trees in two successive points in time is calculated as the difference between the two estimated stocks. As this is the first monitoring report the carbon values in every pool is the result, the starting point of the crediting period is zero carbon.

As in ex-ante estimations, the following equations were used in order to estimate above and below ground biomass ex-post measurements:

$$B_{TREE_{j,p,t,i}} = V_{TREE_{j,p,t,i}} * D_j * BEF_{2,j} * (1 + R_j)$$

Where:

$B_{TREE_{j,p,t,i}}$ Biomass of trees of species j in sample plot p of stratum i in late 2023

$V_{TREE_{j,p,t,i}}$ Stem volume of tree species using field measurements of tree parameters (DBH and height), default values (tree shape factor) and complemented with worksheets data processing (interpolation of not-measured heights); m³.

The applied equation for volume estimation is no other formula than the cylinder volume equation corrected by a taper value (TSF):

$$V_{TREE} = Basal\ area * Height * TSF$$

Where:

$$\text{Basal area} = \frac{\pi * DBH^2}{4}$$

DBH: Diameter at Breast Height

TSF: Tree Shape Factor

According to the methodology, for ex post estimation, the volume equation used must be demonstrated to be appropriate for the purpose of estimation of tree biomass by applying the tool “Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities.” The appropriateness of the equations is demonstrated through the satisfaction of the following condition, in the sense that the formula is very generic and applicable in any case:

The equation has been used in the commercial forestry sector in Uruguay for 10 years or more.

The tree shape factor values used in El Arriero carbon stock calculations during this monitoring period, corresponds to TSF values estimated by COFUSA. A document containing explanations about the procedures followed in order to obtain these values is attached to this document.

D_j : Basic wood density of tree species j. The species j corresponds to the only species used in this project: Pinus sp., with a basic density of 0,44 t.d.m./m³. This parameter was established as “available at validation” in the Project Design, thus it was not measured or monitored. The value was obtained and corresponds to default value for Pinus pinaster in IPCC LULUCF Good Practice Guidance (2003), Table 3A.1.9-1

(http://www.ipccnggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf).

As also established in the validation report, the applied value is also mid-range in values for loblolly pine wood density published by Oregon State.

BEF_{2j} : Biomass expansion factor for conversion of stem biomass to above-ground tree biomass, for tree species j (Pinus sp.); dimensionless. The BEF_2 is to be used in connection to growing stock biomass data and not with increment data, as described in chapter 3.2 of the GPG for LULUCF (2003)). The value was also available at validation and not monitored, it ranged from 3.4 (for young forest) to 1.34 (9 years old forests) and the exact values applied for different plantation dates are reported in the final worksheet for carbon stock calculation. These values were calculated using a model (Sanquetta et al. 2011)⁵ based on the age of the trees; the equation is as follows:

$$BEF = 3.287 * AGE^{-.3684}$$

R_j : Root-shoot ratio for tree species j; dimensionless. The values applied were taken from the suggested equation from the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs":

$$R = \frac{e^{-1.085+0.9256 \cdot \ln(A)}}{A}$$

⁵ Sanquetta et al.: Biomass expansion factor and root- to-shoot ratio for Pinus in Brazil. Carbon Balance and Management 2011 6:6. doi:10.1186/1750-0680-6-6

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3196695/pdf/1750-0680-6-6.pdf>

Where A is aboveground biomass content (t.d.m/ha). The aboveground biomass was calculated per year of plantation and different values were obtained. R values ranged from 0.20 to 0.31.

Finally, the carbon stock in tree biomass within the project boundary is estimated as follows:

$$C_{TREE} = \frac{44}{12} * B_{TREE} * CF_{TREE}$$

Where

C_{TREE} Carbon stock in tree biomass within the project boundary; t CO₂-e.

B_{TREE} Biomass of trees within the project boundaries.

CF_{TREE} Carbon fraction of tree biomass; 0.5 t C td.m-3.

Soil organic carbon

Estimates of soil organic carbon (SOC) stocks were done in accordance with the “Tool for the estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activity.” As suggested by the tool, it is assumed that the implementation of the project activity firstly decreases the SOC content of the lands from pre-project level, due to the site preparation.

Afterwards, the SOC increases to the level that is equal to the steady-state SOC content under native vegetation. The increase in SOC content in the project scenario takes place at a constant rate over a period of 20 years from the year of planting. The project meets the applicability conditions of this tool - as demonstrated in validation- since the areas of land to which the tool is applied do not fall into wetland category, do not contain organic soils and are not subject to any of the land management practices and application of inputs listed in the tool.

Litter remains on site and is not removed, and soil disturbance is in accordance with appropriate conservation practices, limited to site preparation and not repeated within 20 years.

Table 5. Parameters used for estimation of Soil Organic Carbon (SOC)

Parameter	Symbol	Value	Source (SOC estimation tool, V01.1.0)
Reference SOC (tC/ha)	$SOC_{REF,i}$	88	Table 3. HAC soils, warm temperate, High Activity Clay soils
Reference SOC (tC/ha)	$SOC_{REF,i}$	63	Table 3. HAC soils, warm temperate, Low Activity Clay soils
Land use factor	$f_{LU,i}$	1	Table 6. All permanent grassland
Management factor	$f_{MG,i}$	0.70	Table 6. Severely degraded grassland. Lands are identified as degraded lands using the “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”

Input factor	$f_{IN,i}$	1	Table 6. Grassland without input of fertilizer
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The correspondent carbon sequestration calculation is presented to the verification team in the total carbon stock estimation worksheet.

Litter and Dead Wood

Estimations were done in accordance with the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities” using a default and conservative value of 8% and 4% of carbon stock in tree biomass for dead wood and litter, respectively.

5.3 Leakage Emissions

Application of the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” led to the conclusion that this source of leakage (conversion from grazing land to forestry) is negligible.

Through the application of the “Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant”, which is one of the applicability conditions of the tool, the resulting conclusion was that the project will not cause any displacement of the activity occurring before project implementation. The project meets the stated conditions (b) and (d) as follows:

(b) The total area displaced corresponds to the total area of the project 4,636.53 ha, meaning that the grazing area displaced is 100% and more than 50 ha, then the value “ $n - a$ ” (where “ n ” is the area in hectares expected to be displaced and “ a ” is 5% of the total project area or 50 ha) is $4,567 - (0.05 \times 4,567) = 4,338.7$. This area, used for grazing cattle, can be identified as degraded.

(i) The grazing cattle displaced by Arriero's project were relocated to neighbouring areas. It was already demonstrated that the project areas are degraded or degrading due to overgrazing, and because the grazing animals were moved to neighbouring zones, the same conditions apply to the soil.

(ii) Moreover, the animals were displaced only for 2 to 3 years and have returned to the same site. The silvicultural management practice does not permit the animals to be grazing at the while the trees are small to avoid any physical damages. During the period of displacement, the grasslands to where the cattle go had the necessary carrying capacity, as seen in table 10 of the PD document. After 2 or 3 years the trees become big enough for the animals to be reintroduced, and now the project is at a stage in which there is no displacement whatsoever.

(d) The total number of animals expected to be displaced is more than 40 LSU, and the total number of animals expected to be displaced were displaced to the already mentioned areas (i and ii) or the remaining option (v): slaughterhouses. This is a common practice in the beef production systems in Uruguay.

Given all this, we believe the application of the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” is not necessary. The application of the “Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant,” which was superseded by the previously mentioned tool, resulted in the conclusion that the project will not cause any displacement of the activity occurring before project implementation.

- It is worth noting that the afforested areas represent only about 45-50% of the total area owned by the project participant (lowlands, biological corridors, roads, rocky areas, settlements, among others, complete the rest of the land use). Also, Uruguayan grazing activity is completely compatible and even associated with forestry, for instance, during site preparation a high stocking rate of cattle, more than what is usual, is introduced within the project area during the prior months to help reduce the amount of above ground biomass to minimize the use of herbicide.
- After the trees are big enough (about two years after planting) cattle are reintroduced and managed in a silvopastoral system with trees (both activities complement each other: the trees are managed for high-value sawlogs and, at the same time, provide shade and shelter for livestock and forage, reducing stress and increasing forage production). The impact of cattle displacement is reduced to two years over thirty-year rotation.
- Another important point to consider is that the total area under project activity is not afforested in the same year; plantation happened from 2009 to 2011.
- The impact of this staggered plantation plan substantially reduces the eventual grazing displacement each year.



Figure 14. Silvopastoral system in Uruguay

Cattle existing before the project commenced either stayed within project boundaries or in an area controlled by project participant or be sold to the market (calves and surplus heifers are normally sold in the market for fattening on other grazing areas, while cows, heifers and a reduced number of bulls are sold to slaughterhouses). It is El Arriero's policy that landowners can continue with their activities for a certain period after the purchase of the land, so that they have time to reduce the population of their cattle. In some cases, they may even stay in the land.

Furthermore, according to data gathered from governmental Livestock Controller Division (DICOSE) there has been a smooth increase in the beef cattle number of heads at a national level. On the other hand, according to data taken from National Forest Directorate (DGF) forest plantations have also been increasing for the same period. In addition, native forest has been also increasing in terms of area in the last 43 years at the National level. According to National Forest Inventory (2010) and to the forest maps based on aerial photographs of 1967 native forests have increased 21% in terms of area. The fact that total forest area and number of livestock have been increasing is evidence that project activity does not result in displacement of the previous productive system.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

State the non-permanence risk rating (%)	12
Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes ☐ No
For ARR and IFM projects with harvesting, state, in tCO ₂ e, the Long-term Average (LTA).	2,230,676
Has the LTA been updated based on monitored data, if applicable?	☒ Yes ☐ No The long-term average has been updated based on the last forest monitoring. See explanation below .
State, in tCO ₂ e, the expected total GHG benefit to date.	2,274,614
If a loss occurred (including a loss event or reversal), state the amount of tCO ₂ e lost:	N/A

The project's long-term average Emission Reductions and Removals (LTA ERR) has been updated during this monitoring event. The reasons for this update are as follows:

- Forest growth curves were updated based on:
 - 1) Improved INIA Model: The original growth curves (which were developed by CAMBIUM when the project was first validated because there was no forest growth models available at the moment for *Pinus taeda*), were updated based on the model developed by *Instituto Nacional de Investigación Agropecuaria* (INIA) in 2021 to provide more accurate projections⁶. This updated model has been applied to El Arriero, resulting in a revised LTA. The model can be accessed through: iniaforestaluy.com/sag2020/ingreso.aspx

INIA offers decision-support tools for long-term forestry plantations via SAGs (*Sistemas de Apoyo a la Gestión*). These are designed to assist managers, advisors, students, and government agencies in planning and evaluating forest scenarios for both ecological and economic outcomes. The 2021 update modernizes INIA's forest management decision-support platform by incorporating updated models for multiple species and improving usability. Some key improvements made include:

 - New simulation capabilities for key species: Updated SAG tools now include *Eucalyptus grandis*, *Eucalyptus dunnii*, and ***Pinus taeda***, enabling simulations at both parcel and multi-stand levels
 - More friendly user-access: Platforms have been made more readily accessible for producers and stakeholders to run simulations and compare management strategies

⁶ Revista INIA No 68. Actualización 2021 de simuladores; <https://ainfo.inia.uy/digital/bitstream/item/16345/1/Revista-INIA-68-Marzo-2022-14.pdf>

- Users can input growth parameters, simulate thinning or harvest rotations, project timber yields, and assess economic returns and costs

This free-to-use tool was certified in 2021 through the CERTECAgro process, ensuring—through external evaluators—that the perspective of potential users is incorporated into its development.

- Inventory-Based Calibration: For each stand, data from the forest inventory conducted during this monitoring period was used as input to calibrate the INIA model, ensuring that the updated growth curves reflect actual on-site measurements. The average growth curve was then applied to generate the updated long-term average. The results of the model and the equations which were then applied are provided in the ERR ex-ante spreadsheet

These technical modifications led to the update of the forest growth curves and therefore the LTA.

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Buffer pool allocation (tCO ₂ e)	Reductions VCU (tCO ₂ e)	Removals VCU (tCO ₂ e)	Total VCU issuance (tCO ₂ e)
23-Dec-2021 to 31-Dec-2021	0	3,564	0	428		3,137	3,137
01-Jan-2022 to 31-Dec-2022	0	162,177	0	19,461		142,716	142,716
01-Jan-2023 to 12-Oct-2023	0	126,534		15,184		111,350	111,350
Total	0	292,276		35,073		257,203	257,203

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
23-Dec-2021 to 31-Dec-2021	2,358	4,100	10%	See comment below
01-Jan-2022 to 31-Dec-2022	168,662	186,558	11%	See comment below
01-Jan-2023 to 12-Oct-2023	151,513	145,556	11%	See comment below
Total 23 Dec-2021 to 12-Oct-2023	322,533	336,214	11%	The values shown in percentage are relatively low. It must be noted that the achieved reductions are the

				real values in the forest inventories and not the VCUs shown above. The total removals for the period 2009 to 2023 are zero given that the ex ante is estimated with real measured values (expost) up to 2023 and modeled for 2024 onwards.
Total 30-Apr-2009 to 12-Oct-2023	2,274,614	2,274,614	0.0%	

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Section	Information	Justification
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

APPENDIX 2: SUSTAINABLE DEVELOPMENT CONTRIBUTIONS

The project also contributes to SDG number 15 “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” given that the afforestation activities take place on degraded land (due to a history of overgrazing by cattle) and the timber is produced in a sustainable way by following the FSC principles, reverting the degradation process. Additionally, there are 420 ha of native forest in the farms where the project is being developed. This area is protected by Law 15.939 and cannot be cleared. Various indigenous tree species can be identified within native forests, which also represent a natural habitat for different fauna species.

The project proponent is also monitoring the fauna and flora within project boundaries. See below the plan and its results.

"Fauna and Flora Monitoring

Introduction: Monitoring Program Since 2001

In order to fulfill the objective set by the company to preserve the integrity of its project and the natural environment, as well as to harmonize its productive goals with the conservation of environmental quality, COFUSA has been carrying out a fauna and flora monitoring program in the northern part of the country since 2001.

Over the years, valuable information has been collected for the characterization of biodiversity and the different environments in the region, contributing significantly to wildlife connectivity and, consequently, the ecological continuity of the biogeographic region known as the Coastal Atlantic Forest, which represents the southern boundary of the Atlantic Forest.

The monitoring program and its surveys take into account criteria established by the SNAP (National System of Protected Areas) to identify priority plant species for conservation in the region, as well as native fauna species and/or those in danger of extinction. With this research theme, collaboration has also taken place with various research institutions, such as the University of the Republic.

Fauna at El Arriero

In the northeastern part of the country, where the El Arriero project is located, short-term fauna monitoring has been conducted through camera traps in the vicinity of the La Micaela population center, Cerro Largo (study region).

The camera traps were installed during the summer months: December, January, and February, as this is the period of greatest presence and movement of animals.

The forested areas have a great diversity of environments generated by the interaction of different variables, such as species, age, soil type, silvicultural treatments of plantations (pruning and thinning

schedules), silvopastoral systems, etc. These variables interact to create a great variability of ecotones that harbor traditional species of our fauna.

Characterization of Study Environments

The monitored properties were El Germano and Las Víboras. Both properties have cultivated species *Pinus taeda* and *Pinus caribea* x *elliotti* planted in 2010. The area of Riparian Native Forest is 32.45 hectares in the case of El Germano and 88.58 hectares in the case of Las Víboras. The topography of the environments also includes low wetland areas with the presence of *Uliginosas* species.

Below are maps showing the location of the installed monitoring cameras:"

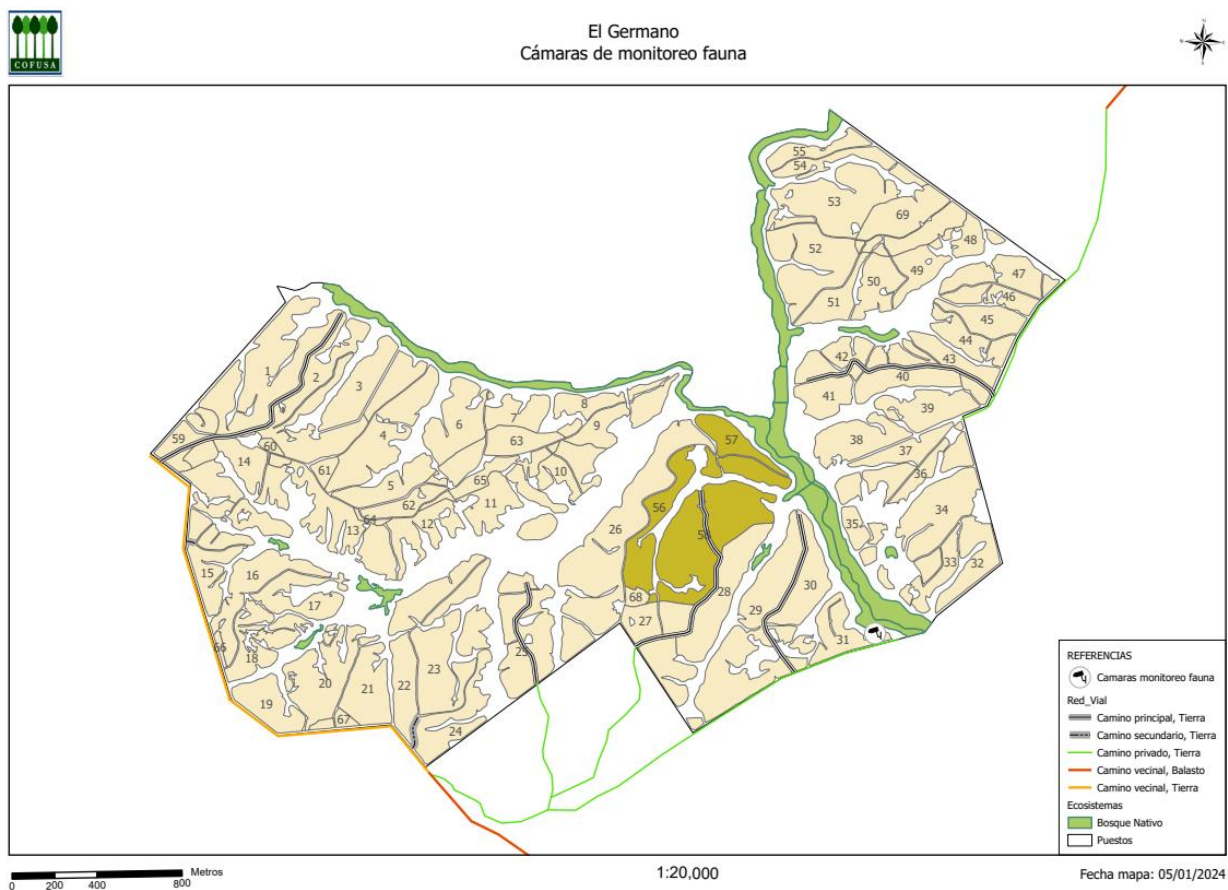


Figure 15. Surveillance fauna cameras

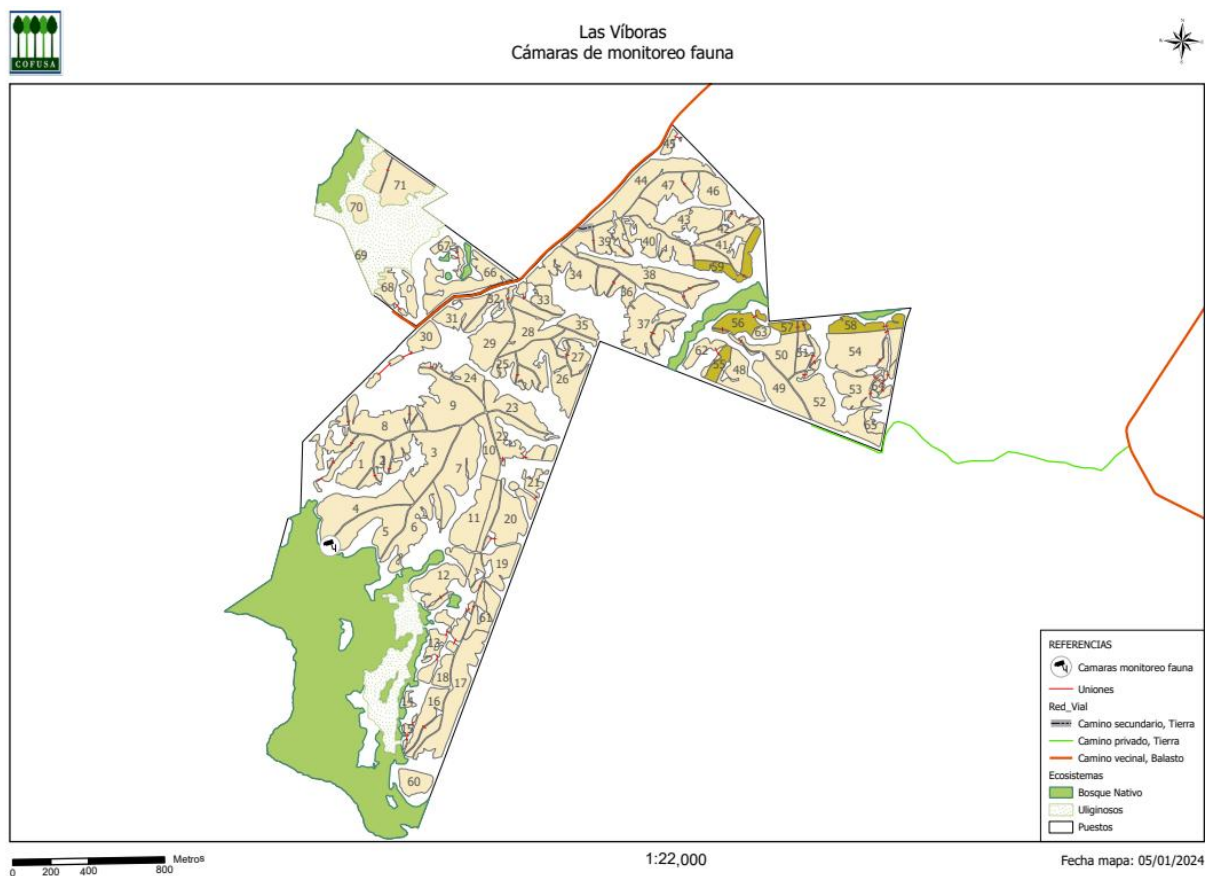


Figure 16. "Species Surveyed in the Study Environments

1) Ñandú – *Rhea americana*

The Ñandú is a native bird of South America, with a distribution across various countries in this region, typically associated with open grasslands. In the Uruguayan prairies, the Ñandú finds an ideal setting for its diurnal activities. Additionally, it has established its presence in the scrublands and shrubs that dot the Uruguayan landscape, as well as in forested areas. These areas provide coverage and shelter, where the Ñandú can seek refuge from predators and find suitable nesting sites. This offers a more protected environment for newly hatched chicks, allowing them to develop securely during the initial moments of their lives.

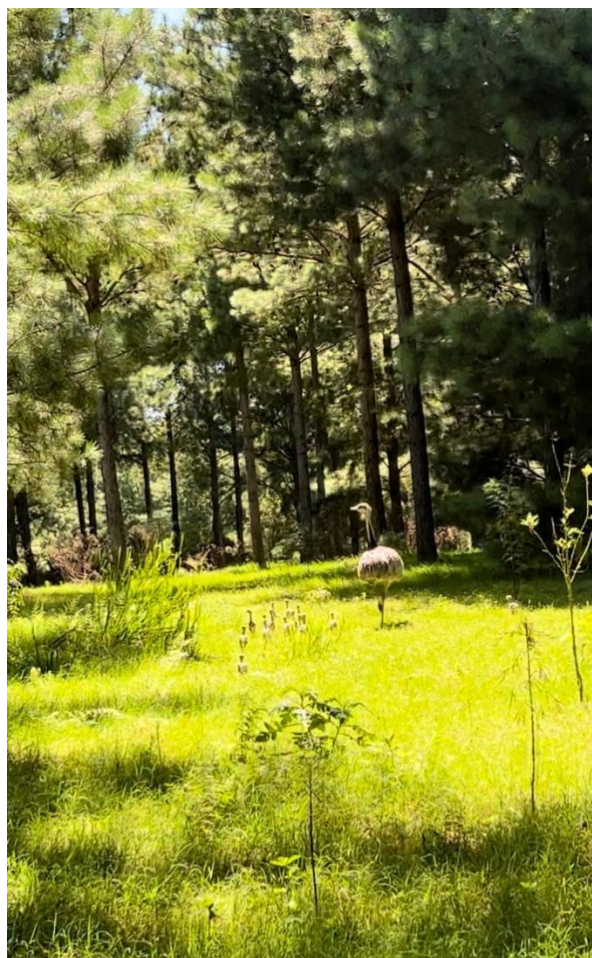


Figure 17. Foto 1. Ñandú followed by its chicks at Las Víboras estate."

2) Mulita – *Dasypus hybridus*

"It is a species of regional endemism, meaning that its distribution is limited to a specific area (Uruguay, Paraguay, Argentina, and the southernmost region of Brazil). In Uruguay, it is protected from hunting by law and is listed as a priority species for conservation."



Figure 18. Foto 2. Armadillo at El Germano estate.

3) Guazubirá – *Mazama gouazoubira*

It is a medium-sized native deer that inhabits Uruguay, although the number of specimens is decreasing. Hunting is prohibited throughout the year.



Figure 19. Guazubirá at El Germano estate

4) Jabalí – *Sus scrofa*

Exotic species distributed throughout the territory of Uruguay. Hunting is allowed in Uruguay.



Figure 20. Wild boars at El Germano estate.

5) Liebre – género *Lepus*

Exotic species distributed throughout the territory of Uruguay. Hunting is allowed in Uruguay.



Figure 21. Hare at El Germano estate.

6) Pava de monte – *Penelope obscura*

Bird belonging to the galliform family, native to Argentina, Brazil, Paraguay, and Uruguay.

Its habitat includes temperate and subtropical forests or low-altitude humid tropical rainforests, as well as subtropical or tropical humid mountains. They inhabit mountain forests and are typically found in trees.



Figure 22. Amazonian turkey followed by two chicks at El Germano estate.

"Some Final Considerations

Considering the results of the conducted monitoring and the species surveyed over time, as well as the heterogeneity of situations provided by forest plantations, it can be inferred that a forest cultivation with proper design, respecting riparian zones, biological corridors, and areas of high biodiversity, represents an excellent opportunity to host a wealth of fauna and even transform into a refuge for threatened species.

The biological importance of unplanted areas, particularly lowlands, riparian zones, and associated environments, is reaffirmed. The potential connectivity of these areas will allow assigning them high conservation value and recognizing them as a biological corridor.

Wildlife thrives in both this set of anthropic environments and in the remaining wild sites.