REFORESTERRA GROUPED PROJECT

Document Prepared By Reforest'Action

Project Title	ReforesTerra
Version	0.1
Date of Issue	16-May-2022
Project Location	Brazil, State of Rondônia, Baixo Rio Jamari watershed
Project Proponent(s)	ReforesTerra SPV Stéphane Hallaire, stephane.hallaire@reforestaction.com +33 1 86 22 04 80
Prepared By	Reforest'Action
Validation Body	TBC
Project Lifetime	15 November 2022 – 15 November 2052; 30-year lifetime
GHG Accounting Period	15 November 2022 – 15 November 2052; 30-year lifetime
History of CCB Status	Not applicable
Gold Level Criteria	The project is not applying for any Gold Level criteria.
Expected Verification Schedule	First Verification three years after Validation. Subsequent verifications every 3 years until the end of the project crediting period

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1 SUMMARY OF PROJECT BENEFITS

The ReforesTerra grouped project aims to recover low-intensity and degraded pasturelands in the Baixo Rio Jamari watershed in the State of Rondônia, Brazil, in the Southern Amazon region. The first instance consists of the reforestation of 2,000 hectares in smallholdings. Public registries and remote sensing data point that the project zone contains over 20,000 ha of land potentially eligible for reforestation in smallholdings.

Through the reforestation of degraded lands in Permanent Protection Areas (PPAs) surrounding water bodies and Legal Reserves (LRs) in other areas of the engaged landholdings, the grouped project aims to protect water resources, plant dozens of native tree species and improve connectivity for wildlife. Additionally, the project expects to benefit to 600 landholders in the first instance through capacitation and Payment for Ecosystem Services, as well as employing 37 local people full time and 12 other professionals in the region part time in the first instance, with equal job opportunities for women and men. Finally, the project will remove on average 26,843 tCO_2e per year in the first instance, summing 805,304 tCO_2e over the 30-year crediting period.

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Restore habitat for wildlife	2.1
2) Improvement of legal compliance of landholders.	2.1.1
3) In-situ native tree species conservation	5.2.5

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	805,304 tCO2e	3.2
	Net estimated emission reductions in the project area, measured against the without-project scenario	Not applicable	
Forest[1] cover	For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	Not applicable	
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	2,000 hectares	2.1.5
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	
	Number of hectares of non-forest land in which improved land management practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	600 landholders	2.3.14
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	To be determined through the baseline survey[5]	2.3.14

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)
[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)
[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)
[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)
[5] The baseline survey conducted prior to validation will provide reliable data on the average household size and composition in the project zone.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Employment	Total number of people expected to be employed in project activities[6], expressed as number of full-time employees[7]	43	2.2.3 2.3.1 4
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	9	2.2.3 2.3.1 4
Livelihoods	Total number of people expected to have improved livelihoods[8] or income generated as a result of project activities	600 direct beneficiaries (i.e. landholders); 37 full-time employees; number of indirect beneficiaries (i.e. family members of direct beneficiaries) to be determined through the baseline survey.	2.2.3 2.3.1 4
	Number of women expected to have improved livelihoods or income generated as a result of project activities	Number of direct beneficiaries (i.e. female landholders) to be determined through the baseline survey;11 full-time female employees	2.2.3 2.3.1 4
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	Not applicable	

[6] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.
[7] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])
[8] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	Not applicable	
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	To be determined through the baseline survey	5.2
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	To be determined through the baseline survey	5.2
Well-being	Total number of community members whose well-being[9] is expected to improve as a result of project activities	600 direct beneficiaries (i.e. landholders); approximately 1800[10] indirect beneficiaries (i.e. family members of direct beneficiaries) and 37 full-time employees	4.2
	Number of women whose well-being is expected to improve as a result of project activities	Number of direct and indirect female beneficiaries to be determined through the baseline survey;11 full-time female employees	4.2
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[11] measured against the without-project scenario	2,000 hectares	2.1.5

[9] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.

[10] Making a conservative estimate of 3 family members per household. This figure will be updated based on the results of the baseline survey.

[11] Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Expected number of globally Critically Endangered or Endangered species[12] benefiting from reduced threats as a result of project activities,[13] measured against the without-project scenario	2 fauna species: black-spider-monkey (*Ateles chamek*) and the giant otter (*Pteronura brasiliensis*)	5.1

[12] Per IUCN's Red List of Threatened Species
[13] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The ReforesTerra grouped project is a reforestation project implemented in the Baixo Rio Jamari Watershed, and up to 5 kilometers beyond the geographic limit of the watershed.

The project zone contains 1,164,387.14 ha, located in the southern region of the Amazon Forest, in Rondônia State, Brazil. The project zone has 40,5% (471,304 ha) of its native forest cover left. Current land cover in the region is composed mostly of low-productivity or degraded pasturelands, small areas of agriculture and remnant forests, the latter mostly small and isolated in the agricultural landscape. However, the project zone still harbors a large share of Amazon biodiversity - the Amazon rainforest being the largest and one of the most diverse tropical forests of the world. Species richness models in the project zone indicate more than 120 mammals species (more than 7 endangered), 450 bird species (more than 5 endangered) and more than 70 species of frogs (Figures 29, 30, 31; Jenkins et al., 2015). In the face of loss of water resources, agricultural productivity and biodiversity, the need for forest restoration becomes clearer, but landholders lack the resources, knowledge or the willingness to carry out these actions without support in this deforested region of the Amazon.

Smallholder landholders will be engaged through local associations to carry out reforestation. Reforestation will be carried out in degraded pasturelands composed of invasive fodder grasses and - to a minor extent - in agricultural lands where tillage practices are being used. Additionally, a result-based Payment for Environmental Services (PES) fund will be implemented to benefit landholders that maintain reforested areas in their landholdings.

In the initial project activity instances, 2,000 ha will be reforested following 5 years of planting activities, establishment of natural assisted regeneration sites and maintenance of these sites and will be monitored over the 30 years of the project crediting period. Reforestation is expected to engage 600 landholders and fully employ 37 local people in the first instance.

Reforestation will be carried out using two different techniques:

1) **Framework Tree Planting**: planting fast-growing species that quickly develop forest structure ('cover' group) along with slow growing species ('diversity' group) in order to quickly create a favorable environment for natural regeneration (Rodrigues et al., 2009). This method introduces more than 90 native species produced in local nurseries. Framework tree planting will be carried out in 75% of the project area.

2) **Assisted natural regeneration**: this will be applied only in areas with potential for natural regeneration. The area will be protected by fencing from external degradation factors (e.g., cattle entrance), invasive grasses will be controlled, and existing natural regeneration will be fertilized.

The objectives of the project are the following:

1. Climate: Mitigate climate change through permanent establishment of secondary forests in degraded lands, with a targeted average carbon sequestration of 402 tCO_2e/ha over 30 years.

2. Community: Generate early community benefits through local people employment, improving legal compliance and payment for ecosystem services delivered by reforested areas; as well as long-term benefits through training of local staff and capacity building among landholders.

3. Biodiversity: Promote tree species richness and *in situ* conservation of native tree species through reforestation and assisted natural regeneration. Restore habitats for wildlife and protect water resources.

Table 1: Reforestation activities of the ReforesTerra project

Activity	Description	Framework tree planting	Assisted natural regeneration
1.1 Nursery	The seedlings of native tree species for the project will come from the Rioterra nursery located in Itapuã do Oeste, Rondônia. In 2021 the nursery produced approximately 1,200,000 seedlings, but it has the capacity for production of 2 million seedlings annually. The seedlings are produced in reusable tubes of 120, 180 and 290 cm^3 and are sent to the field. To ensure the quality of the seedlings, during the stay at the nursery the seedlings are fertilized and go through a period of acclimatization (direct sunlight and reduced water regime in the nursery to acclimatize seedlings to conditions in the planting site) of at least one month to adapt to direct sunlight and less water before they go to the field. The nursery applies sanitary measures to control pathogens and plagues.	X	
1.2 Site identification	Reforestation activities will be carried out only in areas meeting land eligibility criteria, derived from standard and methodology requirements. Given the amplitude of the project zone, reforestation activities will be developed in blocks of nearby rural owners, starting on November 15th, 2022, at the beginning of the rainy season. Planting can be carried out up until March of every year, when rain frequency starts to diminish in the project zone.	X	X
1.3 Seedling transportation	Seedlings are transported without their pods, rolled in packs of 50 seedlings each. Each roll is tagged with the landholder's name and indicated if the species belongs to the 'cover' or 'diversity' framework planting group. Given the large number of landholders engaged in the project, seedlings are distributed in landholders' associations and other community areas to be gathered by landholders for planting. Landholders are informed when seedlings will	X	

Activity	Description	Framework tree planting	Assisted natural regeneration
	arrive.		
1.4 Site preparation	Tilling of the area to be reforested will be carried out to reduce invasive fodder grass cover. A field evaluation will be conducted to establish the dosage of herbicide according to the spread of invasive grasses (see row '"Control of invasive grasses" below).	X	
1.5 Planting	Framework tree planting will be held in groups of "cover" (species that grow rapidly and shadow the area, creating a floretal structure) and species of "diversity" group (other species, important for the diversity of the forest and will keep the forest in long term). At the density of 1,600 trees/ha. The landholders will be responsible for planting.	X	
1.6 Control of invasive grasses	Prior to planting, is necessary, there will be a mechanized application (when possible) of glyphosate herbicide at the concentration of at least 3.50 kg / ha. The subsequent control of invasive grasses will be carried out with the application of herbicide using backpack sprayer at 75 days and 150 days after planting. Backpack sprayers will also be used when tractors are not able to enter the reforestation area. The application is performed by the trained team and using all personal protective equipment, including boots and rubber gloves, mask, goggles and overalls. In the second year, there will be up to 3 applications of herbicide based on the needs of each area.	X	X
1.7 Fertilization	Fertilization will be carried out next to planted trees by applying the fertilizer in the pit in the dosage of 80 g of phosphate with at least 30% P_2O_5 (NPK - 06-30-14). After tree planting, 2 or 3 additional fertilizations using NPK 20-00-20 will be carried out every 45 days.	X	X

Activity	Description	Framework tree planting	Assisted natural regeneration
1.8 Fire control	In areas where there is a risk of fire, the project staff will explain to landholders the importance of firebreaks around reforestation sites and provide instructions on how to establish a firebreak by tilling around the reforestation area, completely removing vegetation cover and preventing fire spread.	X	X
1.9 Fencing	In landholdings with livestock, fences will be built by the landholders to prevent the entrance of the grazing animals in the restored areas. The fence will be formed by a stake every 5 meters with 5 wires.	X	X

The project will also carry out the following non-forest activities that benefit community and biodiversity.

Table 2: non-forest project activities of the ReforesTerra project

Activity description	Description
2.1 Identification and training of nursery staff and of rural extensionists	Employment opportunities as nursery staff or extensionists of the project will be promoted in the community through digital means (e-mail, local news, WhatsApp) and through landholder's associations. Candidates will go through training to evaluate their skills for the activities required. Selected candidates are from the project zone and will go through additional training before starting activities. The project aims to hire at least 30% of women for these roles. See section 2.3.14 Worker Training (G3.9) for more details.
2.2 Landholders engagement	Project extensionists will reach stakeholders through landholder's associations and direct visits into the landholdings. The project will be presented to the landholders through workshops or individual presentations. Interested landholders will receive an additional explanation on the terms of the agreement to participate in the project and are not required to confirm their participation or sign the agreement under any form of time pressure. All contacted landholders will have the contact of the project extensionists. Landholders must fill all land eligibility criteria (section 2.1.5.1. Project Location) to be accepted for project reforestation activities.
2.3 Capacitation of small landholders in reforestation activities and maintenance activities	Landholders that receive reforestation activities on their land will be trained on the reforestation methods to plant, maintain and protect the forests throughout the project period. Extensionists will periodically visit landholders, and landholders will have direct communication channels with extensionists for support and guidance for the maintenance of reforestation activities.
2.4 Application of Payment of Environmental Services (PES) fund	The project will devise a PES scheme to compensate landholders for maintaining the forests created by project activities. PES will be proportional to the reforested area in the landholding and conditional to the maintenance and development of the forest, as well as absence of illegal activities in the landholding.

2.1.2 Project Scale

Project Scale	
Project	X
Large project	

2.1.3 Project Proponent (G1.1)

Organization name	ReforesTerra SPV[14]
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2.1.4 Other Entities Involved in the Project

Organization name	Centro de Estudos da Cultura e do Meio Ambiente da Amazônia Rioterra
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Organization name	Reforest'Action
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[14] See Section 2.4.1 (Project Governance Structure).

2.1.5 Physical Parameters (G1.3)

2.1.5.1 Project location

The grouped project zone corresponds to the Baixo Rio Jamari watershed in the state of Rondônia, Brazil, and to the 5-kilometer-wide stripe surrounding the watershed. This results from the stakeholder consultations where landholders with lands just beyond the border of the watershed expressed their interest in participating to the project. This was made possible by the fact the 5-kilometer-wide stripe surrounding the watershed shows similar physical and socio-economic characteristics as the Baixo Rio Jamari watershed. For more simplicity, the project zone is referred to as 'the Baixo Rio Jamari watershed' or as 'the watershed' in the remainder of this document.

Geodata regarding land use, soils, climate and other aspects presented in this section can be found in Supporting Documentation (2.1.5 Physical Parameters).

2.1.5.2 Climate

The project zone is under tropical, humid and hot climate throughout the year, with precipitation ranging from 2,100 to 2,600 mm annually and an average temperature of 25°C. According to the Köppen-Geiger classification (Figure 3), the climatic type for the region is Am, a tropical monsoon climate characterized by small annual thermal amplitude, with the mean temperature during the coldest month above 18ºC (megathermal), and a short and well-defined dry season during the winter (Alvares et al., 2013). The water deficit occurs between May and September, with July and August being the most critical periods, in which monthly rainfall is below 50 mm.

The annual average relative humidity ranges from 80% to 90% in the summer (September-March), and from 54% to 83% in the winter. In addition, the climate of the region has little influence from the sea and altitude (Fernandes and Guimarães, 2002). Nevertheless, during the winter season, the region is frequently affected by cold fronts due to polar anticyclones that cross the Andes Mountains, south of Chile, and move towards the southern Amazon zone (Nimer, 1989). In some of these events the minimum air temperature can reach values below 6ºC. However, extreme temperature declines are very rare, and the average daily minimum temperatures in these months are not significantly affected thanks to the short duration of the phenomenon (Nimer, 1989).

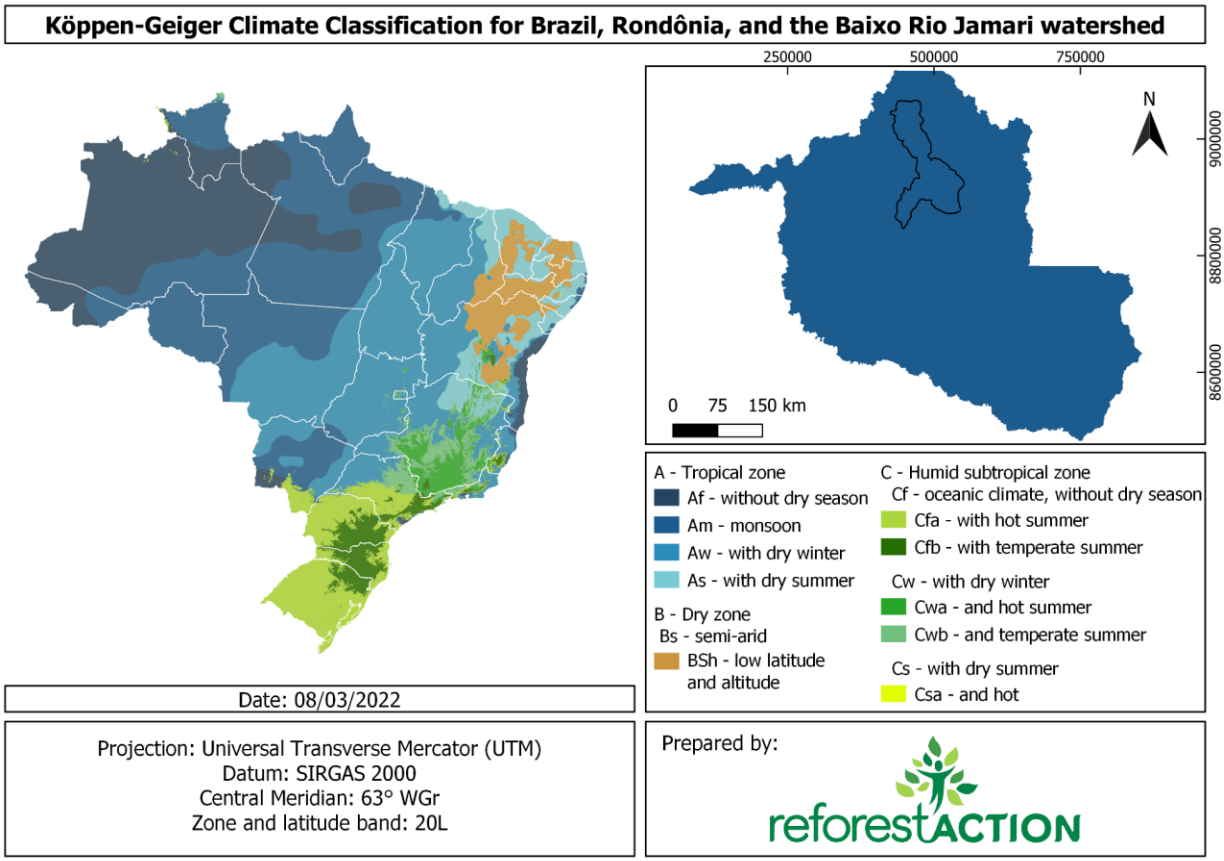


Figure 1: Köppen-Geiger climatic types for Brazil (Alvares et al., 2013), highlighting the Am climate in Rondônia State and the Baixo Rio Jamari watershed.

2.1.5.3 Hydroghraphy

The Baixo Rio Jamari watershed belongs to the Rio Jamari drainage basin, along with three other adjacent watersheds: Alto Rio Candeias, Baixo Rio Candeias, and Alto Rio Jamari (Fernandes and Guimarães, 2002). The Jamari River is 563 km long and drains an area of 29,066.68 km², being one of the main tributaries of the Madeira River, the latter one of the most important watercourses of the Amazon River basin and holder of the largest ichthyofauna diversity in the world (Ohara et al., 2015). The Jamari River course follows from south to north and its headwaters are located in the southwest of Serra dos Pacaás Novos, at an altitude above 700 m near the municipality of Campo Novo de Rondônia. Its main tributaries on the left bank are the Massangana and Candeias rivers, and on the right bank the rivers Canaã, Branco, Preto do Crespo and Quatro Cachoeiras. The Jamari river is of notable economic importance for the State of Rondônia, since it was dammed in 1989 for the construction of the Samuel Hydroelectric Power Plant (HPP). The Samuel HPP is the most important hydroelectric plant in the state, contributing to 34% of the total energy generated (Fernandes and Guimarães, 2002).

2.1.5.4 Topography

The Baixo Rio Jamari watershed is located on two different geomorphological domains, namely: the Flat Surfaces of Southern Amazon and the Tablelands of Central-Western Amazon. The Flat Surfaces of

Southern Amazon occur to a greater extent in the watershed, in the same way that they constitute the most extensive domain in the state of Rondônia. These extensive areas devastated by prolonged events of generalized erosion, along the Neogene, combined with a remarkable tectonic stability on a regional scale, present elevations that vary between 100 and 300 m and are notable for the occurrence of extensive flattened areas, slightly carved by the drainage network (Dantas and Adamy, 2010).

Over large areas, the flattened surfaces are broken into a low-amplitude hilly relief, but also exhibit a significant number of residual features amidst flattened surfaces, such as inselbergs and small ridges or mound alignments. Flattened surfaces and its associated hilly relief often present, on the surface, vast areas of rocky blocks, especially over granitic rocks (Dantas and Adamy, 2010). These surfaces therefore cover lands of the South Amazon Shield and are constituted by an igneous-metamorphic basement of a pre-Brazilian craton of Paleoproterozoic to Neoproterozoic age. The rocky substrate that outcrops in this domain comprises a basement of metamorphic rocks of Paleoproterozoic age, such as orthogneisses, migmatites, paragneisses, schists and calc-silicate rocks of the Jamari and Nova Mamoré complexes and the Quatro Cachoeiras Metamorphic Suite (Dantas and Adamy, 2010).

Less representative in the project zone, the Tablelands of the Central-Western Amazon occurs at the east side of the Samuel HPP and the Midwest of the watershed. This domain is exclusively represented by extensive lateritic plateaus of low relief amplitude ridged by meandering rivers with a predominantly dendritic pattern, comprising the lower courses of the Jamari, Candeias, Preto and Ji-Paraná rivers. These low plateaus are characterized by flat surfaces constituted by sedimentary rocks from the Rio Madeira Formation that are not very lithified, and have elevations that vary between 80 to 120 m (Dantas and Adamy, 2010). These sediments, of Pleistocene age, consist of poorly consolidated to unconsolidated sandstones, of fluvial origin, and the tablelands tend to be poorly dissected over sandy soils. In general, the relief of the project zone is low and the altitude is relatively stable, varying around 80-300 m above the sea level.

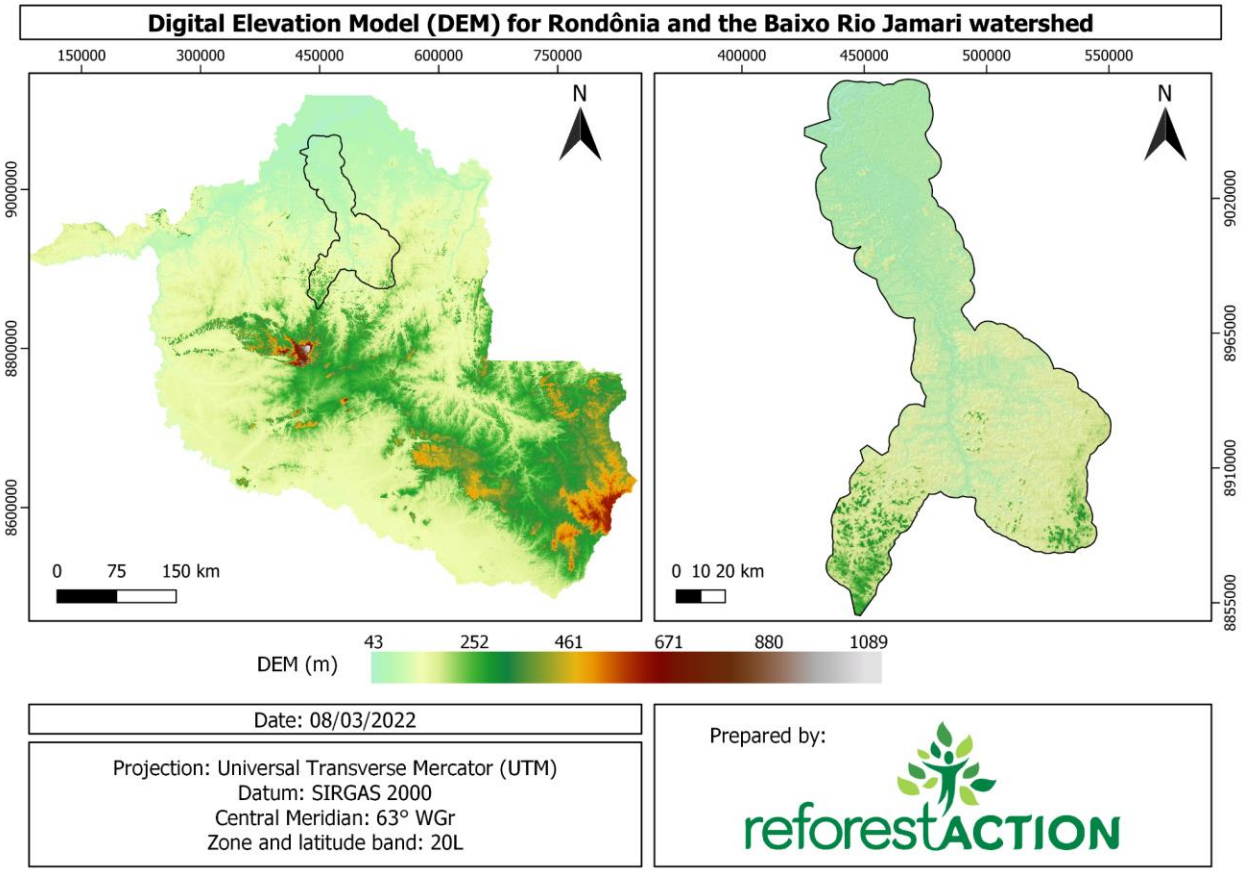


Figure 2: Digital Elevation Model from SRTM (Shuttle Radar Topography Mission) data with a resolution of 90m, for Rondônia and the Baixo Rio Jamari watershed.

2.1.5.5 Soil

Soils developed in both geomorphological domains described in the project zone are, in general, thick, poor and well drained (Shinzado, Teixeira and Mendes, 2010). On the Flat Surfaces of Southern Amazonia, a thick mantle of weathering can be highlighted, reaching tens of meters deep (Marmos et al., 2001), with a predominance of Haplic Ferralsols and Chromic Acrisols (Figure 3). Haplic Ferralsols are the most representative in the watershed. These soils generally occur in flat and smooth wavy relief, have good drainage, aeration and lack of physical impediments to root penetration and mechanization. The low chemical fertility of these soils constitutes their main limitation to agricultural use (Shinzado, Teixeira and Mendes, 2010). The Chromic Acrisols are well drained, with base saturation below 50%, and commonly have thick weathering mantles with a deep C horizon. Their main limitations are low fertility and susceptibility to erosion in more sloping reliefs and with the presence of a strong textural gradient (Shinzado, Teixeira and Mendes, 2010).

Leptosols also occur, associated with residual reliefs in weathering-resistant lithologies, as well as patches of naturally more fertile soils, associated with the chemical decomposition of basic rocks, such as Chromic Lixisols. They are poorly developed, very shallow (less than 50 cm deep) and occur close to the rocky outcrop, being susceptible to erosive processes due to their reduced thickness and the relief where they occur. Its chemical fertility is predominantly medium to high, however, the root development of crops and

vegetation is limited by its low depth (Shinzado, Teixeira and Mendes, 2010). Soils of the order of Chromic Lixisols are considered to be highly erodible due to their physical characteristics, such as the high textural gradient between the surface and subsurface horizons, low hydraulic conductivity, and the strong wavy relief where they occur (Guerra et al., 1999).

In the Tablelands of the Central Western Amazon, Xanthic Ferralsols predominate being the second most expressive soil type in the project zone. These are highly evolved soils in an advanced stage of weathering, presenting high permeability and consequently high resistance to surface erosion under natural conditions and if properly managed (Shinzado, Teixeira and Mendes, 2010). Thanks to its good physical conditions and the fact that it occurs on flatter reliefs, it is favorable for the development of regional crops. However, they present low fertility of both macro and micronutrients (Moreira and Fageria, 2008).

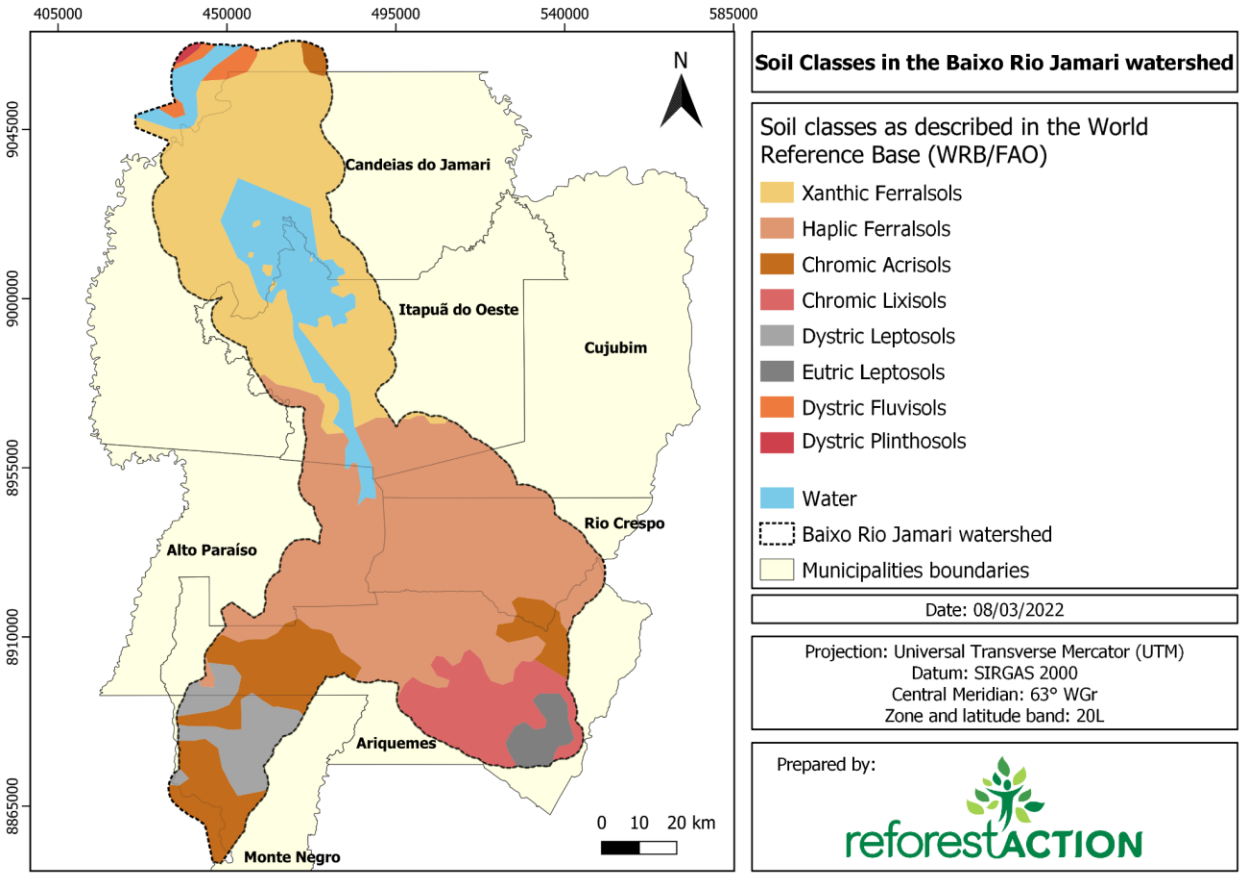


Figure 3: Soil classes in the Project Zone according to the World Reference Base for Soil Resources.

2.1.5.6 Vegetation types

The natural landscape of the project zone is composed of different forest physiognomies, the most representative being the Submontane Open Ombrophilous Forests, Lowland Open Ombrophilous Forests, and Submontane Dense Ombrophilous Forests (Figure 4). Among the non-forest physiognomies, there are small patches of pioneer formations with fluvial and/or lacustrine influence and ecotones between savannas and ombrophilous forests.

Open Ombrophilous Forests (OOF) are characterized by canopy discontinuity and occur in the transition between the Amazon forest and extra-Amazonian area, where dry periods extend for more than 60 days a year (Veloso et al., 1991). Due to the greater solar incidence in the understory, natural regeneration is very dense, with the presence of lianas, palms and bamboos being common. In these forests, the arboreal stratum is more spaced and can reach 30m in height. In the project zone, the main OOF physiognomy is the Submontane with dense formations of palm trees such as Babaçu (*Orbiginya martiana*), Inajá (*Athalea maripa*) and Tucumã (*Astrocaryum aculeatumm*).

Dense Ombrophilous Forests (DOF) are evergreen forests of tropical climates with high temperatures and well-distributed precipitation throughout the year (from 0 to 60 dry days). The upper arboreal stratum has higher density compared to the OOFs, and the main plant life forms are phanerophytes and mesophanerophytes, with trees that can reach up to 50m in height, in addition to abundant woody lianas and epiphytes (Veloso et al., 1991). The main DOF physiognomy in the project zone is the Submontane, which occupies dissected areas of mountainous relief and plateaus with moderately deep soils at altitudes above 100m.

The project region is characterized by high – albeit steadily decreasing – levels of biodiversity. The native forest flora is characteristic of the Amazon basin, with a very high number of tree species per hectare. The landscape contains over 100 species of mammals, over 500 bird species and over 90 amphibian species (RioTerra, 2019). Endangered fauna includes the black- spider-monkey (*Ateles chamek*) and the giant otter (*Pteronura brasiliensis*). Another iconic species in the project zone is the jaguar (*Panthera onca*). At a continental scale, the state of Rondônia is located between the Amazon basin and the La Plata basin, in a key region for South America's atmospheric waterways ("flying rivers"), where moisture runs through evaporation cycles from the Amazon rainforest to the La Plata basin. Consequently, forest degradation and deforestation in this region may contribute to reducing water supply in the southern half of South America (Zemp et. al, 2015).

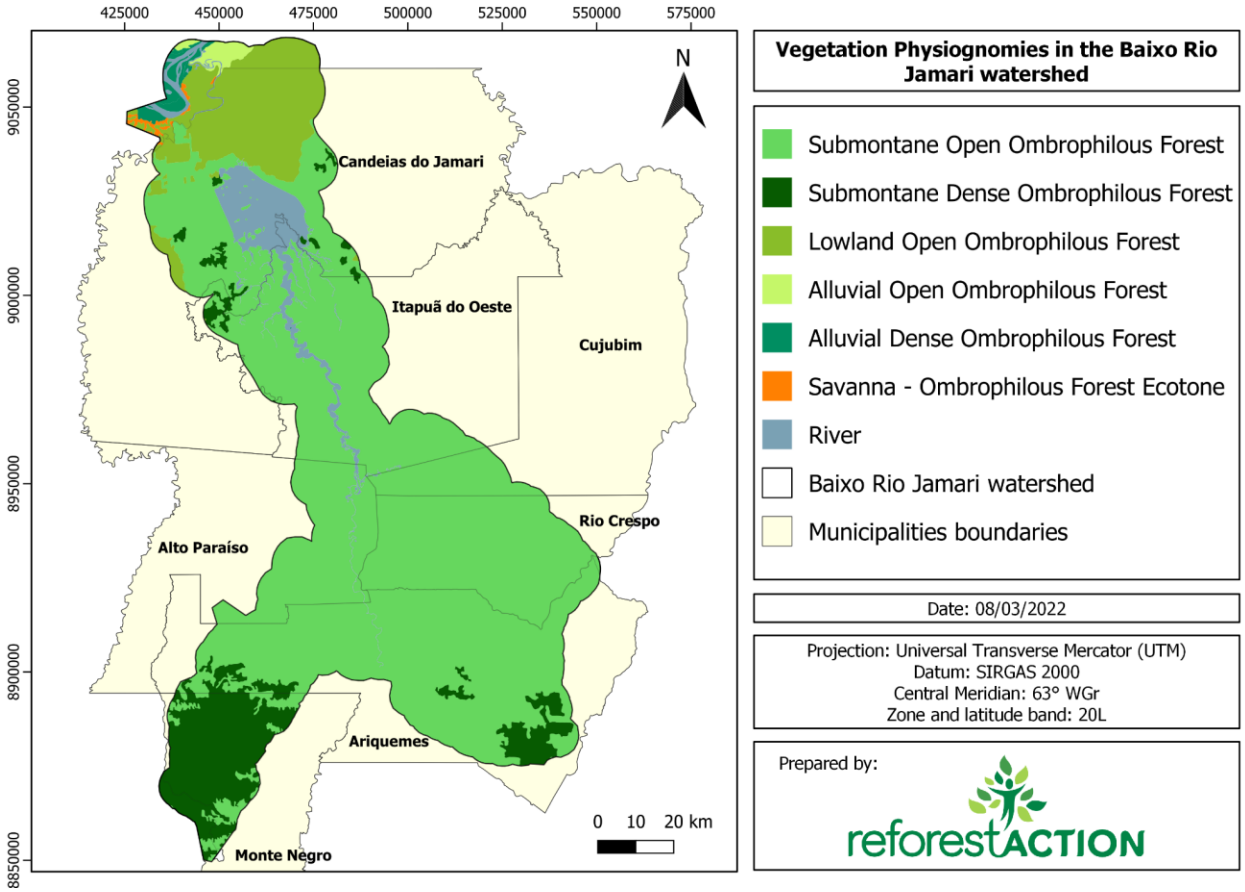


Figure 4: Vegetation physiognomies in the Project Zone.

2.1.6 Social Parameters (G1.3)

2.1.6.1 Historic conditions

The state of Rondônia was almost fully covered with forests about forty years ago. Since the 1980's, the state has lost almost 30% of its forest cover (Souza et al., 2020). Deforestation and degradation rates grew as urbanization and population growth rocketed following the construction of highway BR364, and the implementation of the "Polonoroeste" development program (Fearnside, 1986). Today, the main drivers of deforestation in the region, as in many other parts of the Brazilian Amazon, are cattle-ranching and large-scale farming of agricultural commodities (Souza et al., 2020; FAO and UNEP, 2020). This situation is incentivized by imprecise land tenure laws, poor law enforcement, and land speculation (Silva, 2010). According to MapBiomas land use and cover data, 36.8% (8,744,119.9 ha) of the total area of the state of Rondônia is already covered by pastures, and 1.34% (318,247.3 ha) is covered by soybean and other temporary crops.

The state's deforestation rate is a result of its occupation process and migratory flows, originated by the first rubber cycle in 1879 and composed of conflicts, territorial disputes and spatial inequalities. From this process, described in the timeline below (Table 3), two key moments are important to understand the current situation in the region. The first moment, from 1970 to

1995, consisted of State interventions aimed at expanding the agricultural frontier. Starts with the creation of the Institute of Colonization and Agrarian Reform (INCRA), who instituted Colonization and Settlement Projects, and the Development Program for the Northwest Region of Brazil (POLONOROESTE), which expanded the construction of the highway BR 364.

These settlement projects aimed to reallocate the northeasterners affected by the drought to the region and encourage the suppression of native vegetation to carry out livestock activities. Until the 1990s several settlements were instituted in the state, covering almost entirely the geographic extension of Rondônia (Cunha and Moser, 2010). They did not provide infrastructure for the purchase of machinery, inputs and support for immigrants (schools, hospitals, among others), defining a disorderly dynamics of land use and occupation in the region. This lack of support encouraged abandonment and the improper sale of lots, generating a huge concentration of land in the hands of companies and speculators of the South and Southeast of the country.

The second massive process of land occupation occurred from 1995 to 2010, by the implementation of agribusiness in the area through the installation of large private capital companies and the exploitation of production of commodities (Nascimento, 2010). Gold and cassiterite mining also had an impact in the region, attracting migrants and mining companies. Between 1970 and 1980, the population of the State of Rondônia quadrupled; going from 111,064 inhabitants to 491,025 and, until 1990, this number reached 1,132,629 people[15]. The intense migration and colonization of the period transformed the territory, overcoming the local extractive model to increase agricultural development. The rural landscape has changed, as well as sociocultural patterns and dynamics, exposing the reflexes of intense migration, changing work and the relationship with nature, and giving rise to various territorial conflicts between indigenous, riverside peoples, miners, settlers and land grabbers (Silva, 2010; Costa Silva, 2016).

In order to contain the conflicts and the advance of deforestation in the region, in the early 1990s the federal government instituted the Agricultural and Forestry Plan of Rondônia - PLANAFLORO (Nascimento, 2010). Funded by the federal government and the World Bank, the PLANAFLORO aimed to work with public agencies (such as environmental and agricultural secretariats) of the state of Rondônia to reformulate the local agencies; increasing agricultural productivity, improving infrastructure, conserving the biodiversity of Rondônia, the protection of the boundaries of Indigenous reserve areas and promote the integrated development. It was aligned to the institution of the State Socioeconomic-Ecological Zoning[16], which defined areas for environmental conservation, agricultural use and the amount of Legal Reserve (LR) and Permanent Preservation Areas (PPA) necessary for agricultural landholdings.

Despite these efforts, the State Socioeconomic-Ecological Zoning came into conflict with INCRA's settlement policy, overlapping areas that were already in the process of occupation, causing situations such as interdiction of access to credit, confrontation between settlers and Indigenous peoples and occupation of areas considered ecologically unsuitable for agriculture (Nascimento, 2010). Deforestation and land use patterns in the region have not changed and, currently, cattle ranching is the most concentrated economic activity in the state, sharing space with the growing soybean production and minor production of fish, coffee and cocoa[17].

Table 3: Timeline of land-use history events in the state of Rondônia

[15] https://censo2010.ibge.gov.br/sinopse/index.php?uf=11&dados=0
[16] http://www.amazonia.cnptia.embrapa.br/publicacoes_estados/Rondonia/ZEE_Rondonia.pdf
[17] https://mapasinterativos.ibge.gov.br/agrocompara/

Date	Land-use history event
9,500 before present	Evidence of first human presence across the region, with complex - still to understand - land-use dynamics (fishing, horticulture, hunting). The region is covered by evergreen tropical forests.
XIX century, beginning of the XXth century	First significant migration flow in the region, mostly poor workforce from the northeastern parts of Brazil who migrated in hope of a better income through Rubber production. Establishment of the American company “Percival Farquhar” in the region in 1907, and initiation of the construction of the Madeira-Mamoré Railway.
Beginning - Mid XXth	International demand for Amazonian Rubber plummets, overgrown by British industrial rubber plantations in Malaysia (grown from Amazonian seeds). The newly built railways are abandoned, and with them thousands of Northerners who had immigrated to the region for rubber production. Many died of local diseases. Those who survived learned to hunt, fish and bred with indigenous peoples in the region. A new people were born, today known as “caboclos” or “ribeirinhos”.
From 1940 to 1943	Japan’s domination over South-Pacific islands cut Britain from Malaysian rubber procurement routes; the Brazilian state saw this as an opportunity to recruit more “seringueiros” to restart the Brazilian Rubber industry (supported by a growing American demand for rubber). Between 30 to 50 thousand more people migrated to the region.
1945/ 1956	Creation of the Federal Territory of Guaporé in 1945, being changed to the Federal Territory of Rondônia in 1956, to honor of Marshal Cândido Mariano da Silva Rondon.
1960's	First state-incentivized prospect for mining opportunities, and construction of the road BR-364. Estimated immigration of 30,000 people to work in the mining industry.
1970's	Settlement of the first industrial agricultural and mining companies. Establishment of the first settlement programs in Rondônia.
1980-90's	Government policies incentivize colonization of the region, which is described as an “underdeveloped void.”

1981	Road re-construction to connect Porto Velho to Cuiabá (BR-364, financed through World Bank's Polonoroeste program) triggering fast population growth: deforestation rates skyrocketed.
1990's	Creation of the first conservation areas through the Planafloro program (World Bank program, financed to mitigate the environmental damages caused by the previous Polonoroeste program)
2000's	Agricultural production boomed in the region to meet exportation goals.
Mid 2000's	Beginning of hydroelectric energy production in the region: establishment of two large hydroelectric plants along the Rio Madeira River. Old ribeirinhos remember living in riparian areas where many species, including the Bolivian river dolphins and dourado, now threatened, were once abundant (before the creation of industrial plants). (hearsay).
2012	New version of law 12.651/2012, which defines the requirements for reforestation in private landholdings in Brazil in Permanent Protection Areas (PPAs, environmentally sensitive areas) and Legal Reserves (Minimum amount of forest cover that landholdings must maintain). Establishes the Environmental Rural Registry that creates a self-declaratory database of landholdings and reforestation requirements in Brazil.
2019	Deforestation rates increase in the Brazilian Amazon after decades of reduction or stabilization, followed by federal-level actions that reduced enforcement of environmental legislation and halted the Amazon Fund, one of the main funds for protection and reforestation of the Brazilian Amazon.

2.1.6.2 Land use in the Baixo Rio Jamari watershed

The project zone includes seven municipalities (Ariquemes, Rio Crespo, Alto Paraíso, Candeias do Jamari, Cujubim, Itapuã do Oeste and Monte Negro). These municipalities have similar socioeconomic profiles with absence of formal jobs, low average salary and high unemployment rate Table 4) Land inequality is evident in the region, with large landholdings (>600 ha) representing 2% of all landholdings but 37% of the landholding area. While small landholdings (91% of all landholdings) occupy 44% of the area (Table 3). The main economic activities in the region are livestock and agriculture, with the main products being milk, beef cattle, soy, coffee and cocoa.

The watershed has been affected by the Samuel HPP (Figure 5), built between 1982 and 1989 in Candeias do Jamari. According to the Movement of People Affected by Dams[18], the families affected by the Samuel HPP had their rights disrespected, were poorly compensated and still face problems with resettlement. These families moved to areas that today form the municipalities of Itapuã do Oeste and Candeias do Jamari.

Three forest reserves makes border with the watershed area: the Jamari Nacional Forest (located at the municipalities of Itapuã do Oeste, Candeias do Jamari e Cujubim), the Jacundá National Forest (that covers parts of the municipalities of Candeias do Jamari and Porto Velho), and the Samuel Ecological Station, preserved area created for compensation for the environmental impact of the Samuel HPP (located in the municipalities of Candeias do Jamari and Itapuã do Oeste).

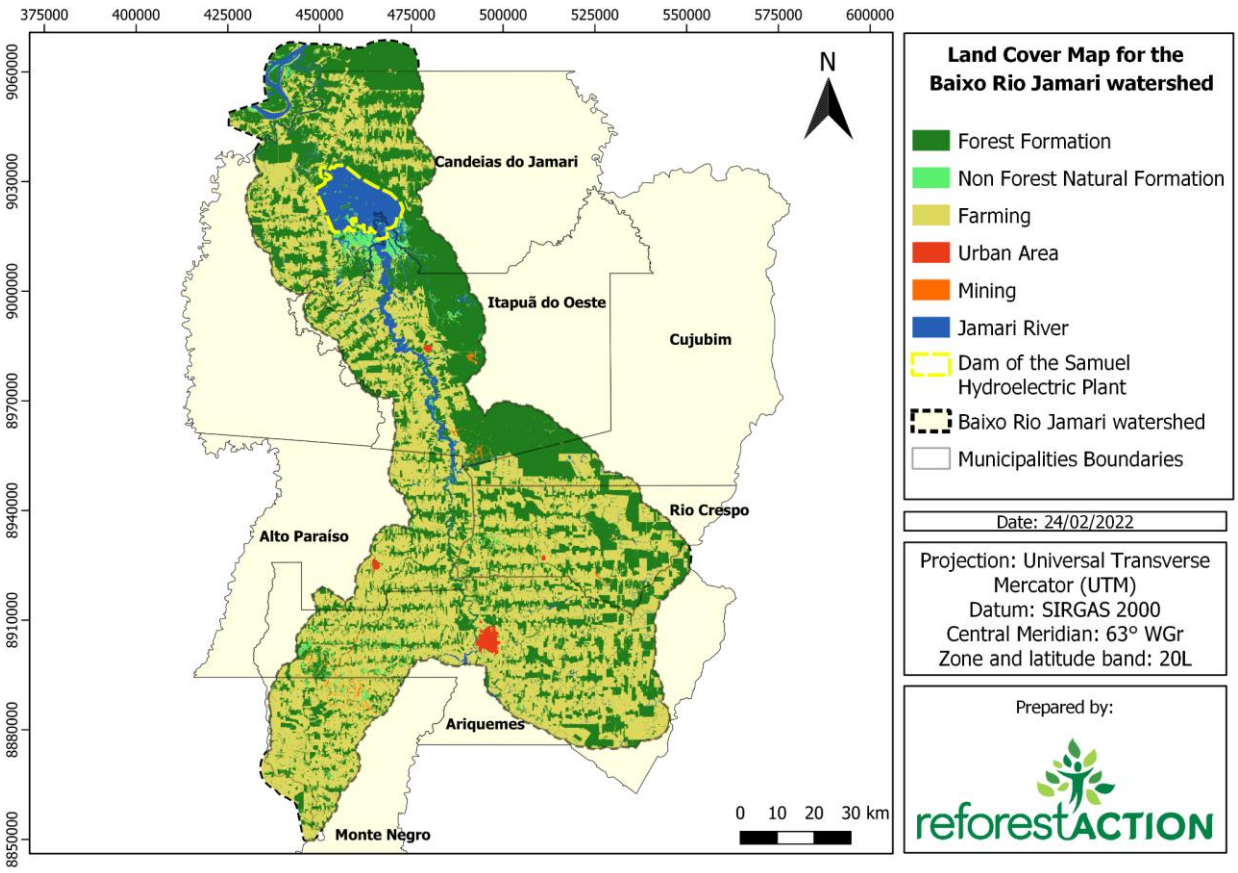


Figure 5 : Land Cover Map of the Baixo Rio Jamari watershed, the project zone.

2.1.6.3 Socio-economic and demographic information

Classification of landholding size follows the National legislation and considers '*Fiscal Modules*' as the unit of area to define landholding size class. The fiscal module is defined for each municipality by INCRA. It is considered as the minimum area to economically maintain a family based on i) the main agricultural activities in the municipality; ii) the income from the main activity; iii) other land uses and agricultural

[18] http://mapadeconflitos.ensp.fiocruz.br/conflito/ro-milhares-de-familias-atingidas-pela-uhe-de-samuel-e-do-baixo-madeira-lutam-para-serem-reassentadas-e-por-seus-direitos/

activities that are not dominant, but represent a significant share of the area or income of the municipality; iv) the concept of 'family farming'. Given the heterogeneous environmental and social contexts, the fiscal module ranges from 5 to 60 hectares in Brazil. In the project zone, the fiscal module is 60 hectares. Similar to other regions in Brazil, in the project zone most of the landholdings are considered small (less than 4 fiscal modules).

Table 4: Landholding size distribution in the project zone. Source: National System of the Environmental Rural Registry (CAR)[19]

Farm classification	Small	Medium	Large	Total
Size range (hectares)	0-240	240-600	>600	-
Number of landholdings	5,094 (91%)	414 (7%)	115 (2%)	5,623
Total area (hectares)	317,698 (44%)	137,350 (19%)	267,218 (37%)	722,266

Ariquemes is the main economic center of the region, with a population density of 20.41 people/km² and a Municipal Human Development Index (IDHM) of 0.702, the highest in the municipalities of the project zone[20]. The municipality has the highest state revenue and industrial production of the interior and the highest rate of resident population in urban areas, reaching 84% in 2010 (

Table 7). Its development began with the extraction of cassiterite at large scale. The other municipalities' main economic activities are livestock and agricultural production. In addition to soy and cattle ranching, Rio Crespo and Monte Negro are coffee productors and Cujubim is the second largest producer of Tambaqui (*Colossoma macropomum*) in the state.

The table below (Table 5) shows demographic data of the municipalities in the watershed. Data evidence the absence of formal jobs, low average salary and high unemployment rate. In all municipalities, less than 20% of the working age population was employed by 2019 and about 40% of the population receives less than one minimum wage (approximately US$240/month).

Table 5: Demographic data of 'Baixo Rio Jamari' watershed. Source: adapted from Brazilian Institute of Geography and Statistics (IBGE) – Cidades (IBGE, 2020; IBGE, 2019; IBGE, 2010)

[19] https://www.car.gov.br/publico/imoveis/index
[20] https://www.ibge.gov.br/cidades-e-estados/ro.html

Municipalities	Area of the territorial unit (km²)	Demographic density (people/km²)	Average salary (number of minimum wages)	Employed population (%)	Population with per capita income of up to 1/2 minimum wage per month (%)	Municipal Human Development Index (IDHM)
Ariquemes	4.426,57	20,41	2,0	18,6%	35%	0,702
Rio Crespo	1.717,64	1,93	2,1	11,1%	42,5%	0,643
Alto Paraíso	2.651,82	6,46	1,9	7,1%	41,6%	0,625
Candeias do Jamari	6.843,87	2,89	1,9	8,1%	38,5%	0,649
Cujubim	3.863,95	4,10	2,1	6,2%	38,7%	0,612
Itapuã do Oeste	4.081,58	2,10	1,9	11,6%	40,2%	0,614
Monte Negro	1.931,38	7,3	1,6	8,9%	40,6%	0,607
Average	-	6,46	1,9	10,2%	39,6%	0,636
Data source	*IBGE, 2020*	*IBGE, 2010*	*IBGE, 2019*	*IBGE, 2019*	*IBGE, 2010*	*IBGE, 2010*

The project zone population grew by 163% in the last three decades (Table 6), according to the IBGE population census collected in 2010. Except for Ariquemes, all municipalities have more than 30% of their population in rural areas, with Alto Paraíso and Rio Crespo having more than 50% of their population in rural areas (

Table 7).

Table 6: Population of Baixo Rio Jamari watershed, during the last three decades. Estimation to year 2021. Source: adapted from IBGE – Estimativa de População (IBGE;2021)

Municipalities	Estimated population -2001	Estimated population - 2010	Estimated population - 2021
Ariquemes	76.371	91.570	111.148
Rio Crespo	3.054	3.346	3.843
Alto Paraíso	13.693	17.444	22.258
Candeias do Jamari	13.816	20.292	28.068
Cujubim	6.976	16.570	27.131
Itapuã do Oeste	7.127	8.700	10.819
Monte Negro	13.217	14.204	16.158
Average	19.179	24.589	31.346
Total	134.254	172.126	219.425

Table 7: Population distribution of Baixo Rio Jamari watershed in 2010. Source: adapted from IBGE - population census[21]

Municipality	Population Distribution (%)	
	Urban	Rural
Ariquemes	84	16
Rio Crespo	32	68
Ato Paraíso	47	53
Candeias do Jamari	65	35
Cujubim	69	31

[21] https://censo2010.ibge.gov.br/sinopse/index.php?uf=11&dados=0

Municipality	Population Distribution (%)	
Itapuã do Oeste	60	40
Monte Negro	52	48
Average	**58**	**42**

Most of the region's agricultural production comes from family farming (Table 8). However, data collected by IBGE shows that less than 20% of this category of landholders in the region have an annual income above US$2,100 (R$10,500) (Table 9).

Table 8: Agricultural establishments and percentage of family farming of the Baixo Rio Jamari watershed in 2017. Source: adapted from IBGE - agricultural census[22].

Municipalities	Agricultural Establishments (N)	Average area (ha)	Family farming (%)
Ariquemes	2928	114,16	79,13
Rio Crespo	492	276,43	66,07
Ato Paraíso	2619	74,70	85,30
Candeias do Jamari	1240	147,53	75,32
Cujubim	1897	102,47	73,96
Itapuã do Oeste	764	110,84	81,41
Monte Negro	1554	92,27	80,89
Average	**1642**	**131,20**	**77,44**

Table 9 : Family farming Income Distribution of the municipalities in Baixo Rio Jamari watershed in 2017. Source: adapted from IBGE - agricultural census.

[22] https://mapasinterativos.ibge.gov.br/agrocompara/

	Family Farming Annual Income Distribution %					
	No income	Less than US$2.100	Between US$ 2,100 - 5,600	Between US$5,600 - 10,500	Between US$ 10,500 - 19,250	More than US$ 19,250
Ariquemes	37,29	43,05	12,37	4,18	1,96	1,15
Rio Crespo	33,23	50,31	10,56	3,11	2,48	0,31
Alto Paraíso	31,77	47,67	14,44	3,72	1,52	0,88
Candeias do Jamari	64,71	25,88	5,88	1,62	1,62	0,29
Cujubim	50,4	40,41	6,99	1,2	0,67	0,33
Itapuã do Oeste	34,24	45,22	14,33	4,78	0,64	0,8
Monte Negro	36,66	43,66	14,99	3,46	0,91	0,33
Average	**41,16**	**42,31**	**11,37**	**3,15**	**1,1**	**0,58**

2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

The grouped project zone corresponds to the Baixo Rio Jamari watershed in the state of Rondônia, Brazil, and to the 5-kilometer-wide stripe surrounding the watershed. It covers 1,164,387.14 ha and encompasses 7 municipalities: Ariquemes, Rio Crespo, Alto Paraíso, Candeias do Jamari, Cujubim, Itapuã do Oeste and Monte Negro.

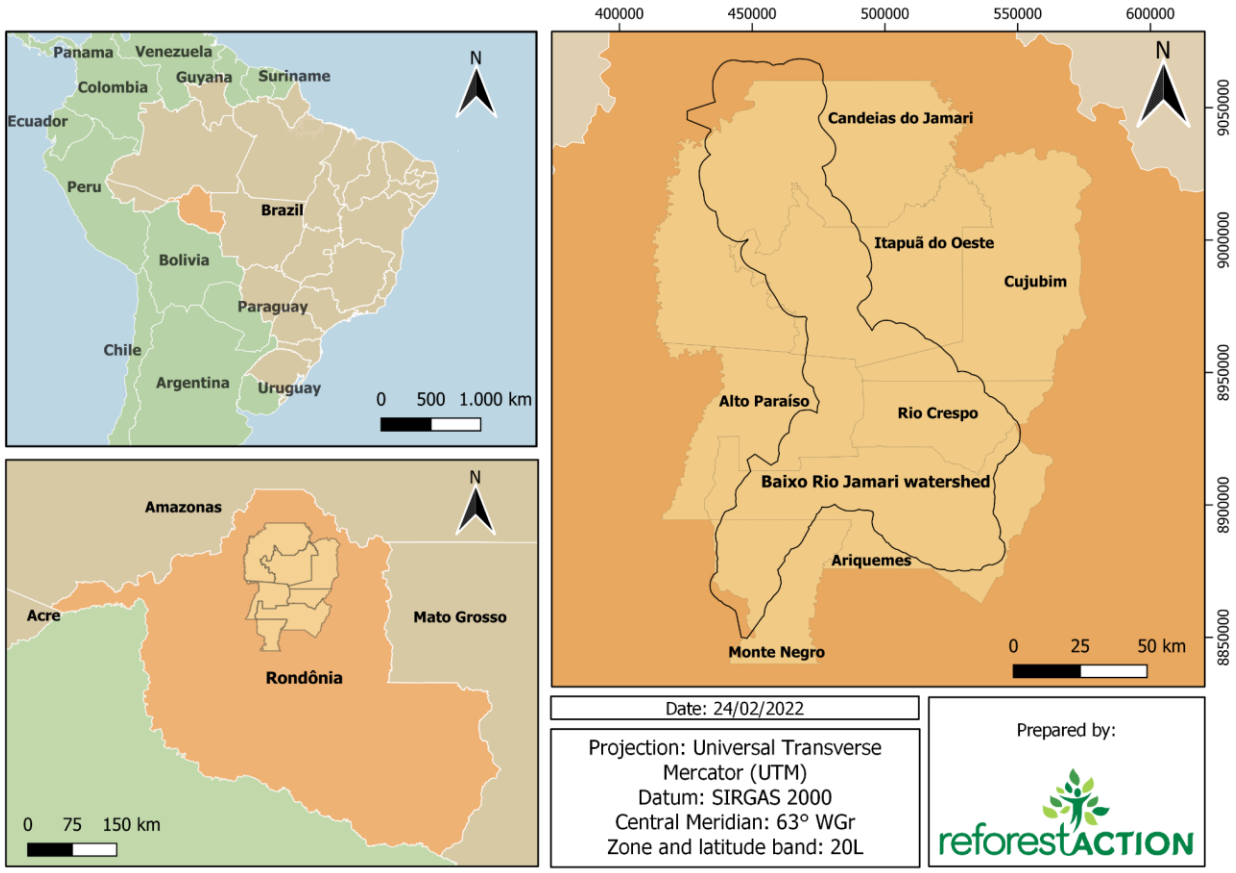


Figure 6 : Project zone. Top left: location of Rondônia State in Brazil. Bottom left: location of the project zone in Rondônia State. Right: Project zone and location of communities (i.e. 7 municipalities)

The grouped project potential area correspond to all land within the project zone meeting all land eligibility criteria detailed below:

a. The land does not fall into the wetland category;

b. The land is degraded pastureland;

c. The land is not a native ecosystem. It is deforested land where deforestation occurred more than 10 years before the start date of the grouped project;

d. Land is not subject to any other carbon project scheme;

e. There shall be no conflict for land ownership or registry;

f. Land is a Permanent Protection Area (PPA) or a Legal Reserve (LR), as defined in national law 12.651/2012;

g. Landholding is <240 ha (i.e., landholders with less than four fiscal modules as defined by Brazil's legislation, each fiscal module is 40 hectares in the project zone). This criteria aims at channeling socioeconomic benefits of the project towards most vulnerable groups.

h. Landholding requires >2 ha reforestation. This criteria is set to keep the logistics of the project feasible.

i. Areas reforested in PPAs must be wider than 20m. This criteria aims at facilitating establishment of permanent plots for the purpose of biomass inventories.

These criteria are based upon the Verified Carbon Standard (VCS) Standard v4.2, requirements of the methodology "AR-ACM0003 Afforestation and reforestation of lands except wetlands. Version 2.0", and include additional criteria relative to specificities of the geographic area, legal framework and project design.

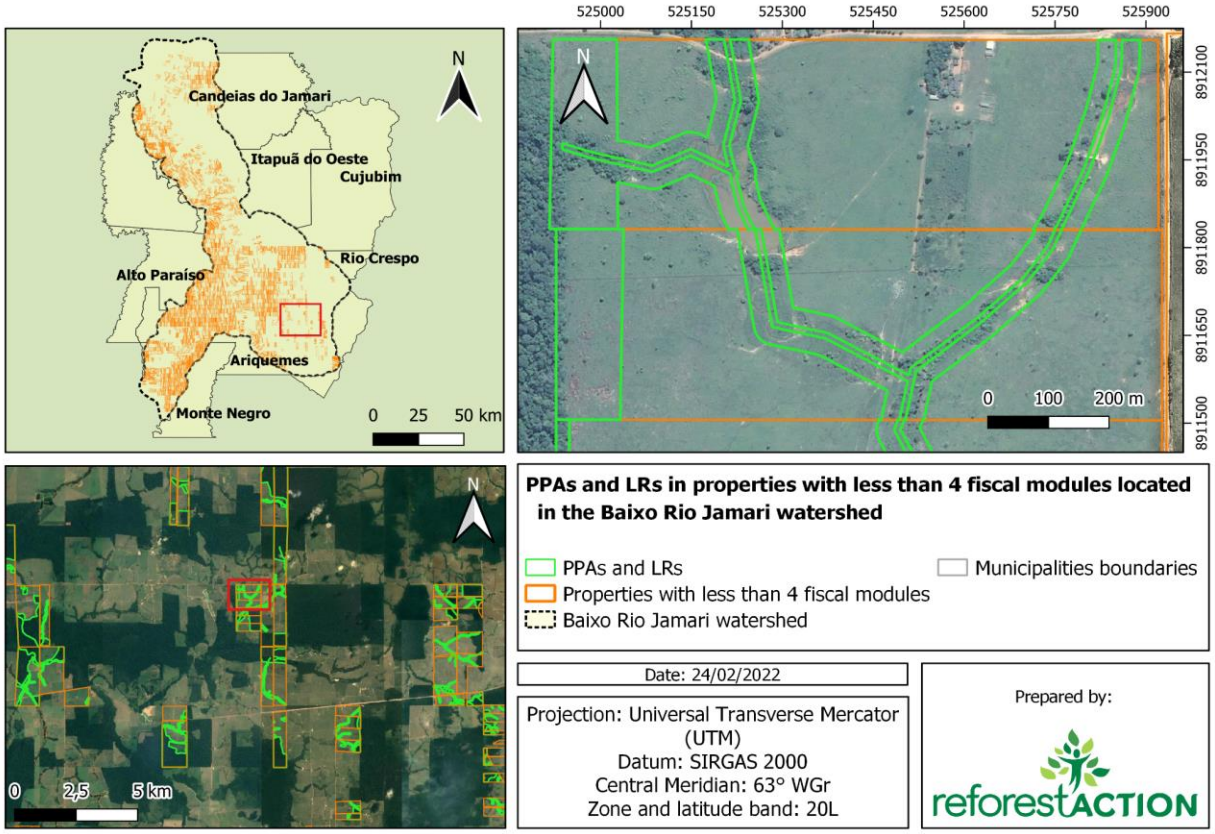


Figure 7 : Potential project area. Top left: Landholdings <240 ha in the project zone. Bottom left: zoom in a region in Ariquemes municipality. Right: PPAs and LRs within landholdings <240 ha.

2.1.8 Stakeholder Identification (G1.5)

Stakeholder identification was conducted at the level of the project's influence area, which was established as the Baixo Rio Jamari watershed (i.e. project zone under direct influence) plus the rest of the seven municipalities covered by the watershed (considered to be under indirect influence). The process of identifying stakeholders was initially carried out in the whole influence area, and included the landholders' associations, landholders, environment and governmental entities that could have a potential interest in being aware or participating in the project. Stakeholders were identified from three methods: 1) *Network*, 2) *Snowball Method*, 3) *Systematic Search*:

1. *Network*: The first step for identifying stakeholders was through the network of the project implementing partner, that has worked with landholders' associations and local public agencies for forest restoration in the region in the past;

2. *Snowball method:* After identifying and classifying stakeholders identified through the network method, contacted stakeholders were asked about other relevant groups that could potentially affect or be affected by the project;

3. *Systematic search:* in order to locate stakeholders who may have been missed, a systematic search of the following terms in Google was carried out: '*restauração florestal*' (forest restoration in Portuguese), '*adequação ambiental*' (environmental adequacy), '*pagamento por serviços ambientais'* (payment for environmental services), '*associação de produtores'* (landholders' association) combined with the term 'Rondônia' (the State where the project will be carried out). Results were filtered to find up to three institutions from each search term in the project zone.

The actors identified in this process were listed in Table 10 and Table 11. The associations of small rural producers in the project's influence area were mapped (Figure 8) to identify those who would be directly impacted. Associations and smallholders located within the limits of the Jamari River watershed were considered to be directly impacted by the project.

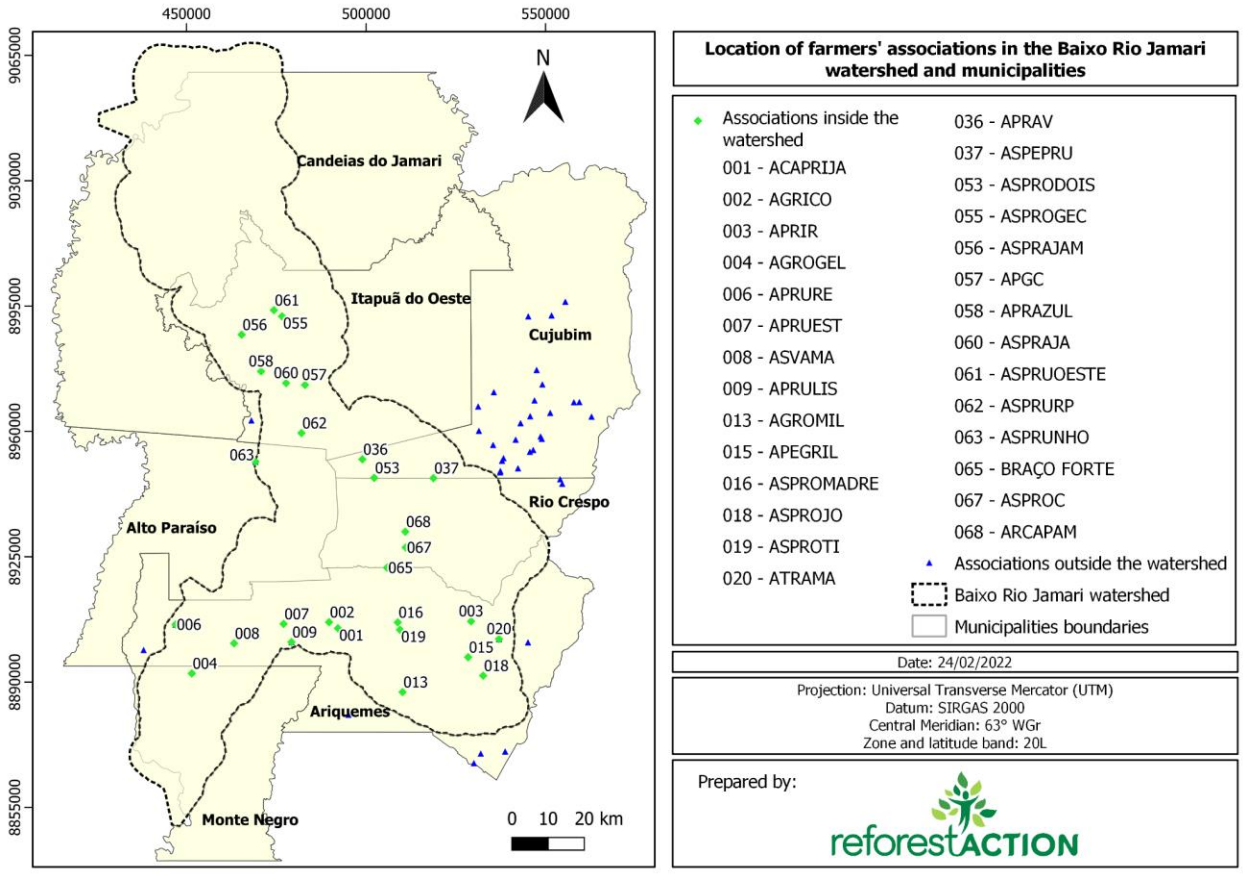


Figure 8 : Associations of smallholders in the Baixo Rio Jamari watershed. In the municipality of Candeias do Jamari, geographic information on the location of the associations was not obtained.

Table 10 : Direct stakeholders identified in the project's influence area

Municipalities	Small landholders' associations	Municipal secretaries
Ariquemes	• ACAPREJA - Small landholders association of Jamari River • AGRICO - *Monte Cristo* landholders association • APRIR – *Igarapé Retiro* landholders association • APRUEST - *Esperança e Trabalho* landholders association· • ASVAMA - *Vale do Maçangana* landholders association • AGROMIL - *Comunidade Sagrada Família* landholders association • APEGRIL - Line C-55 - BR364 small landholders association • ASPROMADRE - P.A. *Madre Cristina* landholders association • ASPROJO - *São João* landholders association • ASPROTI – Horticultural Project landholders association • COOPERAR - Ariquemes and region agroindustry cooperative	• SEMAIC – Municipal Secretary of Agriculture, Industry and Commerce • SEMA - Municipal secretary of the environment
Monte Negro	• AGROGEL – *São Geraldo* community landholders association	• SEPAGRI-Municipal secretary of agriculture • SEMA - Municipal secretary of the environment

Municipalities	Small landholders' associations	Municipal secretaries
Cujubim	• APRAV - *Américo Ventura* Settlement Project small landholders' association • ASPEPRU - *Boa União* landholders association • ASPREDOIS - *Dois de Julho* small landholders association	• SEMAGRI - Municipal secretary of agriculture • SEMA - Municipal secretary of the environment
Itapuã do Oeste	• ASPROGEC – Road *General Carneiro* and region landholders association • ASPRAJAM - *Aliança do Jamari*- Line 619 landholders association • APGC - *Gleba Cajueiro* landholders association • APRAZUL – *Azul* landholders association • ASPRAJA - *Aliança do Jamari* landholders association • ASPRUOESTE - *Itapuã do Oeste* landholders association • ASPRURP - *Rivers Conceição, Alegria e Morador* small landholders association	• SEMAGRI-Municipal secretary of agriculture and environment
Rio Crespo	• BRAÇO FORTE – *Braço forte* landholders association • ASPROC - *Rio Crespo* landholders association • ARCAPAM – *Cafelandense* landholders association	• SEMAIC – Municipal Secretary of Agriculture, Industry and Commerce
Alto Paraíso	• APRUNE - *Nova Era* small landholders association (headquarters outside the watershed boundary, but includes landholders in the project area)	• SEMAGRI/AP – Municipal secretary of the environment • SEMA - Municipal secretary of the environment

Municipalities	Small landholders' associations	Municipal secretaries
Candeias do Jamari	• APRUCAJA- Line 45 landholders association	• SEMAM - Municipal secretary of the environment • ·SEAGRI - Municipal secretary of agriculture

Table 11: Other stakeholders identified

Category	Stakeholders
State organizations	• SEDAM – State secretary of environmental development • SENAR Rondônia – National rural learning services • EMATER Rondônia - Entity responsible for technical assistance and rural extension • EMBRAPA Rondônia - Brazilian agricultural research corporation
Non Governamental Organizations	• Kanindé - ethno environmental defense association • Ecoporé – environmental non governmental organization
Universities	• UNIR – Federal University of Rondônia • FARO – Rondônia University

2.1.9 Stakeholder Descriptions (G1.6, G1.13)

All identified stakeholder groups (Section 2.1.8 Stakeholder Identification) are listed below and a brief description of their rights, interests and relevance to the project is included (Table 12). All these stakeholders were invited to participate in the project's stakeholder's consultation (Section 2.3 Stakeholder Engagement).

Table 12: Stakeholders identification methods, influence, importance, and rights to the project

Main Stakeholder	Rights, interest, and overall relevance to the project
Small Landholders Associations inside the project zone	**Rights** Receive training on issues related to the development of project activities; Receive inputs for application of the project activity, including materials and payment for forest maintenance; Provide feedback on the direct or indirect impact of the project on the interests of the community. **Interest** Environmental adequacy of rural properties in accordance with current legislation; Payment for maintenance of forests under restoration. **Relevance** Direct participation in the project activities; Implementation of some of the project activities such as tree planting and forest maintenance two years after planting; Direct and indirect beneficiaries of the project's impact on climate, biodiversity and communities. Located inside the project zone.
Municipal Secretariats	**Rights** Ensure compliance with environmental standards and projects in the territory; Monitoring and providing recommendations on the environmental management of the project. **Interest** Compliance with municipal standards related to the development of environmental projects; Contribute to environmental adequacy in municipalities.

Main Stakeholder	Rights, interest, and overall relevance to the project
	Relevance Can directly contribute to the project execution; Local policymakers and potential partners for the implementation of project activities; The location of the secretariats varies, but their governance falls within the project zone.
Rioterra's staff	**Rights** **Interest** **Relevance** Direct participation in the project activities; Project proponent and implementer of activities; Located outside the project zone.
State organizations	**Rights** Ensure compliance with environmental standards and projects of the State; Receive project information that will be available to the public; Provide recommendations on the environmental management of the Project. **Interest** Compliance with environmental standards in the territory; Ensuring the environmental adequacy of its jurisdictions. **Relevance**

Main Stakeholder	Rights, interest, and overall relevance to the project
	Do not directly contribute to the execution of the project; Can contribute to the formulation of policies at a broader level that foster restoration activities; Located outside the project zone.
Universities	**Rights** Receive project information that will be available to the public; Provide recommendations on the environmental management of the Project. **Interest** Sharing knowledge for the elaboration of restoration activities. **Relevance** Do not directly contribute to the execution of the project; Can provide technical information for the project implementation; Located outside the project zone.
Other non-governmental organizations	**Rights** Receive project information that will be available to the public; Provide recommendations on the environmental management of the Project **Interest** Generate possible alliances with project implementers for the benefit of both parties. **Relevance** Do not directly contribute to the execution of the project; Do not operate in the area of direct influence of the project;

Main Stakeholder	Rights, interest, and overall relevance to the project
	Located outside the project zone.

2.1.10 Sectoral Scope and Project Type

- Sector Scope: 14 - Agriculture, Forestry and Other Uses of the Land (AFOLU);
- Afforestation, Reforestation and Restoration (ARR).
- The areas are expected to remain degraded or to continue to degrade in the absence of the project.

2.1.11 Project Activities and Theory of Change (G1.8)

Table 13: Theory of Change

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Reforestation of 2,000ha in the riparian areas of the project zone over 3 years with framework tree planting and assisted natural regeneration.	Increase forest cover and repartition of native forest species	Improve the local environment. Generate new habitats for biodiversity Increase of local benefits through development of alternative livelihood with non-timber forest products	Generate GHG emission removals. Increase wildlife population and connectivity through increased forest cover Improved water quality and preservation of water bodies	Climate: Sequestration of carbon in living biomass will contribute to the reduction of GHG emissions Community: Wellbeing for local population Strengthen nature based local economy Biodiversity: Increase forest cover will promote connectivity between ecosystems. Prosperity of highly diverse and closed canopy forest corridors

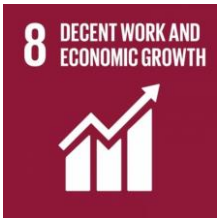
Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
				<u>Environment:</u> Restoring riparian corridors will preserve water bodies from contamination and limit soil erosion
Engagement and capacitation of small landholders in reforestation activities	Improve local knowledge, perceptions, and potential of forest landscapes for local economy, human well-being, and the climate	Enhance capabilities of local communities	Improve long term management of preserved areas	<u>Community:</u> Training small landholders on forest management will enhance the success of restoration activities
Maintenance and monitoring of the restored areas with Payment of Environmental Services	Incentivize landholder engagement in the restoration of the local areas	Maintain the local ecosystem	Improve local native fauna and flora biodiversity	<u>Community:</u> Landholders will have incentive in the maintenance of the restored areas in the long term. Income generation and capacitation through the restoration supply chain <u>Biodiversity:</u> The preservation of native vegetation and ecosystems contribute to the protection of the flora and fauna associated with them.

2.1.12 Sustainable Development

The project activities and objectives aim to achieve compliance with the Sustainable Development Goals (SDGs) of the United Nations (Table 15) as well as Brazil's National Plan for Native Forest Restoration, which aims to restore 12 million hectares in the country by 2030. Currently, the Baixo Rio Jamari watershed presents low native forest cover (40,49%, compared to the 54,86% of the state), high unemployment (only 10,2% of the population has formal jobs, compared to 55,7% of the state[23]) and low average human development index (0,636 compared to the 0,690 of the state and 0,710 of the country[24]). The project will contribute to the following national sustainable development goals.

Table 14: Sustainable Development Goals that the project will directly contribute

[23] https://cidades.ibge.gov.br/brasil/ro/panorama
[24] https://www.br.undp.org/content/brazil/pt/home/idh0.html

Sustainable Development Goals	Application in Project
	Inputs and capacitation provided to landholders to contribute to reforestation. Income generation for landholders to maintain the forest.
	Employment of both women and men without any restrictions ensures gender equality within the project. At least 30% of staff of the project are women.
	Generation of 37 full time jobs for local people and 12 part time jobs.
	Mitigate climate change through permanent establishment of secondary forests in degraded lands, with a targeted carbon sequestration of 402.65tCO_2e/ha over 30 years.
	Through the restoration and protection of tropical forest ecosystems, the project will enhance natural habitats.

2.1.13 Implementation Schedule (G1.9)

Date	Milestone(s) in the project's development and implementation
February - March 2022	Stakeholder consultation
June-July 2022	Baseline Survey
April - October 2022-2025	Seedling production in nursery
Continuous since May 2022	Land identification and land eligibility assessment
Continuous since May 2022	Signature of landholder agreements
Octob. - January 2022-2024	Planting trees (initial activity instances)
2022-2026	Maintenance of reforested parcels by Rioterra
2022-2052	Maintenance of plantation by small landholders
November 2023, 2024 and 2025	Monitoring of plantations
2022-2052	Climate, Community and Biodiversity (CCB) monitoring (at least every 3 years for verification)
2022-2052	GHG accounting period (verification every 3 years)
2022-2052	Biomass inventories for verification (every 3 years)
2026-2052	Annual Payment for Ecosystem Services to smallholders to maintain reforestation sites.

2.1.14 Project Start Date

The Grouped Project Start Date is defined as the date on which land preparation for reforestation began (see VCS standard v4.2, section 3.7). The Grouped Project Start Date will start on November 15th, 2022.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The crediting period of the project is 30 years. The project will start on November 15th, 2022, and will end on November 14th, 2052

2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

There are no differences between the GHG emissions crediting, climate adaptive capacity, and resilience and community and biodiversity assessment periods.

2.1.17 Estimated GHG Emission Reductions or Removals

Year	Estimated GHG emission reductions or removals (tCO2e)
2022	0,00
2023	3.347
2024	10.224
2025	21.500
2026	29.400
2027	39.694
2028	49.873
2029	58.689
2030	64.706
2031	67.673
2032	67.218
2033	65.042
2034	60.577
2035	53.909
2036	45.725
2037	36.695
2038	29.815
2039	23.468
2040	17.779
2041	12.773
2042	9.090
2043	6.548
2044	5.596
2045	4.567
2046	4.550
2047	3.722
2048	2.930
2049	2.690
2050	2.783
2051	2.398
2052	2.325

Total estimated ERs	805.304
Total number of crediting years	30
Average annual ERs	26.843

2.1.18 Risks to the Project (G1.10)

The risk analysis over the crediting period of 100 years was conducted following the guidance of the VCS AFOLU Non-Permanence Risk Tool[25]. The result of the non-permanence risk was 10%, the following specific risks were identified:

Table 15: Risks to the Project

Identify Risk	Potential Impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Financial viability risk: Project cash flow breakeven point is greater than 10 years from the current risk assessment.	The longer time for project breakeven may shun possible funders and require larger investment from implementing institutions.	The project has already secured 100% of the project funding needed to cover the total cash out before the project reaches breakeven and project proponents have vast experience in obtaining funds for reforestation initiatives and are looking for investors to cover the remaining project costs. No further action is considered necessary to secure financial viability of the project. Supporting Documentation TBC.
Opportunity cost risk: NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities.	If landholders prefer the most profitable alternative land use, they may revert reforestation.	Project beneficiaries will be chosen among voluntary landholders willing to commit to maintaining forest cover on their land, both for a compliance purpose and because they understand the value of forest cover in the long term. Legally binding agreements between the Project's Implementing Partner and landholders signed under Free

[25] Supporting Documentation (2.1.18 ReforesTerra Non-Permanence Risk Tool)

Identify Risk	Potential Impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
		Prior Informed Consent will protect reforestation. A PES fund will be implemented to encourage and compensate for proper forest management over 30 years, which will reduce the opportunity costs. Moreover, by signing the agreement, landholders will acknowledge that reverting from reforestation beyond the 30 years period goes against Brazilian law.
Political risk: Brazil's governance score according to the World Bank WGI for the years of 2016-2020 is averaged at -0.20	Governance instability reduces law enforcement and creates expectations among landholders that legal requirements for reforestation will be lifted in the future.	This risk goes beyond the scope of the project activities or the power of the Project Participants. However, legally binding agreements with landholders will ensure that forests are maintained regardless of change in the governance scenario.
Natural risk: Fire	Fire may affect some parcels within the project area, resulting in loss in carbon stock and / or biodiversity loss.	Project activities training of landholders for the construction of firebreaks surrounding areas under restoration and fire prevention.
Natural risk: Drought	Drought in the project zone may affect carbon stocks and result in biodiversity loss.	To reduce the effect of droughts, seedlings will be planted at the beginning of the rainy season and seedlings will be provided to landholders to replant in the case of mortality, up to two years after planting.

2.1.19 Benefit Permanence (G1.11)

The project aims at maintaining the climate, community and biodiversity benefits beyond its lifetime by:

- Building long-term capacity among landholders for forest maintenance and protection;
- Selecting tree species providing non-timber forest products, so that landholders have an additional incentive to maintain/replant them in the long-term.
- Promoting enforcement of existing national legislation with regard to forest cover in PPAs and LR.

2.1.20 Financial Sustainability (G1.12)

The project has secured 100% of the funds required for implementation, monitoring and certification of the initial project activities over the 30 years. The project proponent (ReforesTerra SPV) is a branch of Reforest'Action, an organization with more than 10 years of experience in obtaining funds for reforestation projects and are actively looking for investors for the next instances of the grouped project. Additionally, the income from carbon sequestration will contribute to the funding of the project activities and maintain the social and biodiversity benefits and monitoring. Supporting Documentation to be provided in the validation version.

2.1.21 Grouped Projects

For the grouped project, the following spatial boundaries are defined:

- Project zone: corresponds to the Baixo Rio Jamari watershed plus the 5-kilometers-wide stripe surrounding the watershed. The project zone includes forests and deforested area.
- Potential project area: corresponds to lands within the project zone meeting all land eligibility criteria.
- Project area: area where grouped project activities are implemented. For the first project activity instances, the project area corresponds to 2,000 ha.

1) Eligibility Criteria for Grouped Projects (G1.14)

The following set of eligibility criteria is defined in line with section 3.5.15 of the VCS Standard, v4.2.

1) Meet the applicability conditions set out in the methodology applied to the project.

- New instances meet the conditions defined in section 3.1.2 Applicability of Methodology.

2) Use the technologies or measures specified in the project description.

- The main activity consists of reforestation of degraded pastureland, either through Framework Tree Planting or Assisted Natural Regeneration.

3) Apply the technologies or measures in the same manner as specified in the project description.

- Land is a PPA or a LR, as defined in law 12.651/2012.
- The Project Proponent can demonstrate project ownership over the new instances
- Landholdings where reforestation is carried out are <240 ha.
- Landholdings require more than 2 hectares of reforestation.
- Deforestation on the land occurred more than 10 years before the start date of the grouped project and the area is not a wetland.
- Stakeholder consultation and communication methods, reforestation models, management and monitoring practices are the same as for initial instances and match the project description.
- The area to be reforested must be at least 20m wide, in order to fit the sampling plots at verification.

4) Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area.

- New instances are located in the project zone, i.e., Baixo Rio Jamari, where the first instance is located. This means that the most-likely climate, community and biodiversity without-project scenarios are the same as those determined in the baseline analysis developed for the first instance.

5) Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area. For example, the new project activity instances have financial, technical and/or other parameters (such as the size/scale of the instances) consistent with the initial instances, or face the same investment, technological and/or other barriers as the initial instances.

- New instances are located in the project zone, i.e. Baixo Rio Jamari, where the first instance is located. This means that the project area for new instances will have been covered by the baseline study and data analysis undertaken as part of the additionality demonstration.

2) Scalability Limits for the Grouped Projects (G1.15)

No capacity limits apply to the Grouped Project as the AR-ACM0003 methodology is a large-scale methodology.

The scalability of the project is limited to landholdings <240 hectares located in the Baixo Rio Jamari watershed. It is also limited by the capacity of Rioterra to articulate local landholders, project implementation and maintenance.

The project scalability may be limited by financial resources or logistical challenges to implement and maintain restoration sites. Thus, the addition of new project activity instances is subjected to elaboration of a financial plan and schedule of activities.

3) Risk Mitigation Approach for Grouped Projects (G1.15)

To ensure that the new project instances' areas are in similar baseline and additionality scenarios, the location and land use of potential landholdings will be mapped and land eligibility reviewed before inclusion.

Additionally, new project activity instances will require to have already established financial plans and to be under the same risk score (or better) as the one detailed in section 2.1.18 Risks to the Project.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Land Use Scenarios without the Project (G2.1)

See section 3.1.4 Baseline Scenario, which contains the description of the baseline scenario.

2.2.2 Most-Likely Scenario Justification (G2.1)

The most likely without project land-use scenario in the project zone is the continuation of initial land use activities, i.e., cattle ranching (see section 3.1.5 Additionality). Under the without-project scenario, tree-related CO_2 sequestration increases would not have happened because of the continuation of cattle ranching. In this scenario, pasturelands of invasive grasses such as *Urochola* spp. and soybean would be the dominant ecosystem, storing less CO_2e than the areas under forest restoration implemented by the project (Zanini et al., 2021).

2.2.3 Community and Biodiversity Additionality (G2.2)

Additionality of the project is demonstrated in section 3.1.5 Additionality, the baseline scenario being continuation of initial land use activities. Community and Biodiversity benefits of the project either derive directly from implementation of project activities (i.e. employment, payment for ecosystem services, capacity building) or are a direct consequence of conversion of degraded pastureland to secondary forests at the watershed level (i.e. diversity in tree species, promotion of native species, protected water resources, legal compliance, restored habitat for wildlife). In its first instance, the project activities will generate direct employment of 37 local people as full time staff in the region among rural extensionists, field staff and nursery team, plus 12 part-time jobs (Supporting Documentation 2.2.3 Project Staff).

This would not be possible without the project due to (i) Investment barriers, (ii) Institutional, (iii) local traditions and (iv) ecological barriers (see section 3.1.5 Additionality).

2.2.4 Benefits to be used as Offsets (G2.2)

There are no community or biodiversity benefits to be used as an offset.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

Once the project is listed, the Project Description will be published on Verra's website for a 30-day period for public comment. The Project Description, the supporting documentation and monitoring reports will be

translated to Portuguese, published on Rioterra's website, and sent by email and WhatsApp (a common form of communication in the project zone) to all project stakeholders.

For more accessible communication, summarized versions of project documents, with important information such as dates of meetings and consultations, coverage area, ways to participate and communication channels will be available in hardcopies booklets formats, left in areas of easy access to stakeholders, such as landholders' associations. Those hardcopies will be available for people without access to the internet. This synthetic documentation will also be sent by email and WhatsApp to all stakeholders. In the booklets, a QR code will be available, with direct access to the official documents of the project. All the stakeholders involved will be invited to submit comments during the public comment period.

Periodic meetings will be held with the different stakeholders audiences, in order to inform them about the project planning and implementation. Visits will be conducted every four months from 2022-2024 in the landholdings carrying out reforestation activities under the project (see section 2.3.8 Continued Consultation and Adaptive Management), after this period landholders will have annual visits.

2.3.2 Dissemination of Summary Project Documents (G3.1)

The dissemination of project documents will take into account core groups of stakeholders. There are different communication methods designed for each type of involved stakeholders:

- *State organizations, Universities and non-governmental organizations*: will receive projects design and monitoring documents and summarized booklets by email. They will be invited to public consultations about the project and communication channels will be maintained for suggestions and contributions;

- *Small Landholders Associations inside the project zone and Municipal environmental secretariats:* will have active communication groups via WhatsApp in which they will receive project design and monitoring documents. Summarized hardcopies booklets will be left in areas of easy access to stakeholders.

- *Landholders that directly engage in reforestation activities:* direct beneficiaries of the project will receive project design and monitoring documents via summarized hardcopies booklets and by email and WhatsApp.

In addition to the above, during the stakeholder consultation, communication mechanisms were defined between the parties, as detailed in Section 2.3.8 (Continued Consultation and Adaptive Management). Finally, project design and monitoring documents will be available at all times to the public on RioTerra's website and VERRA's registry.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Informal meetings with stakeholders were not conducted. All the steps for communicating with stakeholders are described in the Stakeholders Communication Plan (see section 2.3.8 Continued Consultation and Adaptive Management).

2.3.4 Community Costs, Risks, and Benefits (G3.2)

During the Stakeholder Consultation, held in February 2022, the preliminary characteristics, objectives, risks, benefits and participation criteria of the project were presented and discussed with communities and local authorities, who provided suggestions and opinions, considered in the adaptive management process (see section 2.3.8 Continued Consultation and Adaptive Management). The meetings were designed according to the profile of each stakeholder and supporting material (as slides, summaries and texts) have been provided to facilitate the understanding of all attendees, facilitate feedback after the meetings through the communication channels, and to guarantee the transparency of information. All the consultation was conducted in Portuguese and the supporting material was all written in Portuguese.

This information was also forwarded along with the invitation letter to all identified stakeholders, in summary and in table format. Communication channels were presented for possible doubts and suggestions (see section 2.3.9 Stakeholder Consultation Channels). Community costs, risks and benefits will be revisited during the continuous consultation process (see section 2.3.8 Continued Consultation and Adaptive Management) and will appear in the hardcopy booklet version of the project. All landholders that will participate in the next stages of the project will have to sign a consent form, stating access to this information.

2.3.5 Information to Stakeholders on Validation and Verification Process P(G3.3)

The Stakeholders were informed about the validation and verification steps and the need for verification and audits during Stakeholder Consultations, described in the section 2.3.8 Continued Consultation and Adaptive Management. The start of the validation audit process and publication of project documents will be informed through email and WhatsApp (see section 2.3.9 Stakeholder Consultation Channels).

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

During the Stakeholder Consultations (see section 2.3.8 Continued Consultation and Adaptive Management), stakeholders were informed about the need of auditor's visits at project validation and verifications, and about the relevance of these visits as part of the project certification process.

During the next stages of continuous consultation, the format and period of the audits will be presented to stakeholders and will be reported that, during the visit, the auditor will interview stakeholders close to the project, even in the absence of the project proponent. With the consent of the stakeholders, and if required by the auditor, some meetings can be held directly with the community and other stakeholders.

2.3.7 Stakeholder Consultations (G3.4)

2.3.7.1 Stakeholder consultation description

Invitations of Stakeholder Consultations

All identified stakeholders (see section 2.1.8 Stakeholder Identification) were invited to participate to local consultations, with the aim of presenting a preliminary version of the project. The meetings were held in person and remotely with 24 institutions: 10 small landholders associations distributed throughout the municipalities, 12 secretariats and 2 members of state agencies. Invitations to associations and municipal secretariats were made through calls, WhatsApp messages and direct contact, while other organizations (Non-Governmental Organizations (NGOs), State agencies and Universities) were invited via email.

Rioterra already has operations and partnerships with family landholders in the municipalities of Itapuã do Oeste, Cujubim, Rio Crespo and Ariquemes. In these places, the invitation was made personally with leaders, associations and landholders involved, through telephone contact and via WhatsApp. Leaders were asked to support the mobilization of landholders and provided an easily accessible and centralized location for the meeting. As a support tool, informative materials were produced to be sent via WhatsApp with date, place and time of meetings (Figure *9*) as well as project summary in Portuguese (Supporting Documentation 2.3.3. Project Summary - Portuguese).

The figure below (Figure 9) is an example of an invitation sent to WhatsApp groups and delivered printed to the landholders. The project summary sent by email is available in the Supporting Documentation (2.3.3 Informal Meeting with Stakeholder).

Figure 9: Template of invitation sent by WhatsApp and printed and delivered to the landholders

In the municipalities of Alto Paraíso, Monte Negro and Candeias do Jamari, where Rioterra has just initiated developing a network and where there is no easy access to contact the associations, a visit was scheduled

to the related secretariats (Agriculture and Environment) to present the project summary and request support in the mobilization process with the indication of organizations and their respective contacts. In these cases, invitations were made door-to-door, through WhatsApp and municipal dissemination channels (newspapers and radio).

Figure 10: In person invitation of landholder in Itapuã do Oeste

Schedule of the Stakeholder Consultation

The stakeholder consultation was carried out in February 2022 (see Table 16 below for dates and detail). The meetings were held in person and remotely with 24 organizations: 10 small landholders associations distributed throughout the municipalities, 12 secretariats and 2 members of state agencies. Attendance lists are included in the Supporting Documentation (2.3.7.1 Stakeholder Consultation Attendance sheets).

Table 16: Stakeholder consultation meetings schedule

Date	Location	Participants
11/02/2022	Online meeting	Representatives of the secretary of environment (SEMA) and agriculture (SEMAIC) of the municipality of Ariquemes
11/02/2022	Maria de Abreu Bianco School auditorium – Monte Negro/RO	Small landholders; AGROGEL community landholders association; Members of EMATER, SEPAGRI, SEMA and city council.

Date	Location	Participants
11/02/2022	CEPLAC (Executive Committee of the Cocoa Crop Plan) – Ariquemes/RO	Representatives of small landholders' associations AGRICÓ, ACAPREJA and COOPERAR; Members of SEMAIC and EMATER.
12/02/2022	APRAV - Americo Ventura Settlement small landholders' association – Cujubim/RO	Representatives and members of APRAV - PA Américo Ventura small landholders' association.
14/02/2022	Online meeting	Representatives of the secretariat of environment (SEMA) and agriculture (SEPAGRI) of the municipality of Monte Negro
14/02/2022	SEMAM - Environment Secretariat - Candeias do Jamari/RO	Representatives of the environmental secretariat (SEMAM) and agriculture secretary (SEAGRI) of Candeias do Jamari
15/02/2022	Alto Paraíso City Hall - RO	Representatives of the environmental secretariat (SEMAM) and agriculture secretary (SEAGRI) of Alto Paraíso
15/02/2022	Alto Paraíso City Hall auditorium - RO	Small or local landholders; Members of SEMA, City council and civil society.
16/02/2022	Line 45 - Candeias do Jamari/RO	Representatives and members of APRUCAJA landholders association; Members of SEMAM.
16/02/2022	Online meeting	Representatives of the environmental secretariat (SEMAM) and agriculture secretary (SEAGRI) of Cujubim
17/02/2022	Nova Era landholders association (APRUNE) – Line C-110 – Alto Paraíso/RO	Representatives and members of APRUNE landholders' association

Date	Location	Participants
17/02/2022	Nursery of CES Rioterra - Itapuã do Oeste/RO	Small landholders of Itauã do Oeste
17/02/2022	Online meeting	Representatives of the environmental secretariat (SEMAM) and agriculture secretary (SEAGRI) of Itapuã do Oeste

In-person meetings were held with representatives and members of the association of small rural producers from all municipalities included in the basin, with the exception of Rio Crespo, where the event was canceled due to the Covid-19 outbreak in the municipality and will be included in the next steps of the consultation. Online and in-person meetings were also held with the Municipal Agriculture and Environment Secretariats of all municipalities.

The consultations were open to the interested public and were publicized through newspapers and municipal media. In some cases, local public representatives, such as councilors, were present at the consultations, adding ideas and feedback to the project. The in-person meetings were scheduled in easily accessible places, such as the headquarters of associations, schools and municipal auditoriums.

Objective of the Stakeholder Consultation

The consultation objectives were to:

1. Provide to stakeholders with complete information about the project scope, design and implementation process, including the VCS+CCB certification process;
2. Discuss projects costs, risks and benefits, including its potential negative impacts;
3. Present the communication channels throughout the project and in particular the feedback and grievance mechanism;
4. Obtain stakeholders feedback about the project and communication methods;
5. Identify other potential project stakeholders.

Program of the Stakeholder Consultation

The complete stakeholder consultation process is detailed in the table below (Table 17):

Table 17: Stakeholder Consultation agenda

Theme	Objective	Description
Introduction	Opening	Greetings and introductions. Preliminary conversation with stakeholders to make them more familiar with the staff and

Theme	Objective	Description
		the consultation process. Present the objectives of the consultation.
	Project information	A short slide presentation of the project that includes: 1. Context and justification (including the context of the Voluntary Carbon Market); 2. Project zone and potential project areas; 3. Restoration methods and supply chain (e.g., seed gathering, seedling production, jobs created); 4. Identified stakeholders; 5. Expected outcomes; 6. Project risks, costs and benefits; 6. Land eligibility criteria; 7. Main partners, 8. VCS+CCB Certification process; 9. Project schedule. (G3.2, G3.3)
	Presentation of the feedback and grievance mechanism (G3.8)	Information on the communication channels for feedback and grievance about the project.
Stakeholder Feedback (G3.4)	SWOT exercise	- Use a SWOT exercise to facilitate obtention of feedback from stakeholders, such as suggestions and possible means of collaboration of stakeholders. - Engaging questions are used to motivate stakeholder interaction: 'What would you make different in this project?', 'What could go wrong in this project?', 'What are the main limitations?', 'What could be done to improve this project?', 'How this project benefits you?', 'Is there any product/trees that you would like to use in the planting area?'. - In particular, the amount proposed for PES is discussed as part of this SWOT exercise. - When there are too many participants, the discussion is moderated in smaller groups. It is made clear that further comments could be sent via the feedback and grievance mechanisms.
	Sustainable Development Goal Exercise	For each of the 17 SDGs: present the SDG and ask participants to identify first the positive impact(s) and then the negative impact(s) that the project could have on SDG.
	Monitoring sustainable project development	Describe what will be important to monitor in the project.

Theme	Objective	Description
	Hidden Stakeholders	Ask stakeholders to identify possible stakeholders not initially listed. If the stakeholders identify new stakeholders, discuss how they may be impacted by the project or what interest in the project they may have, and how to contact them.
Closure	Stakeholders Profile	Ask for stakeholder profile information (age, gender, scholarity) and through a questionnaire.
	Evaluation form	Provide an evaluation form of the consultation process to be filled by stakeholders containing: impression of the meeting, positive and negative aspects of the project.
	Closure	Ask for final considerations. Thank the stakeholders and manage their expectations. Inform the stakeholder that an updated version of the project will be provided for the feedback round.

As support material, a powerpoint presentation was used when possible (Supporting Documentation 2.3.7.1 Powerpoint Presentation). In some cases, the meeting place was outdoors or had no access to electricity, so consultation was carried out using pen and paper. Figures 15, 16 and 17 are photos from the local stakeholder meetings.

Pictures of Stakeholder Consultations

Figure 11: Consultations with landholders and members of EMATER, SEPAGRi and SEMA held in Monte Negro on February 11th

Figure 12: Consultation with landholders of Itapuã do Oeste held on February 17th

Figure 13: Online consultation with Representatives of SEMA and SEPAGRI of the municipality of Monte Negro held on February 14th

2.3.7.2 Stakeholder Consultations results

2.3.7.2.1 SWOT Exercise

The complete table with the SWOT analysis results is available in Supporting Documentation (2.3.7 SWOT Analysis). After the project presentation and based on engaging questions, stakeholders were invited to identify project's strengths, weaknesses, opportunities and threats, according to their reality and perception. The points mentioned were synthetized in Table 18 below:

Table 18: Results of SWOT analysis at local stakeholder consultations

SWOT	Comments
Strengths	• Landholders and Secretariats have interest and area for forest recovery; • Lack of water in the region has brought concern about restoration of riverside areas; • Generation of additional revenues for landholders through Payment for Ecosystem Services; • Some Secretariats are interested in developing a restoration agenda and the project can provide legal compliance; • Landholders already have legal and market demands for restoration, that can create commitment; • The project helps small landholders for whom restoration costs would be too high.
Weaknesses	• Difficulties of some landholders to make the planting, especially in larger areas • Providing only part of the fencing. The value of the fence is very expensive and the landholders may not be able to afford the rest of it; • Not including agroforestry as another planting model; • Planting now and only receiving PES in a few years makes landholders feel insecure; • The minimum initial restoration value of 5 hectares was considered too large. Some producers have small areas and most of them would not have been able to participate; • The PES value should be compatible with other land uses.
Opportunities	• Implement productive cultures with value for extractivism. The inclusion of economic management activities in the areas makes them more attractive to the landholders; • Interest in payment for maintaining existing forest remnants; • Involve local authorities' representatives in training; • Partnership in environmental education activities with the project; • Possibility of developing meliponiculture and Brazil nut extractivism activities in the areas • Potential of the project to inspire public policies • Landholders in the region are being fined and urgently need to reforest; • Use of electric fencing to reduce costs.
Threats	• Rural Environmental Registry (CAR) review by the public agency is very slow and landholders depend on that for start reforestation leading to low landholder engagement. • Landholders can sell the property during the project period so maintenance activities might be operated by individuals that never received a training; • Land use conflicts in some areas in the municipality of Candeias do

SWOT	Comments
	Jamari, due to the proximity to the Samuel HPP; ● Timing of seedling delivery to landholders

The Payment for Ecosystem Services was one of the main strengths, cited in most of the consultations of consultations. Having recognition for forest preservation is of great importance for the landholders and the project is the first to bring this kind of initiative to the region. The presence of legal and market demands for reforestation was also cited in the consultations. Some landholders are already receiving fines and there is an urgent need to adopt environmental adequacy measures.

In five consultations, landholders stated that the planting by the landholder is one of the weaknesses of the project since, in some cases, the landholder will not have the financial resources or time available for the activity. This point may cause landholders to avoid restoring larger areas. It was also widely mentioned that the minimum initial area for participation in the project of 5 hectares would not contemplate the reality of local landholders. With these two points in mind, the minimum area for project adhesion changed from 5 to 2 hectares.

Most producers are interested in receiving payments for forest areas that have not been deforested on the property and that could fit the REDD+ profile. Interest was cited in 86% of meetings with landholders. In these cases, the difference between REDD+ and Afforestation, Reforestation and Revegetation (ARR) projects was explained. The project team also explained that the greatest potential in the region is through ARR due to the small size of existing forest remnants and the large demand for reforestation.

Another opportunity cited was the development of extractive activities or other economic activities (such as meliponiculture) in the areas. For local producers, the economic return has great importance and there is local interest in agroforestry practice. Due to the priority demand of reforestation, the project team is still analyzing the possibility of incorporating other economic activities such as beehive keeping and non-timber products.

In Alto Paraíso both landholders and members of the secretariats stated that the project's coverage area in the municipality is small and, due to the great interest, they would like it to be expanded. In the case of the meeting with Nova Era Association, half of the association's landholders are not within the original project area and may feel wronged. In this sense, the radius of coverage of the project was increased by 5 km, aiming to avoid conflicts between neighbors.

All points raised in the SWOT analysis were recorded and evaluated and relevant suggestions have been integrated to the Project Description. Suggestions which cannot be contemplated will be returned to the stakeholders and justified before project validation.

2.3.7.2.2 Additional comments and suggestions

Consultations were made to local stakeholders about relevant suggestions for the project and which training local landholders are interested in. As described above, these suggestions will be studied and, when possible, incorporated into the project version for validation. The raised points were:

Suggestions:

- Involvement of young people in the project, so that they are inspired and interested in the land;
- Analysis and monitoring of water quality and availability before and after the project start;
  Assistance and advice to landholders in the design and implementation of Project for Recomposition of Degraded and Changed Areas (PRADA), the restoration program, as they do not have the resources or technical support for this;
- Engagement of landholders directly to disseminate the project;
- Development of a cell phone APP for the project, which helps with doubts and leaves the landholders in contact with the rural extensionists;
- Creation of partnerships with public organizations like basin counties to reduce public fees for water use.

Training interest:

- Landholders are interested in training on forestry management, integrated pest management, rural property management and smaller-scale production techniques. Thus, they can optimize the productive areas;
- Alto Paraíso secretariats requested that training activities be open to municipal employees and technicians;
- The landholders are interested in training and materials for the construction of drinking fountains for cattle, which can avoid the need to open the riverside area;
- Smallholders are interested in governance workshops and courses, with the aim of organizing associations.

Payment for Ecosystem Services

Landholders were asked what the value of PES per hectare/year of reforestation would they like to receive. Part of the participants (19.4%) did not know/wanted to state a fair PES value. The most cited value (in 64.5% of the responses) was above R$500, equivalent to approximately 105.00 USD. Of the landholders who answered the questionnaire, 12.9% stated that the amount between R$300 and R$500 (USD 63 to USD 105.00) is also fair for the PES.

In addition to the questionnaire, the value of the PES was discussed with the municipal secretariats and in the dialogue with the associations. In meetings with the secretariats, the values ranged from 22 US$/ha to 300 US$/ha.year. Even though most of the project resources are allocated for reforestation, the project staff managed to raise the annual PES per hectare from R$200 to R$250 (40-50 USD)/hectare.year

Consultation evaluation

In general, the consultation was well evaluated by the participants. Of those who responded to the evaluation form, 25 participants thought the information presented was good, while 6 said it was reasonable. No participant said the information was bad. Only 2 responded that they had remaining doubts. These doubts were recorded and will be answered in the next meetings.

2.3.7.2.3 Sustainable Development Goals Exercise

During consultations with local stakeholders the Sustainable Development Goals (SDGs) were presented and discussed, aiming to know their opinion on which ones relate to the project. Local stakeholders were not familiar with the SDGs and found the presentation interesting. In some cases, they compared the objectives with other projects developed in the region and stated that they wanted to research more about the global agenda.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The Communication Plan (Table 19) was developed and implemented to continuously maintain communication during the project. The communication plan was presented during initial consultation meetings with stakeholders

Through continuous communication, necessary modifications on the project will be analyzed and implemented if necessary to improve climate, community and biodiversity benefits of the project.

Table 19: Stakeholders Communication Plan

What	When	To whom	How	Expected outputs
Stakeholder Consultation	February 2022	All stakeholders	- Physical presentation of the project to landholders association and small landholders; - Virtual presentation of the project to local authorities; - Virtual presentation of the project to research institutions.	- Stakeholders are informed about the project design and implementation process, including the VCS+CCB certification process. - Stakeholders have been given the opportunity to provide feedback on project design and implementation; - They are aware of communication channels throughout the project, including grievance mechanisms; - They understand project costs, risks and benefits and have been able to raise concerns about potential negative impacts.
Public consultation	30-days period starting at	All stakeholders	- Stakeholders are informed of public consultation.	- Draft Project Description is publically available on the Verra registry[26] (English);

[26] https://registry.verra.org/app/search/VCS

What	When	To whom	How	Expected outputs
	project listing		- Prepare a summary project description in Portuguese, to be sent by email and WhatsApp to all stakeholders, and to be made available in booklet format in landholders associations.	- Communities have access to a summary project description in an adequate format and language. - Stakeholders have been given the opportunity to participate in the public consultation.
Project Validation	October 2022	All stakeholders	- Inform all stakeholders of the start of the validation audit by sending a communication through email and Whastapp; - Schedule field visits / interviews with stakeholders selected by the auditor; - Inform all stakeholders when validation is achieved, through email and WhatsApp	- Final version of the Project Description is publicly available on the Verra registry[27] (English and translation in Portuguese) - Stakeholders know when to expect a visit from the auditor, are aware of the stakes of the audit, and are available to provide the requested information; - Stakeholders know when the project has been validated
Monitoring	Every 3 years, before verifications	- Beneficiary landholders - All stakeholders	- Inform all stakeholders of the start of the monitoring/verification campaign by sending a communication through email and Whastapp; - Engagement of landholders through surveys, as detailed in the monitoring plan; - Inform owners of parcels selected for installation/monitoring	- Landholders have been able to participate to answer the survey; - Monitoring of sample plots have been has taken place in the presence of landholders; - Final version of the Monitoring Report is publically available on the Verra registry[28] (English); - Communities have access to a summary of monitoring results in an adequate format and language.

[27] https://registry.verra.org/app/search/VCS
[28] https://registry.verra.org/app/search/VCS

What	When	To whom	How	Expected outputs
			of sample plots ahead of field visits - Prepare a summary monitoring report including monitoring results in Portuguese, to be sent by email and WhatsApp to all stakeholders, and to be made available in booklet format in landholders associations.	
Verification	Every 3 years	- Beneficiary landholders - All stakeholders	- Inform all stakeholders of the start of the monitoring/verification campaign by sending a communication through email and WhatsApp; - Schedule field visits / interviews with stakeholders selected by the auditor	- Stakeholders know when to expect a field visit from the auditor, are aware of the stakes of the audit, and are available to provide the requested information; - Monitoring reports and Verification reports can be consulted by all stakeholders; - Reports will be summarized and translated into Portuguese and made available to stakeholders.
General project information / feedback meetings	Every six months until 2026 and annually after 2026	landholder associations, beneficiary landholders	- General meeting with each landholders association; - Meeting invitations will be shared via email and WhatsApp with stakeholders.	- Participants are aware of the progress of the project, main achievements, and of the next milestones (e.g. monitoring, audits, etc.) - Landholders / landholders are given the opportunity to provide feedback.
Rural extensionists visits	Every four months up to the end of 2024 and	Landholders	- Rural extensionists visit the properties of the landholders who carried out the forest recovery.	- Landholders are invited to share project advancements and potential difficulties faced at the level of their plantation.

What	When	To whom	How	Expected outputs
	annually from 2025 onwards.			
Feedback / Grievances	Continuous over the project	All stakeholders	See Grievance redress procedure for details (see section 2.3.12 Feedback and Grievance Redress Procedure).	- Stakeholders are given the opportunity to provide feedback and express grievances.

The extensionists in Rioterra staff will maintain communication with engaged landholders through site visits, emails, WhatsApp groups and dissemination of information on the project on hardcopies documents deposited in landholder's associations, as well as in Rioterra's office. Through continuous communication, necessary modifications on the project will be analyzed and implemented if necessary to improve climate, community and biodiversity benefits of the project.

2.3.9 Stakeholder Consultation Channels (G3.5)

In person meetings are held in places easily accessible to local family landholders, such as municipal schools, association headquarters and municipal auditoriums, described in section 2.3.7 (Stakeholder Consultations).

Communication channels with stakeholders vary according to their access to communication tools and access to the internet. For the invitation to stakeholder consultations and initial contact, email, telephone calls and WhatsApp were used and, in some cases, the invitation was made in person, through door-to-door carried out by the project rural extensionists.

Communication channels detailed in Table 20 below were validated with the stakeholders during initial stakeholder consultations. They will be maintained in the next stages of the project.

Table 20: Consultation channels with stakeholders

Stakeholders	Communication channels
Small landholders and associations inside the project zone	Regular meetings in associations' offices and regular visits to landholders; WhatsApp; Phone calls; Door to door.
Landholders who carried out the forest recovery in their properties	Regular meetings in landholdings;

Stakeholders	Communication channels
	Extensionists visits; WhatsApp; Phone calls; Door to door.
Municipal secretariats	Regular meetings; Email; WhatsApp; Phone calls;
State organizations; Non-governmental organizations and Universities	Email; Phone calls; Public consultations.

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

The processes related to decision-making and implementation are open to stakeholders participation through periodic meetings (see section 2.3.8 Continued Consultation and Adaptive Management) and contact via communication channels. Involvement in the design, monitoring and evaluation of the project takes place through the consultations and meetings.

Consultations with the landholders' associations and local agencies provide inputs to identify issues and assist in making any necessary changes to the project. The comments and suggestions made by stakeholders in the Stakeholder Consultation were considered and incorporated into the project. The responses given to these comments are detailed in Table 21

The design of the monitoring system guarantees stakeholders participation and involves stakeholders to measure perceived benefits during the development and implementation of the project. Additionally, the dissemination of information (design documents, monitoring reports, hardcopies booklets, etc.) and the publication of results will allow stakeholders to remain up to date about the project status, which will ensure that their participation is effective.

In order to provide equity in the consultation process, including vulnerable communities, women, youth and ensuring respect for cultural diversity, the consultation as grievance processes will follow the Ethic Code described in section 2.3.11 Anti-Discrimination Assurance.

Table 21: Comments received in the local consultation process

Comments	Proponent responses
Landholders asked if it is possible to reconcile the forest restoration area with economic use	Extractive activities in legal reserve and PPA areas are permitted by national legislation. Issues

Comments	Proponent responses
activities. They suggested the inclusion of courses and materials for the development of meliponiculture and the densification of forest species of economic interest, such as Brazil nut (Bertholletia excelsea).	regarding species density and implementation of economic use activities in the area will be studied and discussed with the community in future meetings. The main challenges are the funding for meliponiculture and the potential changes in GHG removals of the project by including species of economic use in planting models.
Representatives of associations and municipal secretariats requested the expansion of the project area (which originally comprised only the area delimited by the basin), in order to avoid conflicts between neighbors and include a greater number of landholders.	This request was discussed and analyzed by the project's technical team. Based on this proposal, the project zone was expanded to 5 km beyond the Baixo Rio Jamari watershed.
Assistance and advice for the regularization of CAR and PRADA (legal instruments necessary for the environmental regularization of rural properties) was requested.	Rioterra has a partnership with SEMA to carry out the CAR, with a technical team available to analyze and consult the document. This team will work with the project, facilitating environmental regularization.
Landholders and secretariats asked if the minimum area for joining the project (originally 5 hectares) can be reduced.	Originally the area proposed by the project aims to facilitate logistics and reduce costs. At the request of the stakeholders, the minimum area for reforestation in each landholding was changed from 5 to 2 hectares
Landholders asked if in areas of other projects were reforestation was attempted, but still contains several gaps, could be eligible for the ReforesTerra project activities.	Such areas will have to be assessed in a case-to-case basis for legibility (section 2.1.5.1 Project location) and additionality (section 3.1.5 Additionality) to the project
Landholders asked how the maintenance process will be done (which inputs will be used, frequency, how the material will be delivered, etc).	Logistic details will be provided during stakeholder engagement.
Landholders requested that, at the next meeting, information on PES values be brought.	Values on PES are still being defined based on the project budget and will be included in landholder agreements.
Many landholders are interested in PES for forest areas with avoided deforestation, maintained on	The difference between AR and REDD+ Projects was explained to all stakeholders. From this explanation, the choice to start an AR project was

Comments	Proponent responses
their properties. This was a recurring topic at the meetings.	justified since the small area of forest remnants in their landholdings would not sustain a REDD+ project.

2.3.11 Anti-Discrimination Assurance (G3.7)

The stakeholders involvement in the project has been inclusive, according to individual capabilities and independent of gender, cultural identity and religion.

During the project preparation phase, in 2022, Reforest'Action and RioTerra went through due diligence process by its funders, which included criteria on anti-discrimination and equal opportunity regardless of social background, race, ethnicity and gender.

Rioterra has a solid culture about policy of human rights and social responsibility. This translates into processes formalized in the Rioterra's Ethic Code, available to the public in Rioterra's website[29]. The Ethic Code is intended to guide the values and attitudes of the project staff by principles protected by transparency and ethics, local, state and federal laws and international treaties and conventions, such as the Universal Declaration of Human Rights.

No type of discrimination based on color, sex, religion, origin, social class, political nature, age or physical capacity is tolerated by employees, board members or partners and this type of behavior is subject to evaluation by the Ethics Committee. The processes and internal controls of Rioterra are periodically audited by the Fiscal Council and by an Independent External Audit Company, and all indications of unethical or fraudulent conduct are immediately reported to the Ethics Committee and to all directly related management instances.

Also, Reforest'Action has an external ethic committee with the mission to guide the organization's and employees positions and actions on various topics such as carbon, our collaborations with our partners and contributors or messages that promoted by the institution. More information about the Reforest'Action's governance methods can be found at the company website[30].

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

Main purposes of the grievance mechanisms are:

- Provide accessible, rapid, transparent and effective response to concerned stakeholders;
- Allow stakeholders the opportunity to raise comments/concerns anonymously through different channels;
- To structure and manage the handling of comments, responses and grievances, facilitating the adaptive management process.

The grievance procedure will occur over three stages:

[29] https://rioterra.org.br/pt/wp-content/uploads/2020/05/Co%CC%81digo-de-E%CC%81tica-CES-Rioterra.pdf
[30] https://www.reforestaction.com/sites/default/files/gouvernance_reforestaction.pdf

1. **Evaluation of comments and complaints by Rioterra's human resources department:** suggestions about the project will be evaluated and incorporated by the project's technical team, grievances will be corrected and resolved in a conciliatory manner, when possible;

2. **Evaluation by the Ombudsman Committee:** if the issue cannot be resolved amicably, it will be evaluated by the Ombudsman Committee, to be formed by representatives of the stakeholders and institutions involved in the project, which will mediate conflicts.

3. **Judicial procedure:** The most serious cases not subject to mediation will be forwarded and resolved by the entities involved in court.

For non-judicial cases, the response time will be up to three weeks and all responses and procedures will be answered and recorded in writing. The institutional ombudsman channels available to stakeholders are the Telephone/WhatsApp: (69) 9246-012 and the e-mail ouvidoria@rioterra.org.br.

2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

During initial consultations, stakeholders were informed about the feedback and grievance redress procedure. The procedure was explained, discussed and approved by the stakeholders. Information about this procedure was also made available in the project summary, sent to the mapped stakeholders via email, WhatsApp and hardcopies (when necessary). In all meetings and consultations, grievance mechanisms will be available and the opportunity will be given to clarify any doubt about the procedure.

The description of the procedure will also be available on Rioterra's website and in the hardcopies booklets.

2.3.14 Worker Training (G3.9)

The management, geotechnology, human resources and financial team include personnel with extensive experience in carrying out reforestation activities in the project zone (see section 2.4.3 Management Team Experience). Basic training relating to project activities are carried out periodically every time a person starts to develop a new activity because the person was hired or transferred from a new area. All staff members will have a presentation of the feedback and grievance redress procedure of the project and instructed on how to use the mechanism for grievances (see section 2.3.12 Feedback and Grievance Redress Procedure). The project will provide equal work opportunities for both male and female staff and at least 30% of full-time staff will be female.

Landholder training will be carried out by rural extensionists, with field days and hands-on demonstrations and practice under supervision of the project staff.

Details and time required for the training and capacitation of rural extensionists and nursery staff follow below:

Rural Extensionists

Before hiring rural extensionists, an initial training and candidate evaluation will be carried out to present basic notions of information technology, geoprocessing and public policies related to the project. This selection technique in course format ensures the construction of a candidate recruitment bank.

The training topics addressed at the evaluation before hiring rural extensionists will be:

a. Basic Informatics - 4 hours training

A summary of functions and shortcuts will be presented for Windows operating system and software Word, Excel, PowerPoint of the Office package, as well as basic notions of internet browsing, which ensures that rural extensionists can carry out their activities and keep the project database updated.

b. Basics of Geographic Information Systems and Geoprocessing - 4 hours training

Concepts of cartography, Geographic Information Systems (GIS), map production and the main tools for landscape management will be taught.

c. Basics of Global Positioning System (GPS) usage - 4 hours training

Using and setting GPS equipment; practical activities in the field and how to download and store data.

d. Introduction to environmental regularization policy - Environmental Regularization Program (PRA) - 4 hours

Explanations will be given on what is the PRA, environmental liabilities and recovery proposals, stages of environmental regularization, and monitoring of PRADA actions.

If the extensionist is positively evaluated in the topics above and is hired by the project, the following trainings will be carried out:

a. Ethical and administrative conduct (*compliance*) - 4 hours

Analysts in the administrative and financial sector will present the standards and protocols regarding project actions and administrative demands, as well as rules of conduct and safety standards based on Rioterra code of ethics (see Supporting Documentation 2.4.6. Code of Ethics).

b. Territorial management in the Amazon - 4 hours

Staff will be trained on essential topics on the subjects of climate change; carbon markets; sustainable tropical landscapes in the Amazon; reforestation; watershed management and the use of geotechnology tools for territorial analysis and management.

c. Project communication and stakeholder engagement - 8 hours

Rural extensionists will be presented with techniques to approach and engage landholders. In addition to the use of tools, they will be provided with registrations and communication support materials.

d. Field support for stakeholder engagement - 8 hours

An experienced member of Rioterra's team will accompany the newly trained staff in the initial visits to provide support and feedback for engagement of landholders regarding the approach, application of protocols, evaluation and knowledge on the topics addressed.

***Nursery staff*:**

Candidates for tree seedling nursery will be trained to carry out the nursery activities. Training topics will include: presentation and description of the nursery, nursery tools, equipment and machinery; seed physiology and gathering; vegetative propagation; seedling substrates and containers; plant nutrition; control of diseases and pests; seedling thinning and pruning; seedling logistics in the nursery.

After the training, the candidates will be instructed to perform the activities so that the nursery management team can evaluate them and select the most adequate candidates for hiring. The training activities for the nursery will require 3 days (24 hours) in total.

At any time that a member of the nursery staff is allocated to a different activity in the nursery (e.g., from seeding to seedling pruning), it will be accompanied and instructed by staff more experienced in the new activity.

Training for engaged landholders:

Landholder**s** will be responsible for planting and maintaining the trees after two years, as well as implementing fences. To ensure quality in the planting and maintenance of reforestation activities, landholders and their families will be trained in groups in the field before receiving the seedlings. The topics addressed during the training will be: Introduction to PRA; soil preparation; planting design and techniques; and fertilization techniques. Landholders will be trained to differentiate between trees of the different framework groups. Landholders are familiar with installing fences in their landholdings and no training in this subject is necessary.

After planting, a similar training will approach the practices for maintenance and conduction of reforestation (pest and disease control, mowing, herbicide use, weeding, etc.). These training sessions will take 8 hours in total.

2.3.15 Community Employment Opportunities (G3.10)

The project shall employ 37 people full time and 12 part-time (Supporting Documentation 2.2.3 Project Staff). The jobs generated are expected to employ people from municipalities within or surrounding the project zone, especially rural extensionists. They will be hired from within the project zone and usually are already engaged with landholders' associations and small landholders, as they are usually rural people that participate in association activities, or are familiar to the landholders themselves.

Project positions will be disclosed through public announcements in social media, WhatsApp groups, the network of landholders' associations and amongst the other project stakeholders, where the profile of the candidates are specified. All full-time project staff will go through a selection process and be evaluated in an objective way, identifying the adjustment of their profile to the requirements of the position for the project. Most of the part-time staff are already employed in Rioterra activities.

Overall, the staff skills required to work on the project are as follows:

- Coordinators of technical activities (e.g., head of nursery, extension coordinator): graduated from the relevant field and have previous experience in the same or similar position;
- Technical staff (seed collectors, rural extensionists): previous experience in the field and at least technical degree or capacitation course in the activity.

- Unskilled labor (nursery staff, drivers): prioritize people from the project zone. They will be trained on project activities.

2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

During the initial training process, workers are informed about their labor rights and the benefits acquired by being directly linked to the project as an employee. Additionally, supervisors provide information to their team at any time as required.

Rioterra complies with the national labor laws in Brazil; the contracts signed between Rioterra and the employees are in accordance with Brazilian regulations.

The labor laws in Brazil are based on the legislation established since 1943 as the Consolidation of Labor Laws (CLT in Portuguese, Law-Decree n. 5.452 /1943), after a series of changes, the current version of the CLT was established in 2019. The aim of these laws is to guarantee security and regulations in the relationship between employers and employees and includes guidelines on the monthly working hours, employment of minors and women, worker safety and safe working environments, and establishes judicial procedures for worker-related issues.

The Brazilian Constitution from 1988 defines in its Chapter II - Social Rights, Articles 7-11 key elements of work relations such as minimum wage, normal working hours, vacations, maternity and paternity leaves, recognition of collective bargaining and prohibition of discrimination.

Law 5,889 from 1973 establishes regulations for rural workers. Complementary to the CLT described above, establishing equality between rural and urban workers, which was not contemplated in previous legislation.

Other relevant labor laws in Brazil are (the number after the '/' indicate the year of the law):

- Law 605/1949: Paid weekly rest;
- Law 2,959/1956: Contract by work or service;
- Law 3,030/1956: Discount for food supply;
- Law 4,090/1962: Christmas bonus;
- Law 4,749/1965: 13º monthly wage at the end of each month;
- Law 4,886/1965: Regulations for autonomous business representatives;
- Law 4,950-A/1966: wage of professionals from the engineering, chemistry, agronomy and veterinary sectors;
- Law 6,019/1974: Urban temporary work;
- Law 6,494/1977: Trainees;
- Law 7,418/1985: Transportation vouchers;
- Law 8,036/1990: FGTS law;
- Law 9,601/1998: Bank of hours and contracts with a termination date;
- Law 10,607/2002: Declares national holidays;
- Law 10748/2003: First job program
- Law 10,820/2003: Discount on payroll benefits

2.3.17 Occupational Safety Assessment (G3.12)

As a general rule, all the workers involved in the ReforesTerra project will receive, during the induction process, basic awareness of potential risks and training on how to overcome them. Occupational safety measures are implemented throughout the project, and include:

- Training activities that are carried out regularly to minimize project risks. Every new staff member goes through training.
- Provision of personal protection equipment to mitigate risks when necessary and ensure staff health for all project activities.
- Threats, harassment violence and other grievances in the workplace are addressed by the project grievance mechanism (see section 2.3.12 Feedback and Grievance Redress Procedure).

A detailed assessment of the project occupational health can be found in Supporting Documentation (see section 2.3.17 Program of medical control and occupational health), Table 22 below summarizes the main risks.

Table 22: Risks for staff and preventive measures

Risk	Preventive measures
Transportation of workers	- All transportation is carried out within the vehicle following the speed limits and wearing seatbelts. - Vehicles are periodically revised to maintain good mechanical conditions.
Handling tools	- Tools are kept in good conditions. - Sharp equipment is transported in cases. - Employees are trained in the handling of all tools. - Protection equipment is provided, staff is trained in how to use it and the use is enforced for all activities that require it.
Handling of agrochemicals	- All protection equipment (boots, suit, gloves, mask glasses) are provided for personal protection. - All safety procedures for handling and disposal of agrochemicals are followed. - Staff is trained for the use of agrochemicals. - Vehicles are always available in case of accidents.
Accidents requiring first aid	- Staff members who are on the field (nursery staff, rural extensionists, planting staff) receive first aid training.
Nursery activities	- Nursery staff alternate functions to prevent muscular fatigue and wear protective equipment.
Covid 19	- Employees are trained in Covid prevention. - Masks are provided to all staff members.

Risk	Preventive measures
	- Training is provided regarding physical distance and hand washing.

This assessment of risk for staff and preventive measures will be completed by a complementary Health Safety and Environment (HSE) risk assessment. This assessment will result in a complementary risk register all the activities that carry risk; as well as some job specific HSE guidance that will be documented and communicated to each worker engaged in activities that carry identified risks.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

The project proponent is ReforesTerra SPV, a Brazilian company 100% owned by Reforest'Action, a French B-Corp certified company founded in 2010. The mission of Reforest'Action is to preserve, restore and create forests around the world in order to develop their multiple environmental, social and economic benefits over the long term through funding of reforestation projects.

The project holder responsible for implementation is the Centro de Estudos Rioterra (Rioterra). Rioterra is an OSCIP, created in 1999, with the objective of contributing to the development of a model for the Amazon region that combines conservation and sustainability to improve the quality of life of local populations, respecting their cultural differences, needs and the natural potential of the environments they use.

Reforest'Action and Rioterra are working together in the conduction of the ReforesTerra project. The governance and responsibilities of the project are described in the Figure 14 below. Regarding governance of the project, both Reforest'Action and Rioterra will be part of the board of directors of ReforesTerra SPV.

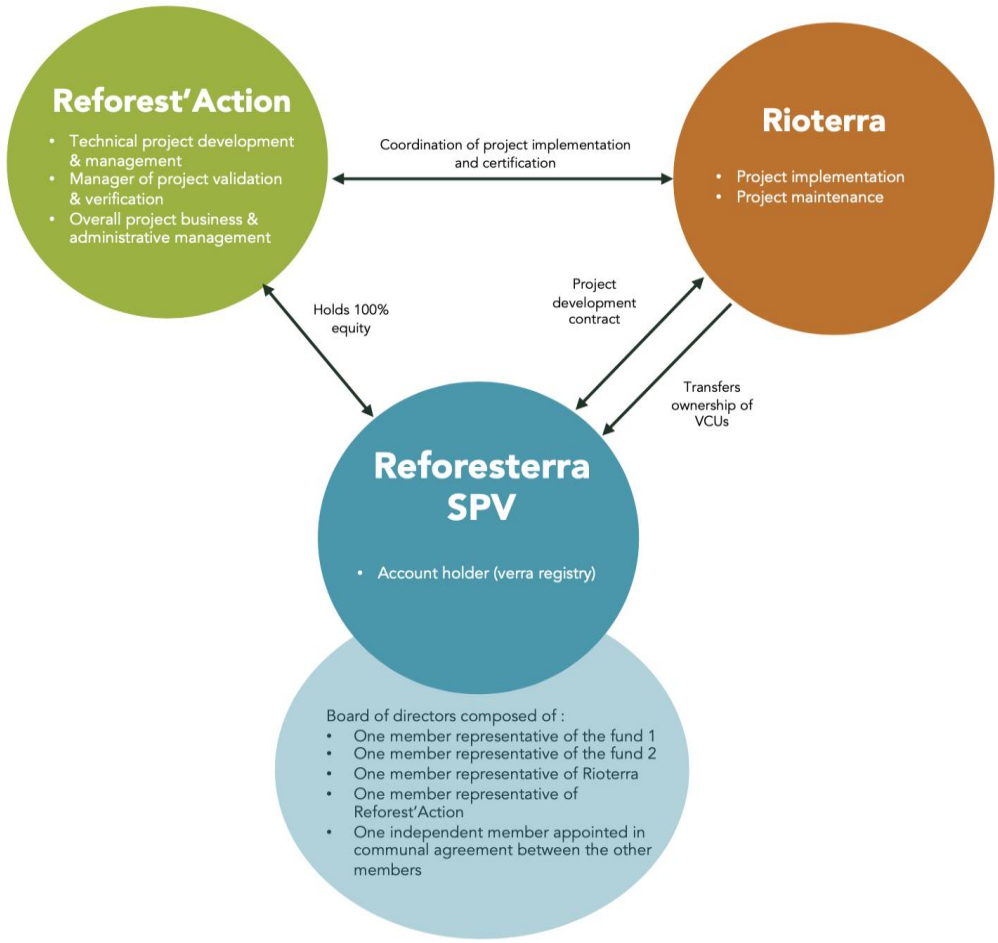


Figure 14: Governance and responsibilities of the project

2.4.2 Required Technical Skills (G4.2)

Document key technical skills required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills

Key skills for project implementation are the followings:

- Abilities in planning, execution and control of administrative and financial resources.
- Abilities in managing resources from funds.
- Knowledge of the area and experience in field implementation of restoration activities.
- Abilities to manage the geographical information system and databases of property owners, as well as to generate all required cartographic analysis.

Key skills for community engagement are the following:

- Knowledge of the region and social science / community related skills.
- Abilities on working with the community and environmental education.
- Abilities on communities' capacity building
- Key skills for biodiversity assessment are the following:

- Experience in sustainable practices for local / rural development, conservation and management of biodiversity and ecosystem services.

Key skills for carbon measurements are the following :

- Knowledge in carbon markets, VCS and CCB standards.
- Abilities in field biomass inventories and carbon measurements.

Key skills for monitoring are the following :

- Abilities in biodiversity monitoring and ecosystem assessment using quality indicators.
- Abilities in sampling methods and bird monitoring.
- Abilities in water quality and quantity monitoring.

2.4.3 Management Team Experience (G4.2)

Reforest'Action's management team has experience in ensuring that the project is implemented as per described in the Project Description Document. Part of the team has experience in developing and implementing projects that achieved carbon certification.

Rioterra's management team is highly experienced in establishing, managing, and implementing restoration projects in Brazil. Rioterra has a 23-year presence in the region. The team is composed of highly qualified members with top-level global experience across several fields, including forestry activities, sustainability, business development, project management, governance, capital raising, stakeholder mapping, and management, among others.

Table 23: Management team experience

Position	Expertise	Experience	Organization
Carbon Manager	Knowledge in carbon markets, carbon offset project development, VCS and CCB standards. Voluntary Carbon Markets, carbon offset project development, VCS+CCB certification	>6 years	Reforest'Action
Carbon Officer	-Abilities in field biomass inventories and carbon measurements. -Abilities in biodiversity monitoring and ecosystem assessment using quality indicators. -Abilities in sampling methods and bird monitoring - Abilities in water quality and quantity monitoring	TBC	Reforest'Action
Latin America Coordinator	-Abilities in planning, execution and control of administrative and financial resources. -Abilities in managing resources from funds. .	>2 years	Reforest'Action

Position	Expertise	Experience	Organization
Local project manager	Knowledge of the area and experience in field implementation of restoration activities.	TBC	Reforest'Action
Project Manager	Abilities in planning, execution and control of administrative and financial resources.	>20 years	Rioterra
	-Abilities in managing resources from funds. -Knowledge of the area and experience in field implementation of restoration activities.		
Reforestation Coordinator	-Knowledge of the area and experience in field implementation of restoration activities. -Knowledge of the region and social science / community related skills. -Abilities on working with the community and environmental education. -Abilities on community capacity building. -Experience in sustainable practices for local / rural development, conservation and management of biodiversity and ecosystem services.	>6 years	Rioterra
Geotechnologist Manager	Abilities to manage the geographical information system and databases of property owners, as well as to generate all required cartographic analysis.	>20 years	Rioterra

Detailed CVs of the team can be found in the Supporting Documentation 2.4.3 (Management Team CVs).

Moreover, the board of directors of ReforesTerra SPV is composed of the following staff:

Table 24: ReforesTerra SPV board of directors.

Member	Organization
Pierre Gaches	Reforest'Action
Alexis Bastos	Rioterra
Rosana Della Mea	ABF
TBC	LFNR

TBC	Independent member

2.4.4 Project Management Partnerships/Team Development (G4.2)

At the time of pipeline listing of the project, the recruitment process is ongoing for the following positions:

- Carbon Officer;
- Local Project Coordinator.

With respect to other capacities needed for project formulation and implementation, no technical or administrative gaps have yet been identified that would need to be filled by an external entity.

2.4.5 Financial Health of Implementing Organization(s) (G4.3)

Rioterra and Reforest'Action are two organizations that are financially healthy, they are audited respectively by DCA Auditores Independentes S/S and FIPAR.

Audited Financial Statements can be found in Supporting Document (2.4.5 Audited Financial Statement Rioterra – 2019) and Supporting Document (2.4.5 Audited Financial Statement Reforest'Action – to be provided in the validation version).

Moreover, the total cash needed is 8,400,000$. Over 80% of the cash needed is secured by the funds and other funders are being sought to comply with the remaining cash needed.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

All forms of corruption (such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion) are prohibited for the project proponent and the other entities involved in the project design and implementation. To prove this assurance:

- Reforest'Action has established an ethics committee that supports the company in the long term to guide the positioning and actions on various subjects related to the projects and the collaborations with technical and financial partners. They intervene within the committee in their own name and not on behalf of the organization in which they work.
- Rioterra has a code of ethics and has undergone independent audits throughout its institutional history. Rioterra code of ethics encompasses the subjects of legal compliance, anti-bribery, conflict of interest, use of information, use of materials, compliance with labor and human rights, transparency, social and environmental responsibility, as well as the establishment of an ethical committee (Supporting Document 2.4.6. Code of Ethics). Moreover, the code of ethics is extended to all suppliers and third parties that may be contracted throughout the project by Rioterra (Supporting Documentation 2.3.5 Compliance).

2.4.7 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

Section to be completed for the final version of the PDD.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

All land within the project area will be private property of landholders engaged through free, prior and informed consent. Autonomy of landholders, rights to land and to natural resources is guaranteed by Article 170 of the Brazilian Federal Constitution[31]. Before signing of landholder agreements, land tenure will systematically be checked in public repositories, such as the Rural Environmental Registry (CAR). The polygons of the landholdings where reforestation will be carried out will be available at the validation version.

2.5.2 Recognition of Property Rights (G5.1)

Project area is on private property (see section 2.5.1 Statutory and Customary Property Rights). No reforestation activities will be implemented with landholders without land property title or in landholdings under dispute or illegally occupied (see section 3.3.3.1 Monitoring the integration of new plots of the Project).

2.5.3 Free, Prior and Informed Consent (G5.2)

The project will not encroach uninvited on private property, community property, or government property.

Project activities are carried out on private land, where landholders have agreed to sign a Landholder Agreement (template to be provided as supporting documentation in the final version of the PDD). By signing this agreement, landholders transfer project ownership to RioTerra, i.e. the legal right to control and operate the project activities. No community or government property are part of the project area.

Process by which free, prior, and informed consent will be or has been obtained of those whose property rights will be or are affected by the project.

Landholders receive information about the project during the Stakeholder Consultation (see section 2.3.3 Informational Meetings with Stakeholders). Moreover, all landholders who decide to engage in the project are once again presented to the objectives, context and activities of the project that will be carried out on their land, at the moment of the first visit of extensionists on their land for pre-registration.

At the time of signature of the agreement signature, project staff explains each section of the agreement to landholders.

After if the agreement is signed, landholders have up to 30 days to pull back from it if desired.

Appropriate restitution or compensation has been allocated to any parties whose lands have been or will be affected by the project.

[31] Government approval is only needed in very specific cases which are not relevant to the project, such as the construction of dams and wells, or removal of timber from native tree species that are not in areas protected by law.

2.5.4 Property Rights Protection (G5.3)

Landholders have all ownership rights over the properties (see section 2.5.2 Recognition of Property Rights). Project activities are carried out in PPAs and LR which usually represent a small share of the landholding area. In case cattle is initially present in the project area, it is relocated to other low intensity grazing land where the total number of animals in the receiving grazing land is still below the carrying capacity of the land.

Hence, relocation of cattle breading activities can be considered negligible.

2.5.5 Illegal Activity Identification (G5.4)

Illegal deforestation might be undertaken by landholders, within the project area or the project zone. The Landholder Agreement addresses both. PES has been designed to incentivize enhancement and conservation of forest cover at the level of the landholding. Landholders commit themselves to “xxx”. Therefore, PES can be suspended in of forest cover loss in the landholding. Forest cover in the landholding is being monitored using remote sensing (see xxx,)

2.5.6 Ongoing Disputes (G5.5)

During the stakeholder consultation, a potential area of land disputes in the project zone was identified, in the region of the municipality of Candeias do Jamari, near the Samuel Hydroelectric Dam (see section 2.3.7 Stakeholder Consultation). Selection of areas for reforestation activities under the project will exclude the zone and only work in landholdings with clear ownership documentation of the land and registered in public repositories information systems, such as CAR.

Thus, no land-use conflicts are expected in the project area. In the event of land disputes rising as the project unfolds, the feedback and grievance redress procedure (see section 2.3.12 Feedback and Grievance Redress Procedure) will be used to receive grievances from land disputes and the necessary steps will be taken to resolve disputes or clarify overlapping claims.

2.5.7 National and Local Laws (G5.6)

Over the last decades, the Brazilian government has enacted several laws, statutes and other significant instances that regulate land ownership and environmental suitability of landholdings. Furthermore, the restoration of ecosystems is considered as a nature-based solution contributing to removal of GHG from the atmosphere and contribute to climate mitigation. Therefore, the project also corroborates with the United Nations Decade on Ecosystem Restoration, 2021-2030, and the Bonn Challenge, a global challenge to restore 350 Mi hectares by 2030, in which Brazil committed to restore 12 million hectares; as well as the National Plan for Large Scale Restoration (PLANAVEG).

Project reforestation activities are carried out in two categories of areas protected by national legislation in Brazil, defined by law 12.651/2012 as:

1. *Permanent Protection Areas (PPAs)*: protected areas with the environmental function of protection of water resources, the landscape, geological and biodiversity stability, facilitating the flow of fauna and flora, the protection of the soil and the wellbeing of human populations. The allocation of these areas is governed by the aforementioned law, protecting water courses and water springs, steep slopes and

other environmentally sensitive situations. Requirements for reforestation varies with the environmentally sensitive situation and the size of the landholding.

2. *Legal Reserve (LRs)*: share of the landholding or rural property that should have forest cover, aiming to assure the sustainable use of natural resources, rehabilitation of ecological processes and conserve biodiversity. It is only allocated if the PPAs areas do not meet the minimum area required in the property according to article 12 of the aforementioned law and varies with landholding size and biome. Its allocation is defined by the landholder.

Table 25: Main National and State laws related to the project

Scope	Law	Description	Project Compliance
National Legislation	Constitution of the Federative Republic of Brazil from 1988	art. 5, item XXIII - the property will serve its social function;	The project will work on private landholdings with the aim of adapting them environmentally, reconciling the economic activity carried out on the property and the preservation of the environment.
		art. 170, item VI - Economic activity must follow the principle of protecting the environment;	
		art. 186, item II - The social function is fulfilled when the rural property meets the adequate use of available natural resources and preservation of the environment and other requirements;	
		art. 225 - Everyone has the right to an ecologically balanced environment, good for common use by the people and essential to a healthy quality of life, imposing on the Public Power and the community the duty to defend and preserve it for present and future generations.	

Scope	Law	Description	Project Compliance
	Law no. 12,651 from 05/25/2012	Provides for the protection of native vegetation by amending previous laws. It establishes that properties located in the Legal Amazon must allocate 80% as LR. If the property does not have this necessary forest cover, recomposition of native habitat is necessary. Allows the inclusion of PPAs in this percentage. The size of the PPA is according to the size of the property and the width of watercourses. PPA occurs in the presence of watercourses, lakes and natural or artificial reservoirs, springs, steep slopes, and hilltops. In addition, this law establishes the Rural Environmental Registry of properties and the creation of state Environmental regularization Programs for properties.	The project aims to restore degraded areas in PPAs and LR of small properties, following the guidelines of this law.
	Law no. 12,187 from 12/29/2009	Establishes the National Policy on Climate Change - PNMC, which aims to establish mechanisms that support the mitigation of climate change, including the restoration of native vegetation.	The project will restore areas that will contribute to the mitigation of Climate Change.
National Legislation	Law no. 10,711 from 08/05/2003	Provides for the National Seeds and Seedlings System. It aims to guarantee the identity and quality of plant multiplication and reproduction material produced, marketed, and used throughout the national territory. Establishes the National Registry of Seeds and Seedlings - Renasem mandatory for activities of production, processing, packaging, storage, analysis, trade, import and export of seeds and seedlings.	The seeds and seedlings used in the project will be registered in Renasem.

Scope	Law	Description	Project Compliance
	Law no. 9,433 from 01/08/1997	Establishes the National Water Resources Policy, creates the National Water Resources Management System. Its objectives are to ensure to current and future generations the availability of water, the rational and integrated use of water resources, prevention and defense against hydrological events and encourage and promote the capture, preservation and use of rainwater.	Forest restoration in PPAs protects water courses and regulates water availability throughout the year, ensuring water availability for the property and surrounding population.
	Decree no. 8,972 from 01/23/2017	Establishes the National Policy for the Recovery of Native Vegetation - PROVEG which includes the creation of PLANAVEG - National Plan for the Recovery of Native Vegetation and CONAVEG - National Commission for the Recovery of Native Vegetation. Its objective is to articulate, integrate and promote policies, programs and actions that induce the recovery of forests and other forms of native vegetation, as well as promote the environmental regularization of Brazilian rural properties, in accordance with Federal Law No. 12,651/2012. PLANAVEG foresees the restoration of 12 million hectares in Brazil by 2030.	The project will contribute to reaching the goal of 12 million hectares by 2030 of PLANAVEG.
National Legislation	Decree no. 7,830 from 10/17/2012	Provides for the Rural Environmental Registry System (SICAR), the Rural Environmental Registry (CAR), establishes general rules for State Environmental Regularization Programs (PRA), encompassed in Law No. 12,651, of 2012, as deadline and obligation for registering the property to CAR and PRA, it points out valid restoration methodologies for regularization.	The project will restore degraded areas determined by law, following methodologies contemplated by the law: planting seedlings and assisting natural regeneration. Using the data provided by CAR and assisting landholders to register in CAR.

Scope	Law	Description	Project Compliance
	Decree no. 2,661 from 07/08/1998	Regulates rules on the use of fire in agropastoral and forestry practices	The project will provide environmental education to landholders on the subject.
	Decree no. 2,959 from 02/10/1999	Provides for measures to be implemented in the Legal Amazon, for monitoring, prevention, environmental education, and forest firefighting.	The project will support forest fire prevention actions, adopting preventive measures such as the implementation of firebreaks. The project will capacitate landholders to prevent fire. In addition, the project will monitor fire hazards in the project areas to ensure its success.
	Decree no. 9,578 from 11/22/2018	Consolidates normative acts issued by the Federal Executive Branch that provide for the National Fund on Climate Change and the National Policy on Climate Change. It points to the planting of forests as an action to meet national goals.	The project plans to restore 2,000 hectares that contributed to climate change mitigation actions.
	Decree no. 10,586 from 12/18/2020	Provides for the National Seeds and Seedlings System. Chapter VI deals with forest species of medicinal or environmental interest in order to guarantee their identity, origin and quality. The decree also establishes that the accreditation is valid for 5 years at RENASEM and the declaration of production is annual.	The Rio Terra nursery is accredited at RENASEM and will renew every 5 years. In addition, annual production reports will be carried out as established by the decree.
National Legislation	MMA Ordinance No. 443 from 12/17/2014	Recognize the list of endangered Brazilian flora species.	The project will plant endangered tree species and provide the habitat necessary for their establishment.

Scope	Law	Description	Project Compliance
	MMA Ordinance no. 561 from 12/15/2021	Establishes the list of native species threatened with extinction, as an incentive to use in methods of recovering native vegetation in degraded or altered areas.	The project will plant endangered tree species and provide the habitat necessary for their establishment.
	MAPA Normative Instruction No. 17 from 04/17/2017	Regulate the Production, Commercialization and Use of Seeds and Seedlings of Forest Species or of Environmental or Medicinal Interest, Native and Exotic, in order to guarantee their origin, identity and quality.	The Rio Terra nursery will remain accredited to MAPA and IDARON, meeting the standards and requirements. There will be a qualified technician responsible for production. Documents related to production will be prepared and reported whenever necessary. Obtaining seeds and producing seedlings will be in accordance with the provisions of this Normative Instruction.
State Legislation	Complementary law no. 233 from 06/05/2000	Provides for the Socioeconomic-Ecological Zoning of the State of Rondônia (ZSEE), dividing the state into three zones with specific use. The ZSEE is the main instrument for planning occupation and controlling the use of the State's natural resources. Zone 1 corresponds to areas with agricultural occupation. Zone 2 are areas of special use, intended for the conservation of natural resources subject to sustainable management. Zone 3 are institutional areas of restricted use.	The project supports the Zone 1 Guideline that indicates the restoration of degraded areas.
State Legislation	Complementary law no. 312 from 06/05/2005	It adds and revokes provisions of Complementary Law No. 233, of June 6, 2000. The LR starts to represent at least 80% of the property. The Legal Reserve must be contiguous.	The project aims to restore the LR provided by law on small properties.

Scope	Law	Description	Project Compliance
	Complementary law no. 784 from 30/06/2014	It adds provisions to article 2 and revokes item VI, § 2, article 7, of Complementary Law No. 233, of June 6, 2000. Establishes the minimum percentage to be restored according to the size of the property. Defines consolidated areas as areas of rural properties with preexisting human occupation since July 22, 2008.	The project aims to restore the LR provided for by law on small properties.
	Complementary law no. 892 from 07/04/2016	Provides for the inclusion of PPA in the percentage of LR.	The project aims to restore the LR provided for by law on small properties.
	Decree no. 20.627 from 03/08/2016	Provides for the Environmental regularization Program for Rural Properties in the State of Rondônia, provided by Law no. 12.651, from 05/25/2012, regulates the reforestation of the state, establishing adherence criteria, deadlines, and guidelines for the activity.	The Project will work with landholdings that use statutory reforestation methodologies, encourage landholders to register with CAR, and respect deadlines to restore properties.
	SEDAM-ASGAB Ordinance No. 205 from 08/28/2018	This Ordinance provides for the administrative process of regularization of PPA, LR and Restricted Use areas, within the scope of the Environmental regularization Program of the State of Rondônia	The Project will guide the owners to follow the guidelines of this ordinance for the environmental regularization of the properties

2.5.8 Approvals (G5.7)

Reforestation activities on private land do not require approvals in Brazil. Landholders who wish to engage in the project will sign agreements to participate in the project. There are no collective territories nor land under traditional authority in the project area.

2.5.9 Project Ownership (G5.8)

Landholder agreements signed with owners of lands where GHG emission reductions are generated stipulate project ownership is vested to Rio Terra (see clause xxx of xxx in Supporting Documentation xx). Additionally, the project development agreement signed between Rio Terra and ReforesTerra SPV transfers project ownership from Rio Terra to the Project Proponent, ReforesTerra SPV (see clause xxx)

As per the VCS Standard v4.2 section 3.6.1, this establishes project ownership is accorded to the project proponent.

2.5.10 Management of Double Counting Risk (G5.9)

VCS+CCB credits are the only form of environmental or social credits being generated from this project. No other environmental, climate, community or biodiversity credits will be generated or sold.

Also, the project area excludes any potential project generating any form of environmental or social credit.

2.5.11 Emissions Trading Programs and Other Binding Limits

Emissions reductions or removals as a result of this project will not be used for compliance under any other trading program or mechanism. The current project is entirely independent of any other carbon project scheme being developed in Brazil such as REDD programs existing in other states[32]; therefore, no double counting will occur.

Additionally, law 12,651/2012 that refers to reforestation in PPAs and LR states clearly in Article 41 § 4º that these areas are eligible to any form of payment or incentive of PES and are considered additional for national and international markets for GHG emission removals and reductions.

2.5.12 Other Forms of Environmental Credit

The project has not sought or received any other GHG environmental credit.

2.5.13 Participation under Other GHG Programs

The project has not been registered, nor is it seeking to be registered under any other GHG program.

2.5.14 Projects Rejected by Other GHG Programs

The ReforesTerra grouped project was not submitted to Validation/Verification to any other GHG program and therefore has not been rejected by any other GHG program.

2.5.15 Double Counting (G5.9)

Aside from VCS+CCB credits, the project does not seek to generate or receive any other form of environmental or social credit, including any tradable climate, community, or biodiversity unit. Use of the Verra Registry will ensure generation, transfer, retirement and cancellation of VCUs is tracked so that unicity of credits is ensured.

[32] Rondônia is the only Amazonian state that has not presented a proposal to the LEAF coalition. Even if a LEAF-funded jurisdictional REDD+ program started in Rondônia in the future, Afforestation, Reforestation and Revegetation projects would fall outside of the scope of REDD+ activities covered by the TREES standard and funded by the LEAF Coalition. Therefore, there would be no risk of double counting of credits from the ReforesTerra grouped project.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

This proposal is an AFOLU Afforestation and Reforestation Project Activities (A/R) project that aims to remove GHG by incrementing carbon sinks from tree growth through framework tree planting and assisted natural regeneration.

Methodologies applied:

1) AR-ACM0003 A/R Large-scale Consolidated Methodology - Afforestation and reforestation of lands except wetlands. Version 2.0

Tools applied:

1) AR-AM Tool 02: Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities. Version 1.0.
2) AR-AM Tool 08: Estimation of non-CO_2 GHG emissions resulting from the burning of biomass and attributable to an A/R CDM project activity. Version 4.0.
3) AR-AM Tool 12: Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities. Version 3.1.
4) AR-Tool 14: estimation of carbon stocks and the change in carbon stocks of trees and shrubs in A/R CDM project activities. Version 4.2.
5) AR-AM Tool 15: Estimation of the increase in GHG emissions attributable to the displacement of pre-project agricultural activities in A/R CDM project activities. Version 2.0.
6) AR-AM Tool 19: Demonstration of eligibility of lands for A/R CDM project activities. Version 2.0

3.1.2 Applicability of Methodology

Table 26: Applicability conditions for the AR-ACM0003 methodology.

Applicability Condition	Compliance
a) the land subject to the project activities does not fall into the wetland category.	Wetlands were excluded from the project area (according to the land eligibility criteria, section 2.1.5 Physical Parameters). Only degraded pasturelands are subject to project activities.
b) Soil disturbance attributable to the project activity covers no more than 10% of the area in each of the following types of land: • land containing organic soils; and	Other than wetlands (already excluded from the project area), the project area does not contemplate organic soils (i.e., soils with more than 12% soil organic carbon[33]). See Figure 15

[33] As defined in the Annex A: glossary of the IPCC GPG LULUCF 2003. Available at: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Glossary_Acronyms_BasicInfo/Glossary.pdf

Applicability Condition	Compliance
• land that, in the baseline, is subject to land-use and management practices and receives inputs listed in appendices 1 and 2 of the AR-ACM0003 methodology.	below (Map of soil carbon stocks). Project forest recovery activities will be carried out in degraded pasturelands. In the absence of project activities, the pasturelands are expected to remain unmanaged, degraded and covered by invasive fodder grasses. Therefore, this land use does not fall within the land uses referred in Appendixes 1 or 2 of the aforementioned methodology.

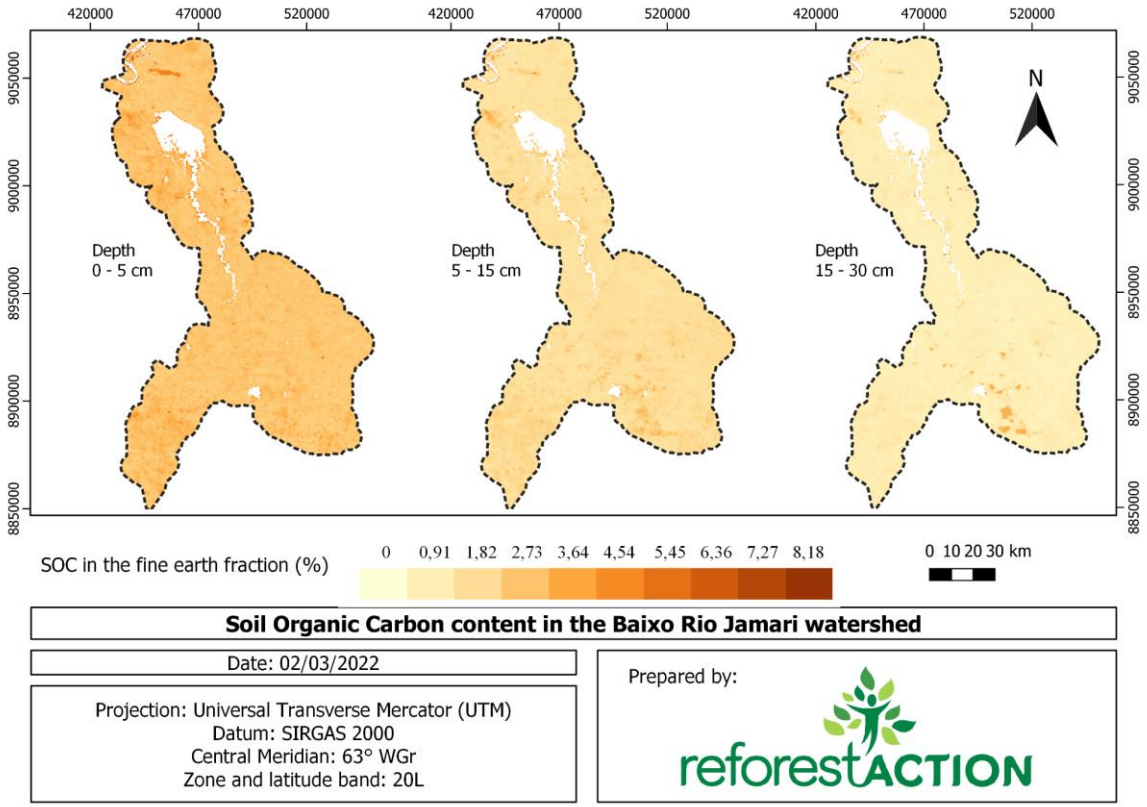


Figure 15: Soil Organic Carbon content in the Baixo Rio Jamari watershed.

Figure 16: Applicability conditions for the tools.

Tool	Applicability Condition	Compliance
AR-AM Tool 02: Combined tool to identify the baseline	a) Forestation of the land within the proposed project boundary	a) Forest recovery will not lead to the violation of

Tool	Applicability Condition	Compliance
scenario and demonstrate additionality in A/R CDM project activities. Version 1.0.	performed with or without being registered as the A/R DCM project activity shall not lead to the violation of any applicable law, even if it is not enforced. b) This tool is not applicable to small-scale A/R project activities.	any applicable law (see sections 2.5 Legal Status and Property Rights, and 3.1.5 Additionality). b) The project activity is not developed by low-income communities; and the average annual GHG removals in the first instance is 26,843 tCO2e.
AR-AM Tool 08: Estimation of non-CO2 GHG emissions resulting from the burning of biomass and attributable to an A/R CDM project activity. Version 4.0	a) The tool is applicable to all fire occurrences within the project boundary. b) Non-CO2 GHG emissions resulting from any fire occurrence within the project boundary shall be accounted for each incidence of fire that affects an area greater than the minimum threshold area reported by the host party for the purpose of defining forest, provided that the accumulated area affected by such fires in a given year is ≥ 5% of the project area.	Non-CO2 GHG emissions resulting from fire occurrences within the project boundary (if they occur) will be accounted for if fire affects an area greater than 1 hectare (i.e. minimum threshold area of forest definition according to Brazil's designated national authorities[34]), provided that the accumulated area affected by such fires in a given year is ≥ 5% of the project area.
AR-AM Tool 12: Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities. Version 3.1.	This tool has no internal applicability conditions.	NA
AR-Tool 14: estimation of carbon stocks and the change in carbon stocks of trees and shrubs in A/R	This tool has no internal applicability conditions	NA

[34] Forests in Brazil must have at least 30% canopy cover of more than 1 hectare and minimum 5 meters canopy cover. https://cdm.unfccc.int/DNA/index.html

Tool	Applicability Condition	Compliance
CDM project activities. Version 4.2.		
AR-AM Tool 15: Estimation of the increase in GHG emissions attributable to the displacement of pre-project agricultural activities in A/R CDM project activities. Version 2.0	This tool is not applicable if the displacement of agricultural activities is expected to cause, directly or indirectly, any drainage of wetlands or peatlands	The displacement of agricultural activities in the project area (cattle grazing) will not directly or indirectly cause any drainage of wetlands or peatlands. Since project activities will not occur in more than 20% of the landholding, grazing animals displaced by project activities in low-intensity pasturelands will be reallocated to other pasturelands and such small displacement will not exceed carrying capacity. Landholders will sign binding agreements to not carry out illegal deforestation in their landholdings. Thus, displacement emissions are considered to be zero.
AR-AM Tool 19: Demonstration of eligibility of lands for A/R CDM project activities. Version 2.0	This tool has no internal applicability conditions	Areas deforested since 2012 (10 years before project start date) in the project zone were obtained from PRODES[35] database, eventual gains in forest cover in deforested areas and existing forest cover was obtained from Mapbiomas[36]. Potential project areas that gained forest cover were excluded.

[35] http://terrabrasilis.dpi.inpe.br/app/map/deforestation?hl=pt-br
[36] https://mapbiomas.org/

3.1.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Aboveground and belowground biomass	CO_2	Yes	Carbon stock in this pool is associated with shrubs and isolated trees existing in the baseline. Shrub cover may be affected by the project and is accounted for in the baseline. Trees existing before the project in framework planting areas are not inventoried along with project trees in monitoring of carbon stocks, therefore, they are not accounted for in the baseline. Trees existing before the project in assisted natural regeneration areas are inventoried along with project trees and are therefore accounted for in the baseline.
		CH_4	No	Not required by the methodology.
		N_2O	No	Not required by the methodology.
		Other	No	Not required by the methodology.
	Soil organic Carbon	CO_2	No	Optional. Carbon stock in this pool are not expected to be significantly affected by the project.
		CH_4	No	Not required by the methodology.
		N_2O	No	Not required by the methodology.
		Other	No	Not required by the methodology.
	Dead wood and litter.	CO_2	Yes	Optional. Carbon stock in this pool is expected to be affected by the project.
		CH_4	No	Not required by the methodology.
		N_2O	No	Not required by the methodology.
		Other	No	Not required by the methodology.
	Burning of woody biomass	CO_2	No	CO2 emissions due to burning of biomass are accounted as a change in carbon stock
		CH_4	No	Potential emissions are negligible as there is no burning of woody biomass.
		N_2O	No	Potential emissions are negligible as there is no burning of woody biomass.

		Other	No	Potential emissions are negligible as there is no burning of woody biomass.
Project	Abovegr ound and belowgro und biomass	CO_2	Yes	This is the main GHG removal pool of the project. It is associated with planted tree growth and it is expected to increase due to the implementation of the project activity.
		CH_4	No	Not required by the methodology.
		N_2O	No	Not required by the methodology.
		Other	No	Not required by the methodology.
	Soil organic Carbon	CO_2	No	Optional. Carbon stocks in these pools may not increase significantly during the project crediting period due to project activities.
		CH_4	No	Not required by the methodology.
		N_2O	No	Not required by the methodology.
		Other	No	Not required by the methodology.
	Dead wood and litter.	CO_2	Yes	Optional. Carbon stock in this pool is expected to be affected by the project.
		CH_4	No	Not required by the methodology.
		N_2O	No	Not required by the methodology.
		Other	No	Not required by the methodology.
	Burning of woody biomass	CO_2	No	CO2 emissions due to burning of biomass are accounted as a change in carbon stock
		CH_4	No	Burning of woody biomass for the purpose of site preparation or as part of forest management will not be used under this Grouped Project Non-CO2 GHG emissions resulting from fire occurrences within the project boundary - if they occur - will be accounted for if fire affects an area greater than 1 hectare, provided that the accumulated area affected by such fires in a given year is ≥ 5% of the project area. In such case, AR-AM Tool 08 will be applied.
		N_2O	No	
		Other	No	

The physical locations where the project activities will take place are presented in Figures 1 and 2 in section 2.1.5.1 Project Location.

3.1.4 Baseline Scenario

The baseline scenario is established by applying the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (Version 01).

As detailed in section 2.1.5 Additionality below, the baseline scenario corresponds to continuation of the pre-project land use, namely low-intensity cattle ranching in degraded pasturelands with no or limited input. This scenario corresponds to the pre-project land use in 49.01% of the project zone.

Figure 17: Example of baseline scenario for a parcel with the project area

3.1.5 Additionality

The additionality demonstration that follows is carried out in accordance with the AR-ACM0003 methodology, following the steps of the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" (Version 01).

STEP 0: Preliminary screening based on the starting date of the A/R project activity

Start date of the grouped project is after 31 December 1999 but before the date of its registration. Therefore, in line with requirements of the tool:

- *Evidence should be provided that the starting date of the A/R CDM project activity was after 31 December 1999*:

See section 2.1.14 Project Start Date. The start date of the project is after December 31, 1999 but prior to the date of registration (expected to be achieved by the end of 2022).

- *Evidence should be provided that the incentive from the planned sale of CERs was seriously considered in the decision to proceed with the project activity:*

The Project Development Agreement signed between [TBC] and Rioterra on [date TBC], clearly states the intent to develop a project certified under a voluntary carbon market standard. For example, section 2.1 (Purpose) of the agreement states "[TBC]".

STEP 1. Identification of alternative scenarios to the proposed A/R project activity

Alternative land-use scenarios were identified with respect to the proposed project activities, and their relevance as baseline scenarios.

Sub-step 1a. Identify credible alternative land use scenarios to the proposed project activity

- Alternative 1: Continuation of the pre-project land use

As per land eligibility criteria, land within the project area are degraded pasturelands with low-intensity cattle ranching and no or limited input.

As described in section 2.1.5 Physical Parameters, pasturelands cover 93,45% of the deforested project zone, 49.01% of the total project zone, and have been the main land use in the project zone for decades. In most cases, they are covered with invasive grasses and receive no fertilization[37].

Thus, continued low-intensity cattle ranching in degraded pastureland with no of limited input is a credible scenario in the project zone.

- Alternative 2: Spontaneous natural regeneration of the land within the project boundary performed without being registered as the A/R VCS and CCB Project Activity.

Spontaneous natural regeneration in abandoned deforested areas is a powerful tool to increase native forest cover globally. However, in the project zone, landholders continue using pasturelands even if productivity is very low. The continuous use of the project area for cattle ranching with periodic fires prevents natural regeneration from occurring. For example, from 2000 to 2020, only 5,61% (2,319.02 ha) of the project area gained forest cover. Nevertheless, spontaneous natural regeneration is considered a credible alternative land use in the project zone.

- Alternative 3: Forestation of at least a part of the land within the project boundary resulting from legal requirements.

Legal requirements for forestation in the project area have been contemplated by federal law in Brazil since 1934. This law was revised several times and is currently consolidated as Federal Law 12.651 from 2012. The law specifies two types of areas that must be reforested by landholders: Permanent Protection Areas (PPAs, environmentally sensitive areas) and legal reserves (LR, forest that the landholder can allocate where they please). The sum of areas of PPA and LR must be up to 10% or 20% of the total landholding area, depending on the landholding size. Also, the protection around water bodies by PPA reforestation varies with landholding size. See section 2.5.7 National and Local Laws for more details.

[37] This is to be confirmed through the baseline survey, to be conducted before validation of the grouped project

Based on publicly available data of the Rural Environmental Registry System (SICAR), the project zone contains an estimated 36,454 ha in small landholdings with potential for reforestation under the Federal Law 12,651 from 2012 (Supporting Documentation 2.1.5 Physical Parameters). This estimate is based on self declaratory data from the landholders in CAR. Therefore, forestation resulting from legal requirements is considered a credible scenario.

Outcome of Sub-Step 1a: The credible land-use scenarios in the project area are:

- Continuation of the pre project land-use;
- Spontaneous natural regeneration of the land within the project boundary performed without being registered as the A/R VCS and CCB Project Activity;
- Reforestation of at least a part of the land within the project boundary resulting from legal requirements.

Sub-step 1b. Consistency of credible land-use scenarios with enforced mandatory applicable laws and regulations

All credible land-use scenarios are consistent with applicable laws listed in section 2.5.7 National and Local Laws, except Federal Law 12,651/2012:

Application of Federal Law 12,651/2012 would not be consistent with Alternative 1 (Continuation of pre-project land-use), but non-enforcement constitutes the common practice in the grouped project area. Given the Socioeconomic and Ecological Zoning of the State of Rondônia and the Federal Law 12,651/2012:

1. Landholdings up to 2 fiscal modules (120 ha) must recover forest cover up to 10% of the landholding area, while farms from 2-4 fiscal modules (120-240 ha) must recover forest cover up to 20% of the landholding area. This situation applies only for areas deforested before July 22th, 2008, which applies to most of the landholdings in the project zone.

2. Reforestation priority is in PPAs (Permanent Protection Areas). PPAs are a protected area surrounding water bodies and other environmentally sensitive areas that vary according to the size of the water body. The minimum amount of reforestation required in a PPA varies with the landholding size and landholders can carry out agricultural activities in PPA areas where reforestation is not required (Law 12,651/2012, Articles 61-65). Landholders are incentivized to reforest all their PPA area in the project.

3. If the minimum PPA reforestation requirements do not reach the minimum area of the landholding described in item 1 above, the landholder must reforest the remainder of the PPA area. If even so the minimum landholding area is not reached, landholders must restore LR (Legal Reserves) which is any area chosen by the landholders in its property, preferably in a way that connects forest remnants or expands the forests created by the PPA.

However, reforestation requirements are not being enforced and landholders face several barriers to carry out reforestation. Hence, the project zone currently contains an estimated 36,454 ha of deforested area that could be deforested under law 12,651/2012 in the project zone.

Outcome of Sub-Step 1b: the credible land-use scenarios in the project area that are in compliance with enforced mandatory legislation and regulations remain the same as sub-step 1a:

- Continuation of the pre project land-use;

- Spontaneous natural regeneration of the land within the project boundary performed without being registered as the A/R VCS and CCB Project Activity;
- Reforestation of at least a part of the land within the project boundary resulting from legal requirements.

STEP 2. Barrier analysis

This step serves to identify the barriers and evaluate which of the land-use scenarios identified in sub-step 1b are not prevented by these barriers.

Sub-step 2a. Identification of barriers that would prevent the identification of at least one alternative land-use scenario.

Realistic and credible barriers that prevent forestation of native species due to legal requirements by smallholders in the project area are as follows:

Reforestation of at least a part of the land within the project boundary resulting from legal requirements - Investment barriers

The costs of reforestation with native tree species, including implementation and maintenance for two years, in this proposal are on average approximately 4,000 US$/ha. The literature for the costs of reforestation projects mentions values of US$2,348/ha (Brancalion et al., 2019), US$7,037/ha (Bechara et al., 2021) and US$3,344 (Benini and Adeodato, 2017). Differences between the project reforestation and literature are caused by different scale and methods used to carry out reforestation and inflation in prices since the costs of the literature. For the sake of comparison, the minimum monthly wage in Brazil is approximately US$240.

Public repositories of demographic information mention around US$433 (1.9 minimum wages, see Table 4) in the project zone. Smallholders can get loans from the National Program for Strengthening Family Farming[38] (PRONAF), however, landholders do not reach this fund for reforestation because 1) most of the lines of the fund refer to agriculture, production and industry, 2) if landholders must get into debt, they will do so to invest in their production infrastructure and pastureland and agricultural sites, as reforestation does not seem as a priority (see Institutional and Local Traditions barriers below), and 3) some landholders are not able to go through the bureaucratic processes to access the PRONAF funds.

In this context, smallholders in the project zone do not have resources to fund reforestation activities on their own, and will not prioritize funding reforestation over other essential activities such as maintenance of pasturelands, groceries, education, leisure, transportation, etc.

Reforestation of at least a part of the land within the project boundary resulting from legal requirements - Institutional barriers

Law 12,651/2012[39], the main law that regulated forest restoration in private properties in Brazil went through several changes since its first version in 1934. The latest changes in 2012 greatly reduced reforestation requirements (Article 61), allowed continuous pasturelands in PPAs (article 61-65) and pardoned deforestation carried out before July 22th, 2008, while landholders that abided to the previous versions of

[38] https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/pronaf#:~:text=Pronaf%20Microcr%C3%A9dito%20

[39] https://www2.camara.leg.br/legin/fed/lei/2012/lei-12651-25-maio-2012-613076-normaatualizada-pl.pdf

the law were not allowed to deforest the surplus forest area. This created an understanding among landholders that the law, which was barely being enforced, was not worth being obliged.

Since 2019, the expectations of landholders that environmental legislation is not enforced in Brazil was further strengthened by the dismantling of several environmental laws followed by a further decrease in the application of environmental fines (Abessa, Famá, and Buruaem, 2019). This context further motivates landholders to not comply with environmental laws without intervention and support from third-parties.

In the past, Rioterra has encouraged landholders to register in the Environmental Regularization Program (PRA) in order to boost reforestation in the project zone. The Environmental Regularization Program (PRA) is a national program contemplated in Chapter XIII of law 12,651/2012 that - among other aspects - provides more flexibility for legal reforestation requirements in exchange for a commitment of the landholder to reforest their PPA and LR in 5 or 20 years respectively, as defined by the Federal Decree 7,830 from 2012. However these landholders still face the same barriers and the project will continue to motivate landholders to join PRA, since it brings legal benefits to them. Nevertheless, the ReforesTerra project will include landholders that registered in PRA because:

- The ReforesTerra project would create a perverse incentive by excluding landholders that registered in PRA (i.e., landholders that have shown to be more willing to follow legal requirements and carry out reforestation).
- Excluding landholders with PRA would be contradictory with past institutional programs that encouraged landholders to register to PRA, which could undermine Rioterra credibility with project stakeholders.
- Even landholders that are registered in PRA and have the resources to carry out reforestation have from 5-20 years to conclude reforestation activities.
- Registering in PRA does not alleviate the other barriers listed in this section for VCS+CCB certified reforestation.

Reforestation of at least a part of the land within the project boundary resulting from legal requirements - Barriers due to local ecological conditions

Pastureland are composed of non-native invasive fodder grasses, such as the genus *Urochloa* spp. and *Melinis* spp. These grasses are very efficient competitors for resources, reducing native tree seedling growth by up to half in reforestation projects (Fragoso et al., 2021; Holl et al., 2000 Weidlich et al., 2020). Thus, they reduce the chances of reforestation success or greatly increase reforestation costs if not controlled.

Additionally, large herbivores may feed on and trample tree seedlings. The use of the project area for grazing, mainly by cattle, significantly reduces the potential carbon stocks of tree growth if cattle is not excluded (Souza et al., 2010).

Spontaneous natural regeneration of the land within the project boundary performed without being registered as the A/R VCS and CCB Project Activity - Barriers related to local tradition

Traditionally, fire is used periodically by some landholders to manage pasturelands. Fire events kill mainly smaller trees (<10 cm dbh) in areas with potential for natural regeneration, thus preventing the constitution and maintenance of any forest structure in the long term (Cochrane et al., 1999). Additionally, frequent use of fires over the years depletes the soil seed bank and favor invasive grasses adapted to savannah

environment commonly used for fodder in the region, such as the genus *Urochloa* sp., exhausting the potential of natural regeneration in the area (Hoopers et al., 2005).

Finally, even if fire does not compromise areas with potential for natural regeneration, and landholders have no interest in using these lands, landholders may perceive such areas as undesirable parts of their landholding. It is common that landholders use such areas to deposit dead animals, trash, or actively destroy vegetation (Zahawi et al., 2014).

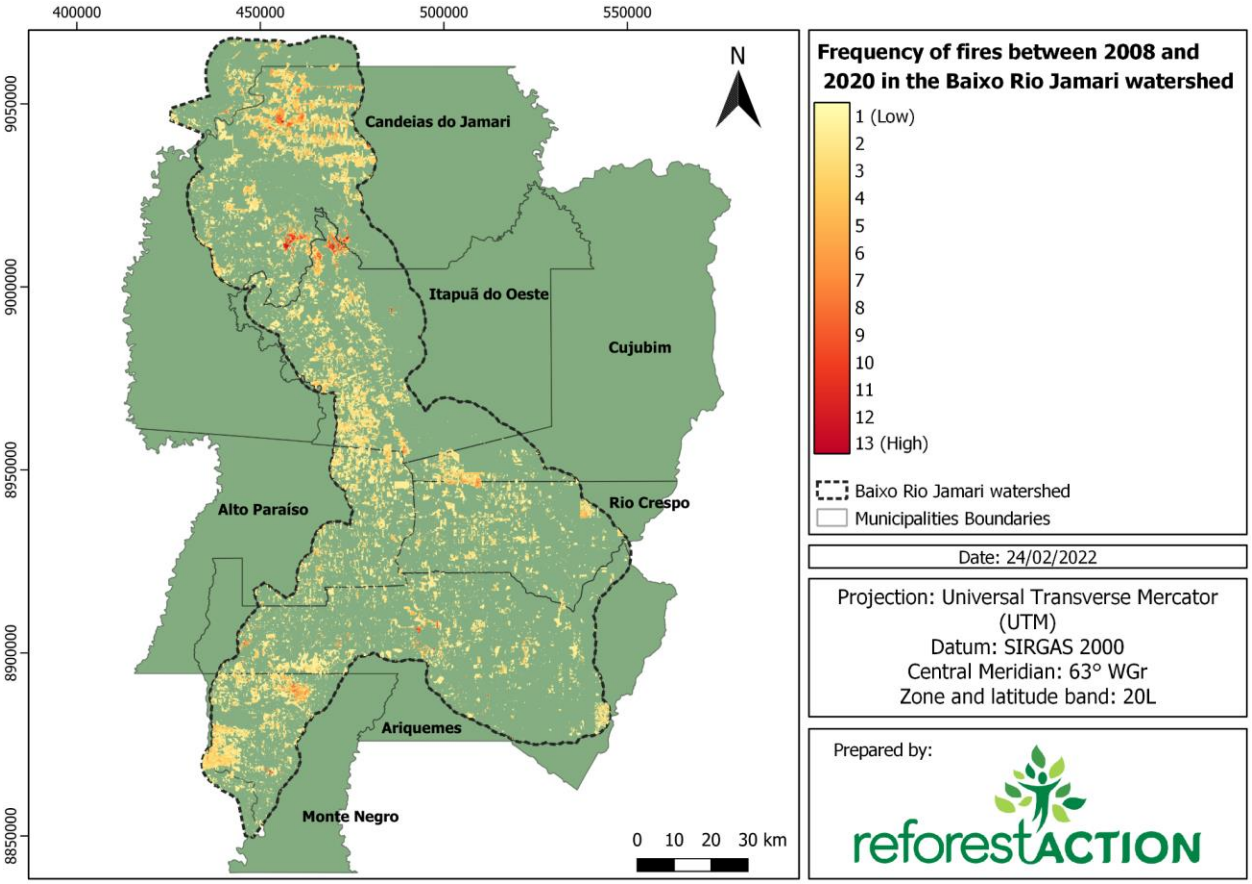


Figure 18: Frequency of fires between 2008 and 2020 in the Baixo Rio Jamari watershed

Spontaneous natural regeneration of the land within the project boundary performed without being registered as the A/R VCS and CCB Project Activity - Barriers due to local ecological conditions

Under certain conditions, natural regeneration is a process that can increase native forest cover in deforested landscapes. Similar to the ecological barriers for reforestation resulting from legal requirements, invasive fodder grasses may cover the soil preventing native seed rain from reaching the soil and hinder the development of established seedlings (Fragoso et al., 2021; Holl et al., 2000; Weidlich et al., 2020).

Time since deforestation and distance from forest remnants are critical to define the chance of natural regeneration. The project area has been deforested for more than 10 years for degraded pasturelands, reducing the abundance and species richness of the soil seed bank that could spontaneously regenerate

(Barnes & Chapman, 2014; Hogan et al., 2016). Additionally, potential project areas are far from forest remnants, reducing the chance of seed rain to the project area for spontaneous regeneration.

Outcome of Step 2a: List of barriers that may prevent one or more land use scenarios identified in the Step 1b:

- Investment barrier
- Institutional barrier
- Local tradition barrier
- Local ecological conditions barrier

Sub-step 2b. Elimination of land use scenario that are prevented by the identified barriers

Investment, institutional, traditional and ecological barriers prevent reforestation activities in the project area. The assessment of these barriers takes into account the level of access to and availability of information, technologies and skilled labor in the region where the planned project activity is located. Therefore, this scenario is eliminated from further consideration.

Continuation of the pre-project land-use is not prevented by barriers listed in Step 2a.

The project zone had significantly more native forest cover since 31 December 1989. Remnant Amazon Forest has been deforested in the project zone historically, as the project zone and the Rondônia State are part of the Amazon deforestation arc, a region that encompass the southern and eastern Amazon and is characterized by high deforestation rates and land conflict. Since 1990, the Rondônia State has lost 6 million hectares of Amazon Forests to agriculture and pastureland, representing circa 20% of the State area[40]. These deforested areas are converted to agriculture and mainly pasturelands, not to forest-based production systems.

With the consolidation of land-use tenure and reduced deforestation rate when compared to previous periods, the main drivers of deforestation are no longer present in the project zone, hence planted forests are expected to persist if planted.

Table 27: Summary of barriers faced for alternative land-use scenarios.

Project Alternative	Barrier Faced
Continuation of the pre-project land-use, i.e. low-intensity cattle ranching in degraded pasturelands with no or limited input.	No barriers faced
Spontaneous natural regeneration of the land within the project boundary performed without being registered as the A/R VCS and CCB Project Activity	Ecological condition barrier Local tradition barrier

[40] https://mapbiomas.org/https://mapbiomas.org/

Project Alternative	Barrier Faced
Reforestation of at least a part of the land within the project boundary resulting from legal requirements	Investment barrier Institutional barrier Local tradition barrier Local ecological conditions barrier

Outcome of Sub-Step 2b: list of land-use scenarios that are not prevented by any barrier:

- Continuation of the pre-project land-use;

Sub-step 2c. Determination of baseline scenario

Forestation is not included in the list of land use scenarios that are not prevented by any barrier. Baseline GHG removals for both land use scenarios not prevented by any barrier (low intensity pasturelands) can be considered as zero (see section 3.1.3 Project Boundary). Therefore, comparison of GHG emission does not apply.

STEP 3. Investment analysis

Not applicable. According to A/R Methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", if forestation without being registered as an A/R CDM project activity is not included in the list of land use scenarios that are not prevented by any barrier, the step 3 (investment analysis) is not required.

STEP 4. Common practice analysis

Large-scale reforestation projects have been implemented in the surroundings of the project zone in the past funded by government funds and enterprises. Below we list the reasons for the discontinuity of these initiatives in the project zone:

- Termination of the funds that made projects possible: both the projects listed below were terminated by the stagnation of the Amazon fund in 2019[41] (the last public call was in 2017). The Amazon fund received mostly international non-reimbursable funds for the monitoring, reduced deforestation and reforestation of the Amazon Forest.
    - 'Quintais Amazônicos': implementation of agroforestry systems in 742 ha in Rondônia. The project ran from 2013 to 2017 and provided technical assistance to 1,201 families[42]. This project differs from the ReforesTerra proposal by its smaller scale and for focusing on the in-situ conservation of native tree species.
    - 'Plantar Rondônia' project: reforestation of 2,520 hectares in 12 municipalities, some of those including the municipalities in the ReforesTerra project zone[43]. The project ran from 2018 to 2022 and did not contemplate the monitoring or commercialization of GHG

[41] http://www.fundoamazonia.gov.br/pt/como-apresentar-projetos/chamadas-publicas/
[42] http://www.fundoamazonia.gov.br/pt/projeto/Quintais-Amazonicos/
[43] http://www.fundoamazonia.gov.br/pt/search-page/?q=plantar+rondonia

removals. This project differs from VCS/CCB activities since it does not contemplate the generation of socioeconomic benefits for the engaged landholders.

- Shift of the fund away from reforestation activities and smaller scale: the smaller project listed below received funds from the Petrobrás, Brazil's national oil company. The company funded reforestation and socioenvironmental projects until 2020, when it changed its funding portfolio mostly to environmental education projects[44]:
    - 'Semeando Sustentabilidade' project: has restored approximately 400 hectares in the project region from 2008 to 2020 therefore it has a significantly lower scale than the ReforesTerra project..

The projects listed above are unable to continue due to lack of funding (Plantar, Quintais Amazônicos and Semeando Sustentabilidade) or are not of a similar scale to the ReforesTerra project (Semeando Sustentabilidade).

In conclusion there has never been a project in the project zone that included reforestation with PES at the scale of the Reforesterra project and monitored the social, biodiversity and climate benefits.

Outcome of Step 4: The proposed project activity is not the baseline scenario and, hence it is additional.

3.1.6 Methodology Deviations

No methodology deviations were applied.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Baseline net GHG removals by sinks are calculated using equation 1 in section 5.4 of the AR-ACM0003 methodology:

$$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t} + \Delta C_{LI\_BSL,t}$$

Where:

$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks in year t; t CO_2e.
$\Delta C_{TREE\_BSL,t}$	=	Change in carbon stock in baseline tree biomass 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 CO_{2e}.
$\Delta C_{SHRUB\_BSL,t}$	=	Change in carbon stock in baseline shrub biomass within the project boundary, in year t, as estimated in the tool "Estimation of carbon

[44] https://petrobras.com.br/pt/sociedade-e-meio-ambiente/socioambiental/

stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_{2-e}.

$\Delta C_{DW\_BSL,t}$ = Change in carbon stock in baseline dead wood biomass within the project boundary, in year t, 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 CO_{2-e}.

$\Delta C_{LI\_BSL,t}$ = Change in carbon stock in baseline litter biomass within the project boundary, in year t, 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 CO_{2-e}.

3.2.1.1 Initial carbon stock in trees in the baseline.

Framework planting

For framework planting parcels, conditions to account as zero the changes in carbon stock in trees in the baseline are met, in line with Chapter 5, paragraph 11 of AR-TOOL14 "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 04.2) as follows:

(a) The pre-project trees are neither harvested, nor cleared, nor removed throughout the crediting period of the project activity;

The project goal is to establish permanent secondary forests, which does not involve removing existing trees during site preparation, nor logging or other harvesting activities.

(b) The pre-project trees do not suffer mortality because of competition from trees planted in the project, or damage because of implementation of the project activity, at any time during the crediting period of the project activity;

Existing trees will not be destroyed during planting. Framework planting areas do not contain natural regeneration (see section 3.1.5 Additionality).

(c) The pre-project trees are not inventoried along with the project trees in monitoring of carbon stocks but their continued existence, consistent with the baseline scenario, is monitored throughout the crediting period of the project activity.

Eventual baseline trees can be easily differentiated from planted trees at the time of monitoring by one or more of these characteristics: i) they are not located in planting rows; ii) they are larger than recently planted trees; iii) they do not belong to the species produced in nurseries. At the first monitoring campaign in each area, eventual baseline trees which fall within the sampling plot will be properly identified and registered. The continued presence of baseline trees will be monitored at every verification, although corresponding carbon stocks will not be accounted for.

Assisted natural regeneration

In parcels of assisted natural regeneration, plots of 15x30 (450m²) will be installed prior to the start of project activities and all baseline trees DBH>5 cm will be tagged and measured and identified to the lowest taxonomic level possible.

For assisted natural regeneration parcels, initial carbon stock in trees in the baseline is equal to initial carbon stock in trees at project start, and will therefore be used for ex-post calculation of change of carbon stock in the project.

3.2.1.2 Initial carbon stock in shrubs in the baseline

For each parcel in both Framework Planting and Assisted Natural Regeneration, baseline shrub carbon stocks will be measured by randomly allocating one 50 m transect and measuring shrub cover over the transect. Shrub carbon stocks will be calculated based on the equations 26 and 27 of the A/R Tool 14 "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 04.2). Initial carbon stock in shrubs in the baseline is equal to initial carbon stock in shrubs at project start, $C_{SHRUB,t}$=0, and will therefore be used for ex-post calculation of change of carbon stock in project in section 3.2.2.1.3 Change in carbon stock in shrub biomass in the project.

3.2.1.3 Change in carbon stock in trees and shrubs in the baseline

AR-TOOL14 "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 04.2)" states in paragraph 12 that changes in carbon stocks in trees and shrubs in the baseline may be accounted as zero if:

(f) Land is subjected to periodic cycles (e.g. slash-and-burn, or clearing-regrowing cycles) so that the biomass oscillates between a minimum and a maximum value in the baseline

The project area is frequently cleared of native vegetation and eventually fires (started on purpose or accidentally reaching the area) destroy spontaneously regenerating trees and shrubs, hence the project has been kept deforested along time even in areas with potential for natural regeneration (e.g., only 4.6% of the potential project area returned to forest through natural regeneration since 2012). The baseline survey that will be conducted in the project zone prior to project validation is expected to provide evidence to support this statement.

3.2.1.4 Change in carbon stock in deadwood and litter in the baseline

Change in carbon stock in deadwood and litter in the baseline is calculated as a percentage of change in carbon stock in trees in the baseline, as per Data/Parameter tables 5 and 6 from the AR-Tool 12 – "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities". Since change in carbon stocks in trees in the baseline is considered zero, $\Delta C_{DW\_BSL,t}$ and $\Delta C_{LI\_BSL,t}$ are considered equal to zero as well.

Therefore, change in carbon stock in the baseline is expected to be zero ($\Delta C_{BSL,t}$=0)

3.2.2 Project Emissions

Project net GHG removals by sinks are calculated using Equation (2) in section 5.5 of the AR-ACM0003 methodology:

$$\Delta C_{ACTUAL,,t} = \Delta C_{P,t} - GHG_{E,t}$$

Where:

$\Delta C_{ACTUAL,,t}$	=	Actual net GHG removals by sinks, in year t; t $CO_{2\text{-}e}$
$\Delta C_{P,t}$	=	Change in the carbon stocks in the project, occurring in the selected carbon pools, in year t; t $CO_{2\text{-}e}$
$GHG_{E,t}$	=	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t, as estimated in the tool "Estimation of non-CO2 GHG emissions resulting from the burning of biomass attributable to an A/R CDM project activity"; t $CO_{2\text{-}e}$

Ex-ante increase in non-CO_2 GHG emissions within the project boundary due to project implementation of reforestation activities ($GHG_{E,t}$) is accounted as zero since the project does not include 1) fire use in site preparation, or 2) fire use to clear the land of harvest residue prior to replanting of the land. In case significant fires occur prior the ex-post verification, the equation 1 of the tool "Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" will be used to determine the increase in non-CO_2 GHG emissions.

3.2.2.1 Change in carbon stock

Project removals by changes in the project carbon stock ($\Delta C_{P,t}$) are calculated following Equation (3) in section 5.5 of the AR-ACM003 methodology, version 2.0.

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in the project, occurring in the selected carbon pools, in year t; t $CO_{2\text{-}e}$
$\Delta C_{TREE\_PROJ,t}$	=	Change in carbon stock in tree biomass in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t $CO_{2\text{-}e}$

$\Delta C_{SHRUB\_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; tCO_2e.

$\Delta C_{DW\_PROJ,t}$ = Change in carbon stock in dead wood in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; tCO_2e.

$\Delta C_{LI\_PROJ,t}$ = Change in carbon stock in litter in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; tCO_2e.

$\Delta SOC_{AL\_PROJ,t}$ = Change in carbon stock in soil organic carbon in the project in year t, in areas of land meeting the applicability conditions of the "Tool for the estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; tCO_2e.

3.2.2.1.1 Stratification

Project stratification was defined according to section 5.3 of the AR-ACM0003 methodology, version 02.0. As biomass distribution over the project area is not homogeneous, stratification is carried out to improve the precision of biomass estimation.

Stratification is based on the two reforestation models (i.e., Framework Tree Planting and Assisted Natural Regeneration) and on the planting schedule (planting year). For initial project activity instances, stratification is detailed in Table 28 below.

Table 28: Stratum for plot sampling

Planting year	Reforestation model	Stratum	Area (ha)	Area(%)
2022	Framework Tree Planting	22t	320	16,0%
	Assisted Natural Regeneration	22a	80	4,0%
2023	Framework Tree Planting	23t	560	28,0%
	Assisted Natural Regeneration	23a	140	7,0%
2024	Framework Tree Planting	24t	720	36,0%
	Assisted Natural Regeneration	24a	180	9,0%
Total			2000	100,0%

The change in carbon stocks in the project, occurring in the selected carbon pools in year *t* is calculated as Equation 3 of the AR-ACM0003 Methodology "Afforestation and reforestation of lands except wetlands":

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL\_PROJ,t}$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO2e

$\Delta C_{TREE\_PROJ,t}$ = Change in carbon stock in tree biomass in project 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 CO2e

$\Delta C_{SHRUB\_PROJ,t}$ = Change in carbon stock in shrub biomass in project 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 CO2e

$\Delta C_{DW\_PROJ,t}$ = Change in carbon stock in dead wood in project in year t, 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 CO2e

$\Delta C_{LI\_PROJ,t}$ = Change in carbon stock in litter in project in year t, 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 CO2e

$\Delta SOC_{AL\_PROJ,t}$	=	Change in carbon stock in SOC in project, in year t, 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 CO2e

3.2.2.1.2 Change in carbon stock in tree biomass in the project

Estimation of tree carbon stocks in the project will be measured by the measures of two independent stock estimates, as per equation 1 of the AR-Tool 14 "Estimation of carbons tocks and change in carbon stocks of trees and shrubs in A/R CDM project activities", in item 6.1:

$\Delta C_{TREE} = C_{TREE,t2} - C_{TREE,t1}$

And the uncertainty will be calculated by Equation 2 of the same tool:

$$u_{\Delta C} = \frac{\sqrt{(u_1 \times C_{TREE,t1})^2 + (u_2 \times C_{TREE,t2})^2}}{|\Delta C_{TREE}|}$$

Where:

ΔC_{TREE}	=	Change in carbon stock in trees during the period between two points of time t1 and t2; tCO2e
$C_{TREE,t1}$	=	Carbon stock in trees as estimated at time t1; tCO2e
$C_{TREE,t2}$	=	Carbon stock in trees as estimated at time t2; tCO2e
$u_{\Delta C}$	=	Uncertainty in ΔC_{TREE}
u_1, u_2	=	Uncertainties in $C_{TREE,t1}$, and $C_{TREE,t2}$ respectively

Under this method, the change in carbon stock of trees will be calculated based on Equations 3, 4 and 5 of the AR-Tool 14 "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities":

$\Delta C_{TREE} = \frac{44}{12} \times CF_{TREE} \times AB_{TREE}$

$$\Delta B_{TREE} = A \times \Delta b_{TREE}$$

$$\Delta b_{TREE} = \sum_{i=1}^{M} w_i \times \Delta b_{TREE,i}$$

$$u_{\Delta C} = tVAL \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_{\Delta,i}^2}{n_i}}$$

Where:

ΔC_{TREE} = Change in carbon stock in trees between two successive measurements; t CO2e

CF_{TREE} = Carbon fraction of tree biomass; t C (t d.m.)-1

ΔB_{TREE} = Change in tree biomass within the biomass estimation strata; t d.m.

A = Sum of areas of the biomass estimation strata; ha

Δb_{TREE} = Mean change in tree biomass per hectare within the biomass estimation strata; t d.m. ha-1

w_i = Ratio of the area of stratum i to the sum of areas of biomass estimation strata (i.e./); dimensionless

$\Delta b_{TREE,i}$ = Mean change in carbon stock per hectare in tree biomass in stratum i; t d.m. ha-1

$u_{\Delta C}$ = Uncertainty ΔC_{TREE}

tVAL = Two-sided Student's t-value for a confidence level of 90 per cent and degrees of freedom equal to n – M, where n is total number of

sample plots within the tree biomass estimation strata, and M is the total number of tree biomass estimation strata

$s^2_{\Delta,i}$ = Variance of mean change in tree biomass per hectare in stratum i; (t d.m. ha-1)

n_i Number of sample plots, in stratum i, in which tree biomass was re-measured

After using the above calculation to achieve tree carbon stock, Equations 9 and 10 will be used to estimate tree carbon stock in the plots and variance in tree biomass.

$$b_{TREE,i} = \frac{\sum_{p=1}^{ni} b_{TREE,p,i}}{n_i}$$

$$s_i^2 = \frac{n_i \times \sum_{p=1}^{ni} b_{TREE,p,i}^2 - (\sum_{p=1}^{ni} b_{TREE,p,i})^2}{ni \times (n_i - 1)}$$

Where:

$b_{TREE,i}$ = Mean tree biomass per hectare in stratum i; t d.m. ha-1

$b_{TREE,p,i}$ = Tree biomass per hectare in plot p of stratum i; t d.m. ha-1

s^2_i = Variance of mean tree biomass per hectare in stratum i; (t d.m. ha-1)

n_i = Number of sample plots in stratum i.

The ReforesTerra project will measure trees in reforestation areas following the fixed 450 m² plot method where all trees with DBH>5 cm will have its DBH and height measured and will be identified to the lowest taxonomic level possible (Supporting Documentation 3.3.3 Monitoring Plan). To estimate individual tree aboveground biomass, the allometric equation developed by Saquetta et al. (*in prep*) for the project zone will be used. The sum of the biomass of each individual tree in a given plot will result in $b_{TREE,p,I}$.

Tree belowground biomass will be calculated by multiplying the estimated tree biomass by 1 + Rj, where Rj is the root shoot ratio of trees defined by:

$$R_j = \frac{e^{(-1.085+0.9256 \times ln\ b)}}{b}$$

As per AR Tool14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities". Page 25, Appendix I. Where b is the above-ground tree biomass per hectare (in t d.m. ha-1)

Table 29: Models and parameters used for tree biomass or carbon estimation

Parameter	Value	Source
Biomass (kg)	Varies with tree	Chave et a., 2015. Improved allometric models to estimate the aboveground biomass of tropical trees. Global Change Biology 20. doi: 10.1111/gcb.12629
Root-shoot-ratio (R) dimensionless	$e^{(-1085+0.9256 \times \ln b)}/b$	CDM_AR_tool_14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities". Page 25. Where b is the above-ground tree biomass per hectare (in t d.m. ha-1)
Carbon fraction	Varies with species	Zanne, Amy E. et al. 2009. Data from: Towards a worldwide wood economics spectrum, Dryad, Dataset, https://doi.org/10.5061/dryad.234
Factor C to CO2	3.667	Intergovernmental Panel on Climate Change (IPCC) “Good Practice Guidance for LULUCF”. 2006. Table 4.3

3.2.2.1.3 Change in carbon stock in shrub biomass in the project

Change in carbon stock in shrubs is considered zero for the purpose of ex-ante calculation.

For ex-post calculation, the change in carbon stock in shrub biomass is estimated based on equations 26 and 27 of the A/R Tool 14 “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” (Version 04.2). While only tree species are planted, native shrub species are expected to regenerate in planting areas and especially in assisted natural regeneration areas.

$$\boldsymbol{C_{SHRUB,t} = \frac{44}{12} \times CF_s \times (1 + R_s) \times \sum_i A_{shrub,i} \times b_{SHRUB,i}}$$

$$\boldsymbol{b_{SHRUB,i} = BDR_{SF} \times b_{FOREST} \times CC_{SHRUB,i}}$$

Where:

$C_{shrub,t}$	=	Carbon stock in shrubs within the Project boundary at a given point of time in year t; tCO_2e
CF_s	=	Carbon fraction of shrub biomass; t C (t.d.m.)-1
R_s	=	Root-shoot ratio for shrubs, dimensionless. The default value of 0.4 is used unless transparent and verifiable information can be provided to justify a different value.
$A_{SHRUB,i}$	=	Area of shrub biomass estimation stratum I; ha
$b_{SHRUB,i}$	=	Shrub biomass per hectare in shrub biomass estimation stratum I; t d.m. ha-1
BDR_{SF}	=	Ratio of shrub biomass per hectare in land having a shrub crown cover of 1.0 (i.e. 100 per cent) and the default above-ground biomass content per hectare in forest in the region/country where the A/R CDM project activity is located; dimensionless.
B_{forest}	=	Default above-ground biomass content in forest in the region/country where the A/R CDM project activity is located; t d.m. ha-1
$CC_{SHRUB\ i}$	=	Crown cover of shrubs in shrub biomass estimation stratum *i* at the time of estimation, expressed as a fraction (e.g. 10 percent crown cover implies $CC_{SHRUB,i}$ = 0.10); dimensionless

3.2.2.1.4 Change in carbon stock in litter and dead wood

The ex-ante estimation of carbon stocks of litter and dead wood was performed following using AR-Tool 12 “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities version 03.0”. Values of the conservative default-factors estimate the carbon stock in dead wood and litter as a percentage of carbon stock in tree biomass as follows:

Dead Wood

$$C_{DW,i,t} = CT_{REE,i,t} \times DF_{DW}$$

Where:

$C_{DW,i,j}$	=	Carbon stock in dead wood in stratum *i* at a given point of time in year t; t CO_2e
$C_{TREE,i,t}$	=	Carbon stock in trees biomass in stratum *i* at a point of time in year t, as calculated in the tool 'Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities'; t CO_2e
DF_{DW}	=	Conservative default factor expressing carbon stock in dead wood as a percentage of carbon stock in tree biomass; per cent
i	=	1, 2, 3, ... biomass estimation strata within the project boundary
t	=	1, 2, 3, ... years elapsed since the start of the A/R project activity.

Litter

$$C_{LI,i,t} = C_{TREE,i,t} \times DF_{LI}$$

Where:

$C_{LI,i,j}$	=	Carbon stock in Litter in stratum i at a given point of time in year t; t CO2e
$C_{TREE,i,t}$	=	Carbon stock in trees biomass in stratum i at a point of time in year t, as calculated in the tool 'Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities'; t CO2e
DF_{LI}	=	Conservative default factor expressing carbon stock in litter as a percentage of carbon stock in tree biomass; per cent
i	=	1, 2, 3, ... biomass estimation strata within the project boundary
t	=	1, 2, 3, ... years elapsed since the start of the A/R project activity.

Table 30: Conservative default value expressing carbon stock in dead wood and litter.

Parameter	Description	Value (%)	Source[45]
DF_{DW}	Conservative default factor expressing carbon stock in dead wood as a DW percentage of carbon stock in tree biomass.	6	Biome: Tropical Elevation: <2,000 m Precipitation: > 1,600 mm yr-1
DF_{LI}	Default factor for the relationship between carbon stock in litter and carbon stock in living trees	1	

3.2.3 Leakage

Low-intensity cattle grazing is the most common land use in deforested areas in the project zone. Considering this, the most likely scenario is that project reforestation activities may displace cattle to other already existing grazing land. Thus, project leakage emissions are accounted as zero according to paragraph 10 (a) of AR-TOOL15 "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity" Version 2.0.

3.2.4 Net GHG Emission Reductions and Removals

According to Equation (5) of the methodology AR-ACM0003 V02.0, the net anthropogenic GHG removal by sinks are calculated as follows:

$$\Delta C_{AR_{CDM,t}} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

Where:

$\Delta C_{AR\text{-}CDM,t}$ = Net anthropogenic GHG removals by sink in year t; tCO_2e

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sink in year t; tCO_2e

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sink in year t; tCO_2e

LK_t = GHG emissions due to leakage in year t; tCO_2e

Project ex-ante GHG removals were calculated separately for both reforestation methodologies (Framework Tree Planting and Assisted Natural Regeneration). Supporting Documentation (3.2.4. Ex-ante carbon stock estimates) details the calculation of GHG removals for each reforestation method.

GHG removals from Framework Tree Planting:

[45] AR-TOOL12 A/R Methodological tool: Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities Version 03.1

Framework Tree Planting GHG removals were calculated based on the assessment of carbon stocks of native trees carried out by Sanquetta et al. (in preparation). The authors sampled native trees in reforestation using 1,600 trees per hectare, similar to the reforestation model that will be employed in the ReforesTerra project. The estimated GHG removal under the Framework Tree Planting reforestation model is 447.72 tCO_2e/ha.

GHG removals from assisted natural regeneration:

Assisted natural regeneration GHG removals were estimated by creating a model using data from four peer-reviewed papers from the project region (southern Amazon). With this data, a polynomial model based on age was developed, with a determination coefficient (R^2) of 0.812. Supporting Documentation (3.2.4. Ex-ante carbon stock estimates), sheet 'Assisted natural regeneration carbon estimates' contains the literature and the data used to develop the model. The estimate under the assisted natural regeneration deforestation model is 226.44 72 tCO_2e/ha.

Total GHG removal on the project:

Table 31: Net GHG removals

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2022	-	0,00	-	0,00
2023	-	3.347,45	-	3.347,45
2024	-	10.223,64	-	10.223,64
2025	-	21.500,33	-	21.500,33
2026	-	29.400,50	-	29.400,50
2027	-	39.693,53	-	39.693,53
2028	-	49.872,63	-	49.872,63
2029	-	58.688,69	-	58.688,69
2030	-	64.706,11	-	64.706,11
2031	-	67.672,88	-	67.672,88
2032	-	67.218,05	-	67.218,05
2033	-	65.041,63	-	65.041,63
2034	-	60.576,96	-	60.576,96
2035	-	53.908,64	-	53.908,64
2036	-	45.725,10	-	45.725,10
2037	-	36.694,71	-	36.694,71

2038	-	29.814,63	-	29.814,63
2039	-	23.468,42	-	23.468,42
2040	-	17.778,51	-	17.778,51
2041	-	12.772,56	-	12.772,56
2042	-	9.089,98	-	9.089,98
2043	-	6.548,17	-	6.548,17
2044	-	5.596,29	-	5.596,29
2045	-	4.567,14	-	4.567,14
2046	-	4.550,14	-	4.550,14
2047	-	3.721,72	-	3.721,72
2048	-	2.930,00	-	2.930,00
2049	-	2.690,09	-	2.690,09
2050	-	2.783,07	-	2.783,07
2051	-	2.397,58	-	2.397,58
2052	-	2.324,62	-	2.324,62
Total		805.303,76		805.303,76

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	Carbon Fraction of dry matter (CF)
Data unit	T C t d.m $^{-1}$
Description	Biomass proportion corresponding to carbon. CF is used to convert biomass to carbon.
Source of data	IPCC (2006). Good Practice Guidance for LULUCF. Chapter 4. Forest Land. Table 4.3. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_ Volume4/V4_04_Ch4_Forest_Land.pdf
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	The default value from IPCC.
Purpose of data	Estimation of GHG Emission Reductions and Removals.

Comments	

Data / Parameter	Carbon Fraction of dry matter (CF)
Data unit	T C t d.m $^{-1}$
Description	Biomass proportion corresponding to carbon. CF is used to convert biomass to carbon.
Source of data	Estimations for native species based on wood density from Zanne et al. (2009)
Value applied	Species specific.
Justification of choice of data or description of measurement methods and procedures applied	Pantropical wood density database for the native species in the project.
Purpose of data	Estimation of GHG Emission Reductions and Removals.
Comments	

Data / Parameter	BDR_{SF}
Data unit	Dimensionless
Description	Ratio of shrub biomass per hectare in land having a shrub crown cover of 1.0
Source of data	CDM AR tool 14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"
Value applied	0.10
Justification of choice of data or description of measurement methods and procedures applied	According to the AR-AM tool 14, version 4.1 a default value of 0.10 should be used unless transparent and verifiable information can be provided to justify a different value.
Purpose of data	Estimation of GHG Emission Reductions and Removals.
Comments	

Data / Parameter	Root-shoot ratio (R)
Data unit	Dimensionless
Description	Ratio of the weight of the roots to the weight of the top of the tree. Used for below ground tree biomass estimation according to the standing aboveground biomass.

Source of data	CDM AR tool 14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" Version 4.1. Page 25 (trees) and 20 (shrubs)
Value applied	Trees = $e^{(-1.085 + 0.9256 \times \ln b)}/b$ Shrubs = 0.40
Justification of choice of data or description of measurement methods and procedures applied	Belowground biomass is usually estimated with this factor, as below ground sampling is destructive and expensive.
Purpose of data	Estimation of GHG emission reductions and removals
Comments	

Data / Parameter	Dead wood (DF_{DW})
Data unit	%
Description	Conservative default factor expressing carbon stock in dead wood as a percentage of carbon stock in tree biomass
Source of data	CDM_AR_tool_12. “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”, Version 03.0
Value applied	6%
Justification of choice of data or description of measurement methods and procedures applied	Dead wood biomass is usually estimated with this factor, as dead wood sampling is destructive and expensive.
Purpose of data	Estimation of GHG emission reductions and removals
Comments	

Data / Parameter	Litter (DF_{LI})
Data unit	%
Description	Conservative default factor expressing carbon stock in litter as a percentage of carbon stock in tree biomass
Source of data	CDM_AR_tool_12. “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”, Version 03.0
Value applied	1%

Justification of choice of data or description of measurement methods and procedures applied	Litter biomass is usually estimated with this factor.
Purpose of data	Estimation of GHG emission reductions and removals
Comments	

Data / Parameter	Factor C to CO_2
Data unit	$tCO2\ tC^{-1}$ (CO_2e)
Description	Factor applied to convert the tree carbon sequestered to tree CO2e sequestered.
Source of data	CDM_AR_tool_12. "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities", Equation 12. Page 14
Value applied	3.667
Justification of choice of data or description of measurement methods and procedures applied	CDM default value
Purpose of data	Estimation of GHG emission reductions and removals
Comments	

3.3.2 Data and Parameters Monitored

Data / Parameter	A
Data unit	ha
Description	Project area (reforestation area)
Source of data	Landholder and public registry
Description of measurement methods and procedures to be applied	The area will be delineated at first using geoprocessing software and public information on the landholding. After that it will be delineated and validated on the ground by the geotechnology team using GPS and geo-referenced remote sensing data.
Frequency of monitoring/recording	During the stakeholder engagement and before reforestation activities. At each verification the project staff will check if the area boundaries are maintained.
Value applied	Ex-post

Monitoring equipment	GPS equipment and Remote Sensing data
QA/QC procedures to be applied	QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied. See section 3.3.3.4 Standard Operation Procedure.
Purpose of data	Calculation of project emissions
Calculation method	Measurement
Comments	

Data/Parameter	A_i
Data unit	ha
Description	Area of stratum i
Source of data	Monitoring of stratum and stand boundaries is done employing Geographical Information Systems (GIS) allowing the integration of data from different sources (including GPS coordinates and remote sensing data).
Description of measurement methods and procedures to be applied	Field measurement: the area shall be delineated either on the ground using GPS or from geo-referenced remote sensing data.
Frequency of monitoring/recording	Each time a verification is conducted.
Value applied	Ex-post
Monitoring equipment	GPS equipment (precision 1-5 m) and Remote Sensing data
QA/QC procedures to be applied	QA/QC procedures from published handbooks or the IPCC GPG LULUCF 2003 are applied. See section 3.3.3.4 Standard Operation Procedure.
Purpose of data	Calculation of project emissions

Calculation method	Measurement
Comments	Strata are based on the reforestation year and reforestation method (tree planting or assisted natural regeneration). Strata may be reviewed in the case of differential tree growth or the event of fire or other degradation in the project area.

Data/Parameter	$A_{p.i}$
Data unit	m^2
Description	Area of sample plot in stratum i
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard Operating Procedures (SOPs) from published handbooks or from the IPCC GPG LULUCF 2003 are applied. See the description for the establishment of permanent plots in section 3.3.3.1 Monitoring the integration of new plots of the Project
Frequency of monitoring/recording	Each time a verification is conducted.
Value applied	Ex-post
Monitoring equipment	Tape measure, hypsometer and GPS
QA/QC procedures to be applied	QA/QC procedures from published handbooks or from the IPCC GPG LULUCF 2003 are applied. See section 3.3.3.4 Standard Operation Procedure.
Purpose of data	Calculation of project emissions
Calculation method	
Comments	Sample plot location is registered with a GPS and marked on the Project map. See the description for the establishment of permanent and temporary plots in section 3.3.3.1 Monitoring the integration of new plots of the Project

Data/Parameter	N
Data unit	Dimensionless

Description	Number of plots to be established in the project area
Source of data	Estimation
Description of measurement methods and procedures to be applied	As per tool A/R Methodological Tool 'Calculation of the number of sample plots for measurements within A/R CDM project activities" version 02.1.
Frequency of monitoring/recording	Each time a verification is conducted
Value applied	Ex-post
Monitoring equipment	
QA/QC procedures to be applied	QA/QC procedures from published handbooks or from the IPCC GPG LULUCF 2003 are applied. See section 3.3.3.4 Standard Operation Procedure.
Purpose of data	Estimate the number of plots needed for complying with a sampling error less than 10%
Calculation method	See section 3.3.3.1 Monitoring the integration of new plots of the Project
Comments	

Data/Parameter	n_i
Data unit	Dimensionless
Description	Number of plots to be established in each stratum
Source of data	Estimation
Description of measurement methods and procedures to be applied	This value will be estimated based on a pre-sampling developed in the project area before monitoring.
Frequency of monitoring/recording	Each time a validation is conducted
Value applied	Ex-post

Monitoring equipment	
QA/QC procedures to be applied	QA/QC procedures from published handbooks or from the IPCC GPG LULUCF 2003 are applied. See section 3.3.3.4 Standard Operating Procedure.
Purpose of data	Estimation of the number of plots needed for each stratum for complying with a sampling error less than 10%
Calculation method	See section 3.3.3.1 Monitoring the integration of new plots of the Project
Comments	

Data/Parameter	Plot location
Data unit	Latitude/longitude
Description	Location of each sampling plot (corners)
Source of data	Data field sampling
Description of measurement methods and procedures to be applied	Measured with GPS
Frequency of monitoring/recording	Each time a verification is conducted
Value applied	Ex-post
Monitoring equipment	GPS
QA/QC procedures to be applied	QA/QC procedures from published handbooks or from the IPCC GPG LULUCF 2003 are applied. See section 3.3.3.4 Standard Operating Procedure.
Purpose of data	Calculation of project emissions
Calculation method	See section 3.3.3.1 Monitoring the integration of new plots of the Project.
Comments	The sample plot location is registered with a GPS and marked on the project map.

Data/Parameter	DBH
Data unit	centimeter
Description	Diameter at breast height of the trees
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Typically measured 1.3 m aboveground. Measure all the trees above some minimum Diameter at Breast Height (DBH) in the permanent sample plots that result from the project activity.
Frequency of monitoring/recording	Each time a verification is conducted
Value applied	Ex-post
Monitoring equipment	Measuring tape
QA/QC procedures to be applied	Staff collecting field data will be fully capacitated and data will be checked by resampling part of the plots and checking for discrepancies and typos in the office. See section 3.3.3.4 Standard Operating Procedure.
Purpose of data	Calculation of project emissions
Calculation method	See section 3.3.3.2 Monitoring the implementation of project activities.
Comments	

Data/Parameter	H
Data unit	meter
Description	Total height of trees
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Measure all the trees heights in the permanent sample plots that result in the project activity.

Frequency of monitoring/recording	Each time a verification is conducted
Value applied	Ex-post
Monitoring equipment	Digital hypsometer
QA/QC procedures to be applied	Staff collecting field data will be fully capacitated and data will be checked by resampling part of the plots and checking for discrepancies in data and typos in the office. See section 3.3.3.4 Standard Operating Procedure.
Purpose of data	Calculation of project emissions.
Calculation method	See section 3.3.3.2 Monitoring the implementation of project activities.
Comments	

Data/Parameter	$CC_{SHRUB,i}$
Data unit	Dimensionless
Description	Crown cover of shrubs in shrub biomass stratum i.
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Considering that the biomass in shrubs is smaller than the biomass in trees, a simplified method of measurement may be used for estimating shrub crown cover. Shrub cover will be estimated in a transect in each sampling plot.
Frequency of monitoring/recording	At every verification
Value applied	Ex-post
Monitoring equipment	N/A
QA/QC procedures to be applied	QA/QC procedures from published handbooks or from the IPCC GPG LULUCF 2003 are applied. See section 3.3.3.4 Standard Operating Procedure.
Purpose of data	Calculation of project emissions

Calculation method	M/A
Comments	

Data/Parameter	T
Data unit	Year
Description	Period elapsed between two successive estimations of carbon stock in trees and shrubs
Source of data	Verification records
Description of measurement methods and procedures to be applied	See section 3.3.3 Monitoring Plan
Frequency of monitoring/recording	Each time a verification is conducted
Value applied	Ex-post
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	$T= t_2-t_1$
Comments	If the two successive estimations of carbon stock in trees are carried out at different points of time in the year, t_2 and t_1, (e.g., in the month of February in year t_1 and in the month of August in year t_2), then a fractional value is assigned to T.

3.3.3 Monitoring Plan

3.3.3.1 Monitoring the integration of new plots of the Project

Table 32: Land eligibility criteria verification.

Land eligibility criteria	Verification process	Responsible(s)
The land does not fall into the wetland category	TBC	TBC
The land is degraded pastureland	TBC	TBC
The land is not a native ecosystem. It is deforested land where deforestation occurred more than 10 years before the start date of the grouped project.	To verify the criterion of "deforestation occurred more than 10 years before the start date of the grouped project, data was obtained from the Legal Amazon Deforestation Satellite Monitoring Project (PRODES in Portuguese), from the Brazilian National Institute for Space Research (INPE)[46], which monitors land-use change in the Amazon. With that, ll areas that have been deforested in the project zone before 2012 were identified, ten years before the project start date.	TBC
Land is not subject to any other carbon project scheme.	TBC	TBC
There shall be no conflict for land ownership or registry.	TBC	TBC
Land is a Permanent Protection Area (PPA) or a Legal Reserve (LR), as defined in national law 12.651/2012.	TBC	TBC
Landholding is <240 ha (see Brazilian national law 12,651/2012)	TBC	TBC
Landholding requires more than two hectares of reforestation (to keep the logistics of the project feasible).	TBC	TBC

3.3.3.2 Monitoring the implementation of project activities

The process for monitoring implementation of project activities will be defined prior to validation of the grouped project.

[46] http://terrabrasilis.dpi.inpe.br/app/map/deforestation?hl=pt-br

3.3.3.3 Monitoring of changes in carbon stocks in the pools selected

The project will only measure the aboveground biomass of planted and spontaneous regenerating trees and shrubs.

The belowground, litter and deadwood carbon stocks resulting from project activities will not be monitored, instead these stocks will be estimated using default values and suggested methods from the tools 'Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities'. The root-shoot ratio (R) will be used for the estimation of belowground biomass based on the aboveground measures[47].

Table 33: Monitoring team

Function	Responsibility
Project coordinators	Develops the monitoring plan with the project proponents and the monitoring coordinator. Provides supervision and orientation and oversees quality assurance.
Monitoring manager	Responsible for managing and implementing the monitoring on the field. Trains the monitoring team on the monitoring procedures. Implement corrective measures and provide reports and feedback to project coordinators.
Monitoring team	Establishes the plots, measures and identifies tree species on the field. Process and record data. Reports to monitoring manager.

3.3.3.3.1 Stratification

Data sampling design will follow the stratification defined in section 3.2.2.1.1 Stratification, based on the reforestation model and planting year.

As project reforestation activities develop over time, monitoring of different growth patterns inside each stratum may lead to the unification among strata or the creation of new strata. At each monitoring event and at the inclusion of new instances of the grouped project, an update of the project stratification may be proposed based. Strata that initially had different reforestation interventions (Framework Tree Planting and Assisted Natural Regeneration) will not merge throughout the project.

[47]IPCC Good Practice Guidance for LULUCF. Annex 3A.1 Biomass Default Tables for Section 3.2 Forest Land. Table 3A.1.8: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf

3.3.3.3.2 Plot type and size

Given that part of reforestation activities will be carried out in strips more than 20 m wide near water bodies, the project will allocate rectangular permanent plots of 15x30m (450 m²) to sample carbon stock in all areas. Carbon stocks will be monitored on the same plot along time, which allows for more consistent data and track of development of carbon stocks at a given site.

In each plot area, all trees with diameter at breast height (DBH) greater than 5 cm will have their DBH and height measured and will be identified to the lowest taxonomic level possible. Tree species identification at this stage is critical to determine wood density and select allometric equations from the literature and calculate carbon stocks.

Shrub cover will be measured 50 m transects positioned in the middle of the plot.

Given that project reforestation activities will be carried out in several small areas in different landholdings, plots will be allocated in all landholdings randomly, with at least one plot per landholding. All permanent plots shall be properly numbered, georeferenced and located in the project area (see section 3.3.3.4.3 Data collection in the field for more details on data gathering).

3.3.3.3.3 Number of plots

The number of sample plots required for estimation of biomass stocks from sampling based measurements in the project scenariowill be calculatedusing the CDM tool “A/R Methodological tool for calculation of the number of sample plots for measurements within A/R CDM project activities”.

The number of plots to be established and measured will be estimated as follows:

$$n = \frac{N * {t_{VAL}}^2 * \left(\sum_i w_i * s_i \right)^2}{N * E^2 + {t_{VAL}}^2 * \sum_i w_i * {s_i}^2}$$

Where:

n = Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless

N = Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless

t_{VAL} = Two-sided Student’s t-value, at infinite degrees of freedom, for the required confidence level; dimensionless

w_i = Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless

s_i = Estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1})

E = Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha^{-1}), i.e. in the units used for s_i

i = 1, 2, 3, … biomass stock estimation strata within the project boundary

For each strata, the number of plots allocated will be defined by the equation:

$$n_i = n * \frac{w_i * s_i}{\sum_i w_i * s_i}$$

Where:

n_i = Number of sample plots allocated to stratum i; dimensionless

n = Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless

w_i = Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless

s_i = Estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1})

i = 1, 2, 3, … biomass stock estimation strata within the project boundary

3.3.3.4 Standard operating procedure SOP

The project will employ Standard Operating Procedure for the establishment of all plots. The plots will be placed in all landholdings with project activities at random locations. Plot locations will be defined using adequate tools from geoprocessing softwares such as QGIS to prevent biases at plot allocation. Plot allocation will be done before monitoring and plot location can only be altered on the field in the case of exceptional circumstances (fire or other degradation factor). For each plot, the GPS coordinates, stratum code, reference points and landholding that is located will be recorded. More plots may be allocated in the case of degradation, uneven growth or other circumstances that may change forest strata.

3.3.3.4.1 Access to plots

Plots will be allocated using geoprocessing software such as QGIS to randomly allocate plots and the coordinates will be uploaded to GPS or other tool to locate plots on the field. Reference points that could help to find plots will also be registered.

3.3.3.4.2 Establishment of permanent plots

For the preparation of the first verification, once the monitoring team arrives at the plot randomly allocated based on (Geographical Information Systems) GIS methods, a 1.5 m pipe will be fixed on the ground in each of the four vertices of the plot. All trees measured will be painted directed at the center of the plot, in order to facilitate the finding of the plot in future measurements.

3.3.3.4.3 Data collection in the field

All trees with DBH over 5 cm in the plot will have their DBH and height measured and will be identified to the lowest taxonomic level possible. Trees located on the border of the plot will be considered as being inside the plot if at least half of its DBH falls inside the plot.

Tree DBH measurement

Tree diameter will be measured over bark at breast height (DBH, i.e. at 1.3 m above the ground). Measurements will be carried out using measuring tape.

Measurements shall take the following precautionary measurements (see

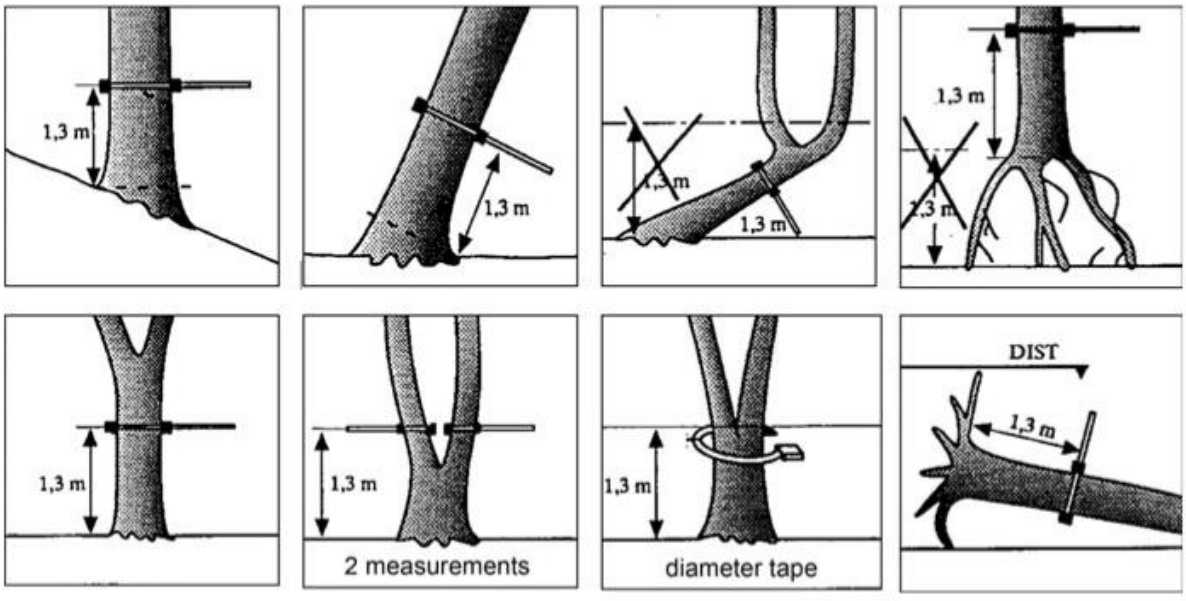


Figure *19*):

- Measurements must be done perpendicular to the tree axis at 1.3 m;
- On slopes, measurement of tree DBH must be done at the higher part of the terrain;
- Trees with large thorns (e.g., *Ceiba speciosa, Senegalia polyphylla)* must have the thorns removed at DBH before measurement;

- Trees with irregular stem at 1.3 m caused by bulges, wounds, diseases, hollows, branches, etc. must be measured above the irregular point;
- Forked trees will be measured as follows:
    - If the fork is below 1.3 m height, every stem will be measured as an independent tree;
    - If the fork is at 1.3 height or higher, DBH will be measured below forking, below the bulge caused by the fork that could influence DBH.

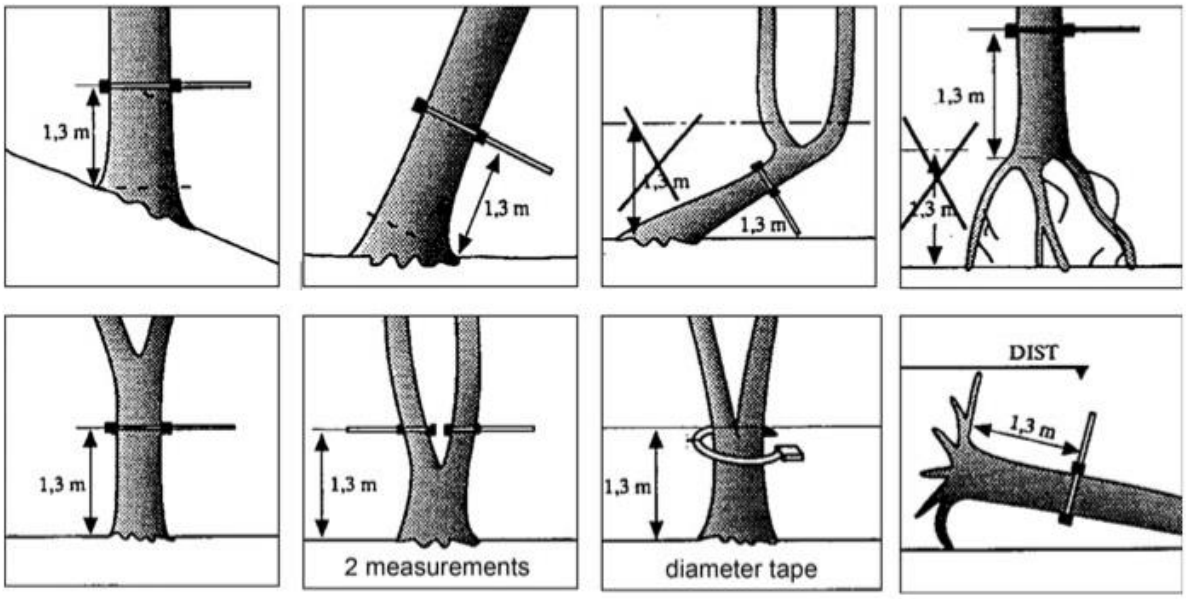


Figure 19: measuring diameter at breast height in different situations (Source: adapted from Plugge et al., 2015).

Tree height measurement

All trees in the plot will have their height measured using a digital hypsometer. The hypsometer registers the distance from the measured tree and automatically calculates the height of the tree.

Shrub cover

Shrub cover will be measured over two transects of 30 m at 3 m from the edge of the plot. Shrub cover of the plot will be the average value of shrub cover over both transects. Standard values of root-shoot ratio and carbon fractions will be used to convert shrub cover to plot biomass.

Table 34: parameters used for shrub carbon stock estimation

Parameter	Value	Source
Shrub Canopy cover	NA	Measured on the field
Root-shoot ratio (R)	0.4	CDM AR tool 14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"

Carbon fraction	0.47	IPCC "Good Practice Guidance for LULUCF". 2006. Table 4.3
Factor C to CO2	3.667	IPCC "Good Practice Guidance for LULUCF". 2006. Table 4.3

3.3.3.4.4 Monitoring frequency

Based on the VCS CCB requirements, carbon stocks will be monitored at least once every three years until the end of the crediting period.

3.3.3.4.5 Data Analysis

The data obtained will be input in allometric equations[48] for ex-post estimates of tree aboveground biomass in tropical forests (Chave et al., 2014).:

$$AGB_{est} = 0.0673 \times (\rho D^2 H)^{0.976}$$

Where:

AGB_{est} = Aboveground biomass of the measured tree, in kilograms.

ρ = Wood specific density of the measured tree, in g cm^{-3}

D = Diameter at breast height (DBH) of the measured tree, in cm.

H = Tree height, in meters.

The standard IPCC value of 0.47 will be used to convert aboveground biomass to carbon, and the carbon will be multiplied by 3.667 to be converted in tCO_2eq. Root carbon stocks will be calculated using the standard values from IPCC[49]. Deadwood and litter estimates will use the values provided in the Tool 'Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities'

3.3.3.4.6 Quality Control and Quality Assurance (QA/QC) Procedures

Project coordinators will be responsible for managing, recording and centralizing the data and documentation needed for project planning and implementation. Procedures of QA/QC will be implemented to ensure that ex-post GHG estimates are accurate, comparable, complete, conservative, consistent, relevant and transparent.

SOPs will be defined in all steps of monitoring such as field measurements, GIS analyses, data entry, data documentation and data storage. The monitoring team will be fully trained in field data collection and

[48] Allometric equations may be updated
[49] IPCC Good Practice Guidance for LULUCF. Annex 3A.1 Biomass Default Tables for Section 3.2 Forest Land. Table 3A.1.8: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf

analysis at each monitoring event. A framework of data flow and quality control procedures from the field measurements to data storage will be defined to ensure data quality

Table 35: main activities aiming to guarantee the quality of the information gathered at monitoring

QA/QC Activity	Procedures
Check for transcription errors and typos	• Check input data by a monitoring team member that was not on the field to find transcription error. • Run an automated outlier and typo analyses in R software to identify transcription errors. • Check plot spatial information: coordinates, landholing and strata. • Check that units, conversion factors and equations to estimate carbon stocks are used correctly
Check that removals are accurate	• Redo 5% of all the plots at each monitoring event, preferably using different members of the monitoring team.
Reporting and feedback	• Ensure that inconsistencies, typos and missing data are reported and corrected. • If needed, carry out additional training sessions or adapt monitoring protocol to reduce inconsistencies.
Compare to previous estimates	• To ensure consistency of the results, carbon estimates obtained will be compared to previous monitoring events. If significant changes (that do not originated from changes in carbon stocks along time) are identified, the data will be checked.

3.3.3.4.7 Monitoring of catastrophic losses of carbon stock

Non-CO2 GHG emissions resulting from the occurrence of fire in the project area will be quantified if the accumulated area affected by fire in a year is ≥5% of the project area. Fire will be monitored by frequent visits to landholders and the affected area will be delimited using geoprocessing software.

Emission of non-CO2 GHG resulting from the loss of aboveground tree biomass due to fire will be calculated in each verification period by using the aboveground biomass in trees of relevant strata calculated in the previous verification and the default values for the combustion factor, the emission factors, and the global warming potential.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

Besides the standard publication of the monitoring plan and all documents and information about the results of the monitoring and verification in the Verra platforms, the project staff will prepare summaries of the monitoring plan and monitoring results to be disseminated to stakeholders, mainly engaged landholders and landholders' associations (see section 2.3.8 Continued Consultation and Adaptive Management).

3.4 Optional Criterion: Climate Change Adaptation Benefits

The project does not seek to be validated to the Gold Level for climate change adaptation benefits.

3.4.1 Regional Climate Change Scenarios (GL1.1)

3.4.2 Climate Change Impacts (GL1.2)

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

The ReforesTerra project reforestation is aimed directly at landholders in the seven municipalities of the project zone (namely Ariquemes, Rio Crespo, Alto Paraíso, Candeias do Jamarí, Cujubim, Itapuã do Oeste and Monte Negro). Each of these municipalities constitutes a community. Data from public repositories (see section 2.1.6 Social Parameters) and stakeholder consultation (see section 2.3 Stakeholder Engagement) indicate that the seven municipalities contained in the project zone face similar socioeconomic challenges.

Well-being information

Community characteristics

Diversity within the community

Not only 39.6% of the population earns less than half a minimum wage (minimum wage is US$240/month), but also only 89.8% of the population is not under a registered employment. Thus, most of the income comes from informal work relationships and from landholding production.

Rural population composes on average 42% of the population in the municipalities, ranging from 16-68%. Mean landholding size is 131.2 ha and small landholders represent 91% of all landholdings registered in CAR in the project zone. Landholders produce very little in their landholdings: on average 41.1% of landholders have no income from their landholdings and another 42.3% make less than US$2,100/year from their landholdings.

The information obtained from public repositories and stakeholder consultation mentioned above will be complemented though the baseline survey before validation of the grouped project.

4.1.2 Interactions between Communities and Community Groups (CM1.1)

Currently there are no formal agreements between municipalities, secretariats, or landholders of different municipalities that may affect or be related to the project. However, such agreements may occur in the long term.

4.1.3 High Conservation Values (CM1.2)

Three forest reserves border the northern section of the project zone: Jacundá National Forest, Jamari National Forest and Samuel Ecological Station. However, project stakeholders and landholders in the project zone do not interact with these state-owned forests. Hence, areas of High Conservation Value for community well-being will be investigated during community baseline survey.

4.1.4 Without-Project Scenario: Community (CM1.3)

Without the project, the PPAs and LRs of the small landholdings in the project zone will remain deforested and used as degraded pasturelands. This activity exposes water bodies to erosion and may keep landholders in the marginality of environmental laws. On the other hand, state agencies face structural difficulties and even omission for supporting landholders in reforestation and enforcing environmental laws. Thus, it is expensive and landholders usually lack the resources, will or knowledge to carry out reforestation on their own, as described in section 3.1.5 Additionality, and would not be carried out without project support.

The project zone is located in the 'Amazon Deforestation Arc', a region encompassing the southern and eastern Brazilian Amazon characterized by high deforestation rates, poor law enforcement and social conflicts. In this scenario, deforestation is more pronounced in private areas, such as the landholdings in the ReforesTerra project. This is motivated by the lack of law enforcement described above as well as the mindset of some landholders that they will receive amnesty for deforestation, as occurred in the past.

Formal jobs are scarce in the project zone. On average, only 10.2% of the population in the project zone is formally employed (Table 4) Informal jobs provide less support to people, especially regarding insurance, minimum wage, social benefits, stability and retirement. Thus, labor laws and worker's health are more likely to be neglected in informal work relationships.

Xx

Landholders in the project zone already observe the reduction of water provision in the project zone (personal communications, to be confirmed by community baseline survey). Reduction of water resources may intensify in the region as drought frequency is increasing in the project zone (Figure 1 in Supporting Documentation 4.1.4 (Methods for drought frequency and intensity)). While best agricultural practices and reforestation could locally mitigate the loss of water resources, they are unlikely in the without project scenario.

Xx

Xx

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

The baseline survey will allow to identify the expected community impacts of the project as perceived by communities. For that, a dream map approach will be he future of their population in 30 years considering the benefits that the project brings to the territory. The following community impacts are expected to be identified for the ReforesTerra project.

Community Group	Landholders
Impact	Capacity building for reforestation
Type of Benefit/Cost/Risk	Predicted/Direct/Benefit
Change in well-being	Capacitation for reforestation activities, education

Community Group	Local people hired as project staff
Impact	Enhanced skills
Type of Benefit/Cost/Risk	Predicted/Direct/Benefit
Change in well-being	Capacitation for reforestation activities, education

Community Group	7 municipalities
Impact	Increased employed opportunities
Type of Benefit/Cost/Risk	Predicted/Direct/Benefit
Change in well-being	Increase in income and social benefits, capacitation, employment opportunities for women.

Community Group	Landholders
Impact	Contribution to meet legal requirements
Type of Benefit/Cost/Risk	Predicted/Indirect/Benefit
Change in well-being	Compliance with legal requirements, easier access to credit

4.2.2 Negative Community Impact Mitigation (CM2.2)

The baseline survey will allow to identify the expected negative community impacts of the project as perceived by landholders.

Potential negative community impacts of the project will be analyzed by the project team and strategies to mitigate such impacts will be co-developed with landholders and other stakeholders that may be relevant to the given impact.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

This section will result from findings of sections above. Comprehensive information on Net Positive Community Well-Being will be provided prior to validation of the grouped project.

4.2.4 High Conservation Values Protected (CM2.4)

This section will result from findings of sections above. Comprehensive information on potential effect on the HCVs related to community well-being will be provided prior to validation of the grouped project.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

To be defined after baseline data gathering with engaged stakeholders. Other potential stakeholders may be engaged as the project unfolds and will be included in future versions of the project documentation. Potential impacts on other stakeholders may include:

- Research institutions: Opportunity for research on climate, community and biodiversity aspects of the project that will be monitored
- Landholderss associations and Secretariats: use the project PES scheme to expand PES activities in the municipalities included in the project zone.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

To be defined after baseline data gathering with local communities. No negative impact on other stakeholders is expected.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

To be defined after baseline data gathering with local communities.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

Supporting document 3.3.3 (Monitoring Plan) details the indicators, methods, responsibilities, outputs and frequencies for community impact monitoring. Table xx below summarizes monitoring of community impacts.

Table 36: Community monitoring topics and indicators of the project. Further details can be found in Supporting Documentation (3.3.3 Monitoring Plan).

Topic	Indicator	Method	Frequency over the project lifetime
Community engagement	Number of direct and indirect project beneficiaries	- The number of participating landholders is obtained from the plantation database - Demographic information (i.e., age, gender, family size, income class, education level, time living in the landholding, main income sources, landholding size) will be obtained by workshops and interviews (see sheet 'Landholder engagement').	Annually when there is integration of new plots (first 3 years of the project).
Local people employment	Number of jobs created (full-time equivalents)	Track record of all staff members is kept, including contact type and duration, gender, and hometown	Every year.
	Share of the staff hired from the project zone		
Legal compliance	Number of landholders of the project zone having registered to the PRA since project start	- landholders that require PRA will be identified in the landholder engagement process (see 'Landholder engagement' sheet). - Preparation of PRA for engaged stakeholders that need it.	Annually when there is integration of new plots (first 3 years of the project).
	Number of landholders meeting legal requirements thanks to the project / Number of landholders closer to meet legal requirements	Obtained from the GIS, by overlapping the project area and legal requirements for reforestation in each landholding	Annually when there is integration of new plots (first 3 years of the project).
PES	Absolute (US$) income increase	The income from PES for each landholder will be calculated based on their annual PES earnings.	Every 3 years (i.e., before each project verification)
	Perceived wellbeing	Questionnaire encompassing the perception of project benefits to engaged landholders. The team will compare perceived wellbeing amongst project participants and baseline wellbeing obtained from participants and non-participants stakeholders obtained during	

		community baseline survey.	
Capacity building	Number and topic of staff training sessions	The name, gender, age class and location of staff that participated on capacitation activities will be registered. As well as the type of capacitation being carried out (e.g., tree planting, forest maintenance, fire prevention, etc.)	Every year that there is staff training or capacity building
	Number and topic of capacity building sessions with landholders and staff	The name, gender, age and location of the project staff and landholders that participated on capacitation activities will be registered. As well as the type of capacitation being carried out (e.g., tree planting, forest maintenance, fire prevention, etc.)	
	Number of participants to landholders' capacity building		
Gender	Share of women participating to capacity building to landholders		
	Number and share (%) of women directly and indirectly benefitting from the project	Obtained from landholders' information in the planting registry. Direct women beneficiaries are women landholders, indirect women beneficiaries are family members of landholders.	Every year that there is landholder engagement, training or capacitation.

4.4.2 Monitoring Plan Dissemination (CM4.3)

Dissemination of the monitoring plan is conducted as presented in Table 20 .

The monitoring plan will be shared with landholders and landholders' association for validation, and all engaged landholders will be informed prior to any monitoring activity in their landholding.

The results of the monitoring plan will be shared with landholders via WhatsApp and email. Additionally, a hardcopy of the monitoring report in Portuguese will be available in accessible areas for landholders, such as landholder's associations and municipality secretariats.

4.5 Optional Criterion: Exceptional Community Benefits

The project does not seek to be validated at the Gold Level for exceptional community benefits.

4.5.1 Exceptional Community Criteria (GL2.1)

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

4.5.3 Community Participation Risks (GL2.3)

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

4.5.5 Net Impacts on Women (GL2.5)

4.5.6 Benefit Sharing Mechanisms (GL2.6)

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

4.5.8 Governance and Implementation Structures (GL2.8)

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

Flora

Description of the flora biodiversity is based on a literature review on vegetation in forest remnants in the project zone. Although there are no studies in the forest structure and composition in forest remnants in small landholdings, the project zone overlaps with three Forest Reserves: Jamari National Forest, Samuel Ecological Station and Jacundá National Forest, which have been the object of biodiversity inventories. These are assumed to represent the potential biodiversity scenario within the project zone.

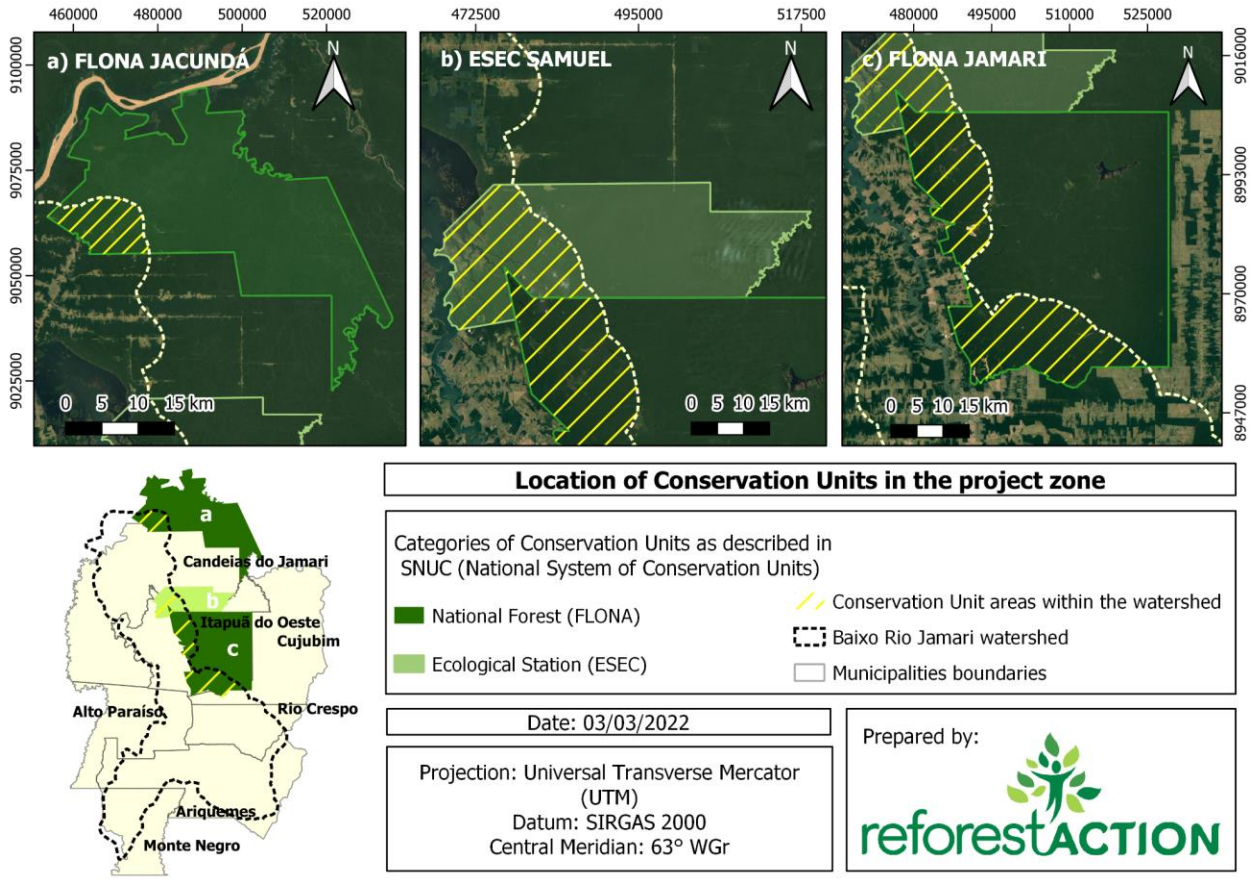


Figure 20: Location of the three forest reserves in the region, highlighting their respective overlap with the project zone.

Forest inventories in the Jamari National Forest (FLONA JAMARI), at the eastern section of the project zone, found 250 tree species belonging to 55 families, some species rare and of conservation interest, such as *Coccoloba* sp. - Cocoloba-da-folha-grande, *Huberodendron swietenioides* (Gleason) Ducke - Mungubarana, *Mezilaurus itauba* (Meisn.) Taub. ex Mez - Itaúba, *Cedrela fissilis Vell.* - Cedro, *Platymiscium trinitatis var. duckei* (Huber) Klitg. - Macacaúba and *Torresia acreana* Ducke - Cerejeira (IBAMA, 2005).

Some companies have the logging concession in FLONA JAMARI, such as AMATA. The forest census is a mandatory pre-exploratory activity, thus AMATA carried out inventories in the years 2010, 2011, 2012, 2014, 2016. More than 150 thousand individuals were found in approximately 9,394 hectares (17 ind.ha^{-1} with DBH greater than 40 cm), average basal area found was 6.74 m².ha^{-1} and average volume of 76.37 m³.ha^{-1}. There are more than 150 tree species in this area, the most common are: *Protium robustum* (Swart) D.M. Porter - Breu, *Peltogyne paniculata* Benth. - Roxinho, *Astronium lecointei* Ducke - Muiracatiara, *Tachigali* sp. - Tachi, *Bertholletia excelsa* Humb. & Bonpl. - Castanheira, *Pouteria guianensis* Aubl. - Abiu, *Cariniana micrantha* Ducke - Tauari-vermelho and *Couratari stellata* A. C. Sm. - Embireira, these species have great economic importance due to timber. The inventory also found the Brazil nut (*Bertholletia excelsa* Humb. & Bonpl.), considered as a Vulnerable species in the IUCN Red List[50] (AMATA, 2010, 2011, 2012, 2014a, 2014b, 2016).

[50] https://www.iucnredlist.org/

In the Samuel Ecological Station Reserve (ESEC) more than 400 flora species were found, including trees, shrubs, lianas, and herbs (ELETROBRAS, 2015). In one hectare, 483 trees were found, being 207 morphospecies, from 41 families, the most representative species were Fabaceae (83 individuals), Moraceae (82 ind.), Burseraceae (41 ind.) e Lecythidaceae (26 ind.). The ESEC has a low occurrence of epiphytes, especially in the upland forests, the Araceae: *Phyllodendrum* sp., *Anthurium* sp. and *Heteropsis* sp. The understory has typical species such as *Piper* spp., *Calathea* spp., *Ischnosiphon* spp., *Costus* spp., *Heliconia* spp., *Pariana* spp. and *Selaginela* spp. (ELETROBRAS, 1993 apud ELETROBRAS, 2015[AFM4]). There is a predominance of dense and open submontane rainforests that contain several the emerging species: *Bertholletia excelsa* Bonpl. - Castanheira, *Cariniana decandra* Ducke - Tauarí, *Eschweilera atropetiolata* S.A.Mori - Castanha-vermelha, *Qualea paraensis* Ducke - Mandioqueira, *Dipteryx odorata* (Aubl.) Forsyth f. - Cumaru, *Dinizia excelsa* Ducke - Angelim-vermelho, *Hymenolobium sericeum* Ducke Angelim-damata, *Astronium lecointei* Ducke - Muiracatiara, *Parkia pendula* (Willd.) Benth. ex Walp. - Visgueiro, *Parkia multijuga* Benth. - Faveira-arara-tucupi, *Enterolobium schomburgkii* (Benth.) Benth. - Orelha-de-macaco, *Anacardium giganteum* Loudon ex Steudel - Cajuí, *Bombacopsis nervosa* (Uittien) A.Robyns - Munguba-da-mata, *Huberodendron swietenioides* (Gleason) Ducke - Mungubarana, *Schizolobium amazonicum* Huber ex Ducke - Paricá, *Caryocar villosum* (Aubl.) Pers. - Piquiá, *Caryocar pallidum* A.C.Sm. Piquiarana, *Tabebuia incana* A.H.Gentry - Ipê-amarelo, *Peltogyne exelsa* (roxinho), *Protium hebetatum* (breu-vermelho), *Copaifera multijuga* (copaíba), *Eschweilera sp.* - Matá-matá, *Brosimum rubescens* Taub. - Pau-rainha, *Osteophloeum platyspermum* (Spruce ex A.DC.) Warb. - Ucuúba-branca, *Hymenaea intermedia* Ducke - Jatobá, *Dialium guianensis* (Aubl.) Sandwith - Jutaí-pororoca, *Licania heteromorpha* Benth. - Macucu-sangue and *Neea floribunda* Poepp. & Endl. - joãomole. The lianas are *Connarus* sp., *Strychnos* sp., *Nemora* sp., *Arabidea* sp., *Doliocarpus* sp., *Abuta* sp., *Acacia* sp., *Derris* sp., *Machaerium* sp., *Dalbergia* sp., *Bauhinia* sp. and *Maripa* sp. (ELETROBRÁS, 2015).

The inventory in the Jacundá Nation Forest found 2662 individuals belonging to 285 species (trees and lianas) and 55 families, the most representative families were Fabaceae, Euphorbiaceae, Annonaceae, Sapontaceae, Lecythidaceae, Moraceae, Chrysobalanaceae. The main species found were: *Dialium guianensis* (Aubl.) Sandwith - Jutaí-pororoca, *Eschweilera bracteosa* (Poepp. ex O.Berg) Miers - Matamatá amarelo, *Naucleopsis caloneura* (Huber) Ducke - Muiratinga folha grande, *Ocotea cinerea* van der Werff - Louro preto, *Pouteria caimito* (Ruiz & Pav.) Radlk. - abiurana vermelha, *Protium apiculatum* Swart - Breu vermelho, *Euterpe precatoria* Mart. - açaí, *Guatteria discolor* R.E.Fr. - Envira preta, *Heisteria duckei* Sleumer - Chupeta de macaco and *Helicostylis scabra (J.F.Macbr.) C.C.Berg* - Inharé (ICMBIO, 2010).

Table 37:Species of flora reported at Baixo Rio Jamari Watershed with the most critical conservation status, according to IUCN and MMA no. 443 of 12/17/2014[51].

Family	Specie	IUCN Category	Portaria MMA nº443, of 12/17/2014
Lauraceae	*Mezilaurus itauba* (Meissn.) Taub. ex Mez	VU	VU
	Ocotea tabacifolia (Meisn.) Rohwer		EN

[51] http://cncflora.jbrj.gov.br/portal/static/pdf/portaria_mma_443_2014.pdf

Family	Specie	IUCN Category	Portaria MMA nº443, of 12/17/2014
Lecythidaceae	*Bertholletia excelsa* Humb. & Bonpl.	VU	VU
Meliaceae	*Cedrela fissilis* Vell.	VU	VU
Myristicaceae	*Virola surinamensis* (Rol.) Warb.	EN	VU
Fabaceae	*Hymenolobium excelsum* ducke		VU

Fauna

A literature review of fauna composition in the project zone was performed to describe wildlife biodiversity. The Amazon Rainforest is the largest and most diverse rainforest in the world. It is estimated that there are 40,000 species of plants, 427 mammals, 1294 birds, 378 reptiles, 427 amphibians and 3,000 fishes (Rylands et al., 2002).

In the Jamari National Forest, 39 species of mammals distributed in 17 families, 151 birds from 43 families, 33 fish from 11 families, 8 amphibians and 16 reptiles were identified. It is estimated that there may be up to 183 species of fish in the region. Fish species with potential for aquarism were found, such as M*onocirrhus poliacanthus* - Leaffish, *Mesonauta* sp. - Cará, *Hemiodus* sp. - Cruzeiro-do-sul, *Characidium* sp., *Axelrodia* sp, *Pyrhulina* sp. and *Nannostomus* sp. Other iconic species found on land were such as *Panthera onca* - Jaguar, *Tapirus terrestris* - Tapir, *Myrmecophaga tridactyla* - Anteater, *Leopardus wiedii* - Margay that are at risk of extinction were found (IBAMA, 2005).

At ESEC it is estimated that there are 115 species from 21 families of fish in the Jamari River, 81 amphibians from 10 families, 93 species of reptiles, 194 birds from 47 families, 128 mammals from 34 families (ELETROBRÁS, 2015).

In the Jacundá National Forest it is estimated that there are 100 species of mammals, especially the *Panthera jaguar* - Jaguar and *Tapirus terrestris* - Tapir; 201 species from 44 families of birds, most of them frugivorous (34.8%), 7 species are migratory: *Tytira cayana, Tyrannus savanna, Podager nacunda, Chaetura spinicauda, Tringa solitaria, Pyrocephalus rubinus* and *Progne subis*; 36 amphibians, 40 fish and 167 arthropods were found (ICMBIO, 2010).

Table 38: Species of fauna reported at Baixo Rio Jamari Watershed with the most critical conservation status, according to IUCN and MMA no. 444 of 12/17/2014[52].

[52] http://cncflora.jbrj.gov.br/portal/static/pdf/portaria_mma_443_2014.pdf

Class	Family	Specie	IUCN Category	Portaria MMA nº444, of 12/17/2014
Mammals	Felidae	Leopardus wiedii	NT	VU
		Panthera onca	NT	VU
	Myrmecophagidae	Myrmecophaga tridactyla	VU	VU
	Atelidae	Ateles paniscus	VU	
		Lagothrix lagothricha	VU	VU
	Mustelidae	Pteronura brasiliensis	EN	VU
	Tayassuidae	Tayassu pecari	VU	VU
	Tapiridae	Tapirus terrestris	VU	VU
Birds	Tinamidae	Tinamus tao	VU	VU
	Strigidae	Pulsatrix perspicillata		VU
	Accipitridae	Harpia harpyja	VU	VU
Reptilia	Podocnemididae	Podocnemis unifilis	VU	

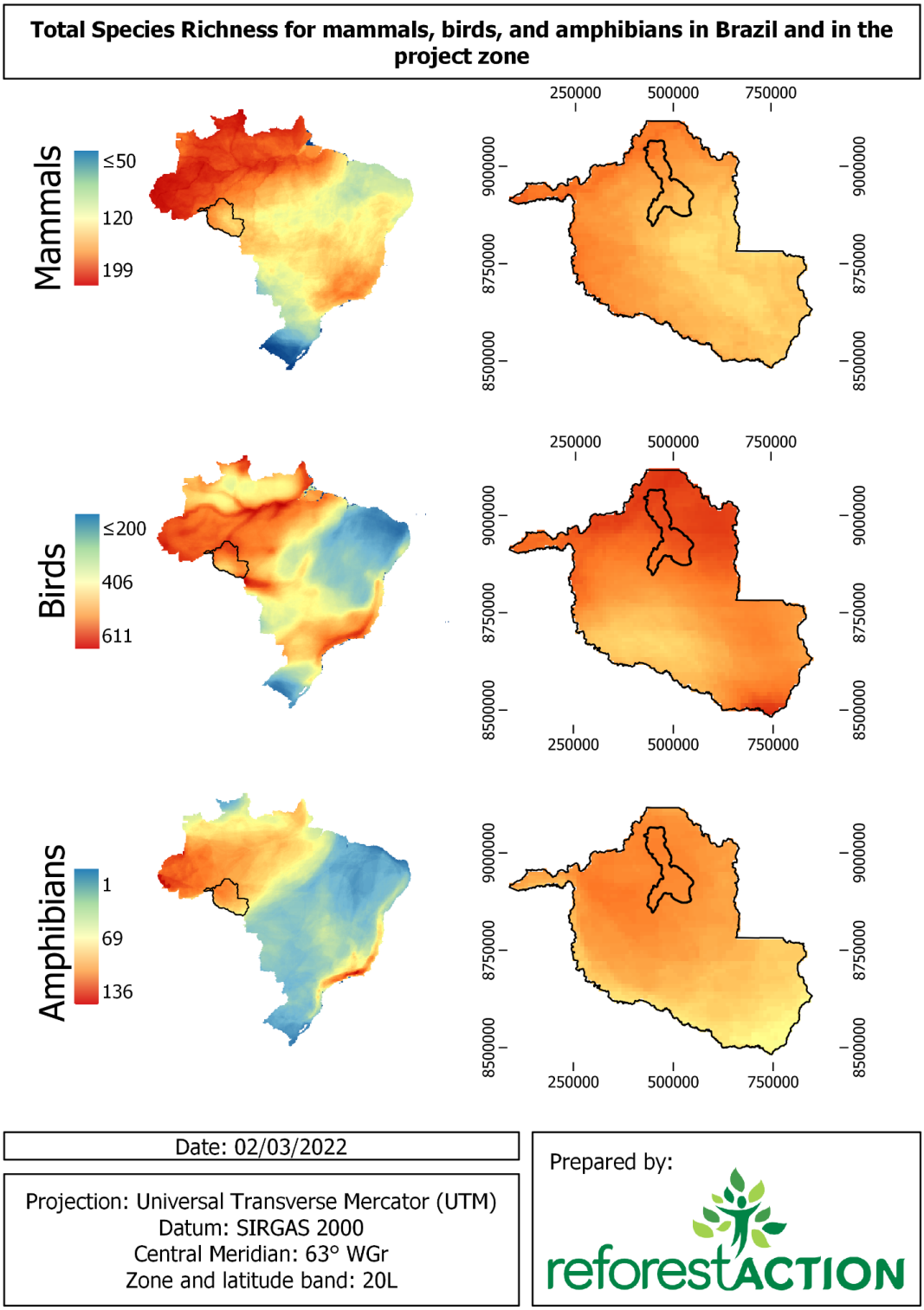


Figure 21: Total species richness for mammals, birds and amphibians in the project zone (Jenkins et al., 2015)

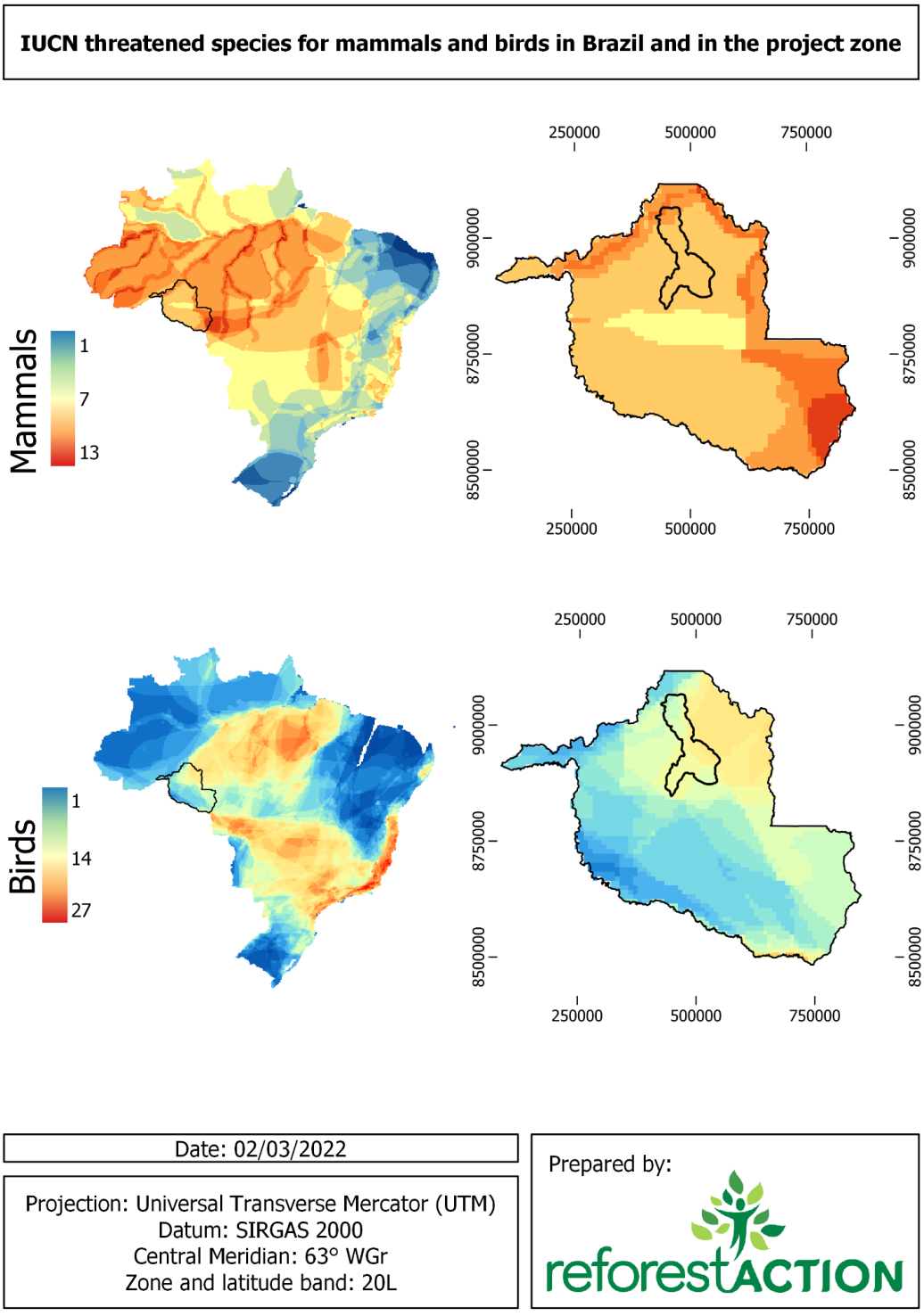


Figure 22: International Union for the Conservation of Nature (IUCN) threatened species for mammals and birds in the project zone (Jenkins et al., 2015)

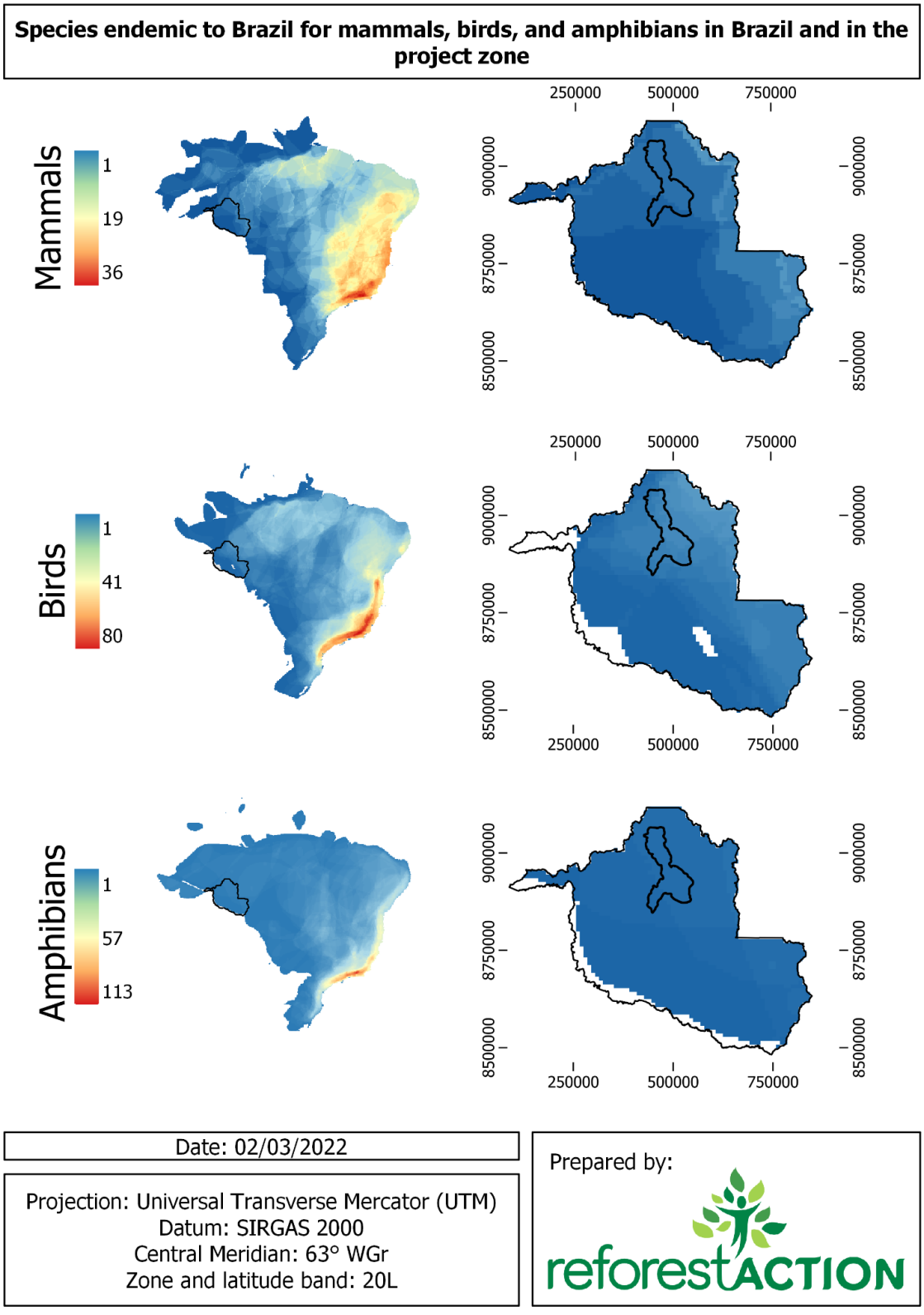


Figure 23: Species endemic to Brazil for mammals, birds and amphibians in the project zone (Jenkins et al., 2015)

The information presented in this sub-section will be complemented by an inventory of bird species in the project area before planting, as well as in forest remnants in the project zone. This will allow to complement information from secondary sources and will establish a baseline for bird community-related indicators. Results of the inventory will be presented in the first monitoring report.

5.1.2 High Conservation Values (B1.2)

Three forest reserves border the northern section of the project zone: Jacundá National Forest, Jamari National Forest and Samuel Ecological Station. However, project stakeholders and landholders in the project zone do not interact with these state-owned forests and project activities are not going to be carried out in these areas. Also, these areas do not house most populations of native or endangered species in the project zone.

5.1.3 Without-project Scenario: Biodiversity (B1.3)

In the absence of the project activities, the project area would continue to be managed as the continuation of pre-project land use scenario (degraded pasturelands). Spontaneous natural regeneration of trees would be prevented in degraded pasturelands due to competition with invasive fodder grasses, trampling and herbivory from cattle, frequent fire events and eventual mowing of shrubs and trees by landholders (see section 3.1.5 Additionality, sub-step 2a – Ecological barriers). Over time, such activities would deplete the native seed bank of the area, and the thick layer of invasive grasses and litter would prevent native seed rain to establish in the area.

In some cases, degraded pasturelands may lead to the siltation of water springs and runoff of manure, continuously reducing quality and quantity of water resources in the project zone.

Hence, without reforestation the project area would remain as degraded pastureland, and the biodiversity benefits of the project activities would not be achieved.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Flora
Estimated Change	Positive
Justification of Change	Framework Tree Planting reforestation method will include >90 native tree species, some of them being endangered species such as *Bertholletia excelsa* and *Cedrela odorata*. Tree seedlings are produced from local nurseries collecting seeds from several 'matrices' trees in the region for each species, providing genetic diversity for tree plantings. Assisted natural regeneration creates conditions for tree seedlings that were suppressed due to current land-use activities to develop in the project area. Species in these areas come naturally from surrounding forest remnants and the seed bank and are the most adapted to local conditions. Some of the

	species in these areas are not produced in nurseries, hence the species composition of the assisted natural regeneration areas may be complementary to Framework Tree Planting areas, creating a larger pool of native tree species that benefit from the project. In the long term, these forests attract seed dispersers and create conditions for the spontaneous regeneration of native tree species that were not planted to perpetuate the forest beyond the lifetime of the trees that were established by reforestation activities.

Biodiversity Element	Fauna
Estimated Change	Positive
Justification of Change	Forests established by project activities will expand and connect existing forest remnants and turn deforested areas into more suitable habitat for fauna. In particular, bird species benefit from forest environments for feeding and nesting, especially those that require forests and forest understory. The project zone is home to more than 450 bird species, of which more than 5 are endangered. Hence, reforestation will benefit a myriad of species in the project zone.

Biodiversity Element	Enhanced biodiversity through enhanced water availability and quality
Estimated Change	Positive
Justification of Change	Forests around water bodies reduce sedimentation and runoff of agricultural inputs into water bodies. In the long term, reforestation activities of the project are expected to increase water quantity and quality surrounding the water springs protected by the project zone. While at the scale of the project zone these impacts may be small, negative impact of agricultural activities in water resources will be mitigated by reforestation from project activities. Improved water availability and quality may in turn lead to positive impacts for biodiversity. The project expects to improve the following water attributes: dissolved oxygen, conductivity, pH, temperature and turbidity.

5.2.2 Mitigation Measures (B2.3)

Reforestation activities conducted as part of the project will follow a set of procedures from seedling production to tree planting to mitigate negative biodiversity impacts. The procedures to mitigate biodiversity impacts are listed in Table 39 below.

Table 39: List of procedures and activities to mitigate biodiversity impact

Water use in nurseries	- Seedling watering is automated and scalonated according to the requirements of different life stages of the seedlings (i.e., young sprouts and seedlings being climatized for field conditions receive less water in the nursery). - The automated system allows watering to be interrupted in rainy days or reduced in cloudy or colder days. - Nursery staff is trained on the management and maintenance of the automated system and on the efficient use of water.
Handling fertilizers	TBC
Handling herbicides	TBC
Fires	- During the first two years after planting, control of invasive grasses reduces the amount of flammable material in the reforestation areas. - Landholders are be trained on fire prevention in the project area.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

Compared to the continuation of pre-project land use scenario (i.e., degraded pastureland), reforestation activities carried out as part of the ReforesTerra project will generate net positive biodiversity impacts thanks to the establishment of highly diverse native tree forests that will provide in-situ conservation of native trees, protect water bodies and provide habitat for wildlife in the project zone.

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These positive impacts will benefit wildlife and tree communities in the project zone, including fauna and flora endangered species.

5.2.4 High Conservation Values Protected (B2.4)

Reforestation activities will not be carried out in public forest reserves, or in areas that could affect these reserves. Moreover, non-native trees planted are chosen to be non-invasive (see list IUCN of invasive species[53]). Hence the non-native species used in this project would not invade existing forest remnants or forest reserves. Therefore, these HCVs will not be harmed by forest activities.

5.2.5 Species Used (B2.5)

Table 40: preliminary list of species used for project activities (subject to change in the final version)

[53] http://www.iucngisd.org/gisd/

Common name	Scientific Name	Framework planting group
Abiu	Pouteria caimito (Ruiz & Pav.) Radlk.	Cover
Abiu do mato	Pouteria sp.	Diversity
Almecegueira	Protium sp.	Cover
Amapá	Parahancornia amapa	Diversity
Andiroba	Carapa guianensis Aubl.	Cover
Angelim	Angelim sp.	Diversity
Angelim saia	Parkia pendula (Willd.) Benth. ex Walp.	Diversity
Angico	Anadenanthera peregrina (L.) Speg.	Cover
Araça	Eugenia stipitata McVaugh	Cover
Arapari	Macrolobium acaciifolium Benth.	Cover
Arueira	Astronium urundeuva (M. Allemão) Engl.	Diversity
Bacupari	Garcinia gardneriana (Planch.& Triana) Zappi	Cover
Bacuri	Garcinia macrophylla Mart.	Cover
Bajinha de paca	Stryphnodendron pulcherrimum (Willd.) Hochr.	Cover
Bandarra	Schizolobium parahyba var. amazonicum (Huber ex Ducke) Barneby	Cover
Biribá	Annona mucosa Jacq.	Cover
Biriba do mato	Annona sp.	Cover
Breu	Protium heptaphyllum (Aulbl) March.	Diversity
Breu Amesclao	Trattinickia rhoifolia Willd.	Cover
Cacaui	Theobrama speciosum Willd ex spreng.	Cover
Caferana	Toulicia guianensis Aub.	Cover
Caixeta	Simarouba amara Aub.	Diversity
Caja (Tabereba)	Spondias mombin L.	Cover
Camu-camu	Myrciaria dubia (Kunth) McVaugh	Cover
Caroba	Jacarandar copaia (Aubl.) D. Don	Cover
Castanha do Pará	Bertholletia excelsa Bonpl.	Diversity
Cerejeira	Amburana acreana (Ducke) A.C.Sm.	Diversity
Cedro fissilis	Cedrela fissilis Vell.	Diversity
Cedro odorata	Cedrela odorata L.	Diversity
Coloral do mato	Bixa arborea Huber.	Cover
Copaiba	Copaifera langsdorffii Desf.	Diversity
Copaiba Multijuga	Copaifera multijuga	Diversity
Copaibão	Copaífera grycycarpa Ducke.	Diversity
Cumaru	Dipteryx odorata (Aubl.) Willd.	Diversity
Cupuaçu	Theobroma grandiflorum (Willd. ex Spreng.) K.Schum.	Diversity
Embiruçu	Eriotheca pentaphylla (Vell.)A.Robyns	Cover
Faveira ferro	Dinizia excelsa Ducke	Diversity
Feijao cru	Samanea tubulosa (Benth.) Barneby & J.W.Grimes	Cover

Common name	Scientific Name	Framework planting group
Freijó	Cordia goeldiana Huber	Diversity
Garapa	Apuleia leiocarpa (Vogel) J.F.Macbr.	Diversity
Garrote	Bagassa guianensis Aubl	Diversity
Guariuba	Clarisia racemosa Ruiz &Pav	Diversity
Inga chichica	Inga laurina (Sw.) Willd.	Cover
Inga de metro	Inga edulis Mart.	Cover
Inga do mato	Inga sp.	Cover
Inga feijao	Inga marginata Willd.	Cover
Inga Mari Mari	Cassia leiandra Benth.	Cover
Ipê amarelo nativo	Tabebuia serratifolia	Diversity
Ipê roxo nativo	Handroanthus impetiginosus (Mart. ex DC.) Mattos	Diversity
Itauba	Mezilaurus itauba (Meisn.) Taub. ex Mez	Diversity
Jatai pororoca	Dialium guianense (Aubl) Sandwith	Diversity
Jatobá	Hymenaea courbaril L.	Diversity
Jatobazinho	Hymenaea parvifolia Huber	Diversity
Jenipapo	Genipa americana L.	Cover
Jenipaparana	Genipa infundibuliformis Zappi & Semir (*non-native*)	Cover
Jequitiba	Allantoma decandra (Ducke) S.A.Mori, Ya Y.Huang & Prance	Diversity
Mamui	Jacaratia digitata (Poepp. & Endl.) Solms	Cover
Mata-matá	Eschweilera cariacea (DC.) Sa Mori	Cover
Mirindiba	Terminalia tetraphylla (Aubl.) Gere & Boatwr.	Diversity
Mogno	Swietenia macrophylla King	Diversity
Morototó	Didymopanax morototoni (Aubl.) Decne. & Planch.	Cover
Muiracatiara	Astronium lecointei Ducke	Diversity
Murici	Byrsonima crispa A.Juss.	Cover
Painera	Ceiba speciosa (A.St.-Hil.) Ravenna	Cover
Painera vermelha	Pseudobombax munguba (mart. & Zucc.) Dugand	Cover
Parica	Parkia multijuga Benth.	Cover
Pau de Balsa	Ochroma pyramidale (Cav. Ex Lam.)	Cover
Pau de espinho	Senegalia polyphylla (DC.) Britton	Cover
Pau jacare	Piptadenia gonoacantha (Mart.) J.F.Macbr.	Cover
Peroba guatambu	Aspidosperma parvifolium A. DC.	Diversity
Pintadinho	Poeppgia procera (Poepp. Ex Spreng.) C. Presl	Cover
Pitomba	Talisia esculenta (Cambess.) Radlk.	Cover
Quariúba	Clarisia racemosa Ruiz &Pav.	Diversity
Quina-quina	Geissonspermum laeve (Vell.) Miers	Diversity

Common name	Scientific Name	Framework planting group
Roxinho	Peltogyne sp.	Diversity
Sangue de dragao	Croton lechleri Müll. Arg.	Cover
Seringa	Hevea brasiliensis (Willd. Ex A.juss.) Mull.arg.	Cover
Sorva	Coumo utilis Muell.	Diversity
Sucuuba	Himatanthus phagedaenicus (Mart.) Woodson	Cover
Tachi	Tachigali sp.	Diversity
Tachi vermelho	Tachigali sp.	Cover
Tauari Branco	Couratari guianensis Aubl.	Diversity
Timborio	Enterolobium contortisiliquum (Vell.) Morong	Cover
Tuturuba	Pouteria macrophylla (Lam.) Eyma	Diversity
Urucum	Bixa orellana L.	Cover
Virola	Virola venosa (Benth.)	Diversity
Ipê amarelo liso	Handroanthus sp.	Diversity
Roxinho vogel	Peltogyne vogel	Diversity
Sucupira preta	Diplotropis purpurea	Diversity
Mapati	Pouroma guianensis	Cover
Sapotinha roxa	Pouteria gardneri	Cover
Angelim pedra	Hymenolobium petreum Ducke	Diversity
Fava arara tucupi	Parkia sp.	Cover
Caucho	Castilla ulii Warb.	Diversity
Mapati	Pouroma guianensis	Cover
Fava atanã	Parkia gigantocarpa Ducke	Cover

5.2.6 Invasive Species (B2.5)

None of the tree species used in reforestation activities of the project is considered invasive.

5.2.7 Impacts of Non-native Species (B2.6)

Species	*Genipa infundibuliformis*
Justification of Use	Its fruits are appreciated by local communities. It is used in rural areas due to ornamental value and fruit consumption.
Potential Adverse Effect	There are no records of invasion of forest remnants by this species, and it is not included in the registries of invasive species in Brazil[54]. No adverse effects on wildlife, native species or the propagation of pathogens have been observed for this species.

[54] https://www.ima.sc.gov.br/index.php/biodiversidade/biodiversidade/especies-exoticas-invasoras

5.2.8 GMO Exclusion (B2.7)

No GMOs are used in the project activities. All seeds for seedling production come from local native tree matrices found in native forest remnants.

5.2.9 Inputs Justification (B2.8)

Name	Roundup Glyphosate Herbicide
Justification of Use	The use of glyphosate-based herbicides is needed to cost-efficiently control invasive fodder grasses that cover the project area. By eliminating the invasive grasses, competition with native tree seedlings aboveground (light) and belowground (water and nutrients) is greatly reduced. Glyphosate is widely used in reforestation projects in many parts of the world, including the tropics (Weidlich et al., 2020). Not using herbicide could greatly compromise trees development: controlling grasses using this chemical increases seedling height by 2 times, and canopy and basal area growth by 5 times when compared to mowing, while reducing reforestation costs in half (Florido et al., 2021).
Potential Adverse Effect	If applied before intense rainfall, glyphosate may contaminate nearby water bodies (Florido et al., 2021). Additionally, continuous application of herbicide in an area may alter soil microbiota (Florido et al., 2021). To reduce these effects, the project will only apply herbicide when there is no forecast or signs of rain in the area. Also, herbicide will be applied using a tractor once before tree planting in the full area, after that, it will be applied using backpack sprayers only over resprouting invasive grasses, if needed, for the next 2 years after planting. Native trees next to invasive grasses may be damaged if herbicide is misapplied. To prevent that, herbicide backpack spraying after tree planting will have drift guards attached at the end of the sprayer, preventing damage to non-target plants. Additionally, herbicide will never be applied by planes or during windy days.

Name	Fertilizer

Justification of Use	Soils in the project zone and in deforested areas of the Amazon in general are notably poor, especially when deforestation occurred years ago and no best practices or inputs have been applied in the area. Hence, fertilization is needed to ensure seedling development. Fertilization in reforestation with native seedlings can increase seedling growth and carbon stocks significantly when compared to non-fertilized areas (Ferez et al., 2015). The addition of Nitrogen (N), Phosphorus (P) and Potassium (K) aims to provide nutrients to boost seedling above and belowground growth in the critical early stages after planting.
Potential Adverse Effect	When applied directly in contact with the seedling root system, the fertilizer may damage finer roots and compromise seedling growth. Hence, fertilization will be done in small holes around 20cm next to native seedlings, to prevent damage and facilitate absorption. After heavy precipitation events, surface fertilizer may runoff to nearby water bodies and foment eutrophication. The amount of fertilizer used (only 200g per tree or 320 kg per hectare) applied only one time after planting is not enough to generate eutrophication. Nevertheless, fertilization will be done in small holes next to seedlings, and covered with dirt, which will reduce runoff.

5.2.10 Waste Products (B2.9)

Handling of chemical products will follow the technical, security and safety recommendations of the fabricant. In summary, the main procedures for handling chemical products are:

- Herbicide: full personal protective equipment suit, including impermeable rubber boots and gloves, hood, glasses and breathing mask. Herbicides will not be applied when there is a forecast or signs of rain in the following 4 hours after application and it will be applied using drift guards.
- Fertilizer: gloves and cloth breathing masks. The field staff will never put fertilizer in direct contact with their skin or breath close to it.
- All storage and discarding procedures of herbicides and fertilizers will follow the recommendations and procedures from the fabricant, addressing empty packages to the correct disposal. In no circumstance will packages be reused.
- The washing and maintenance of machinery, tools, and containers is forbidden in areas close to natural drainages or water sources.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

There are no negative impacts on biodiversity outside the project zone resulting from project activities.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

As mentioned in section 5.3.1 Negative Offsite Biodiversity Impacts and Mitigation Measures, no negative biodiversity impacts are expected outside the project area.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

Flora biodiversity monitoring

Project impact on flora biodiversity will be measured by characterizing the composition, structure and species richness of trees established by project reforestation activities every three years (i.e., before each verification event).

Species will be identified to the lowest taxonomic level possible. Threatened species will be identified based on the IUCN Red List database[55] and in national lists of threatened species[56]. Species will also be classified as endemic and native/non-native. Additionally, key indicators related to forest structure (canopy cover) and long-term forest permanence (spontaneous natural regeneration and invasive grass cover) will be measured.

All data will be collected by trained personnel accompanied by at least one field botanist with experience in identifying tree species planted and naturally occurring in the project zone. Data will be collected in 15x30 m (450 m²) plots through random stratification including different landholdings and reforestation methods.

Bird biodiversity monitoring

Bird community is sampled using point counts in the project area. Points counts data is collected by an experienced ornithologist and his/her team staying in a given point for 20 minutes recording bird sightings and hearings. Binoculars and recorders are used to improve bird sighting chance and to identify species based on their vocalization, respectively. If possible, indirect evidence such as nests and feathers are also used to identify species occurrence in each point. Data is collected during the most active times for birds (dawn and dusk).

Once bird species are identified to the lowest taxonomic level possible in each point, data is gathered on the trophic guild based on Sick (1997), if the species is native or non-native and if it is threatened based on the IUCN Red List.

[55] https://www.iucnredlist.org/
[56] Brazil's national list of threatened species: https://ckan.jbrj.gov.br/dataset/23f2e24c-5676-4acd-83f0-03621cba4364/resource/53e32c38-9d0e-486c-8b4e-666ddbb30429/download/especiesportaria443.pdf

Point counts are allocated through random stratification considering different landholdings and reforestation methods, and a minimum distance of 100 m between points. Sighted species are photographed when possible.

Water quality and quantity

Water monitoring is carried out in water springs and water streams (hereafter collectively referred as "water bodies") where project activities are carried out and nearby deforested water bodies in landholdings that do not participate of project activities, in order to compare the impacts of project reforestation activities with a without project scenario. Water bodies that will receive reforestation will also be measured for water quality and quantity before project activities in order to accompany the changes in the same water body along time. Water monitoring will be carried out every three years (i.e., before each verification event).

Water quantity is measured using the Acoustic Doppler Profile of the SonTek RiverSurveyor system. This method is accurate, simple and flexible enough to be used in most pluvial scenarios If the water body does not fit the criteria from the use of the Acoustic Doppler Profile, a pluviometry micro-windlass for water measurement is used.

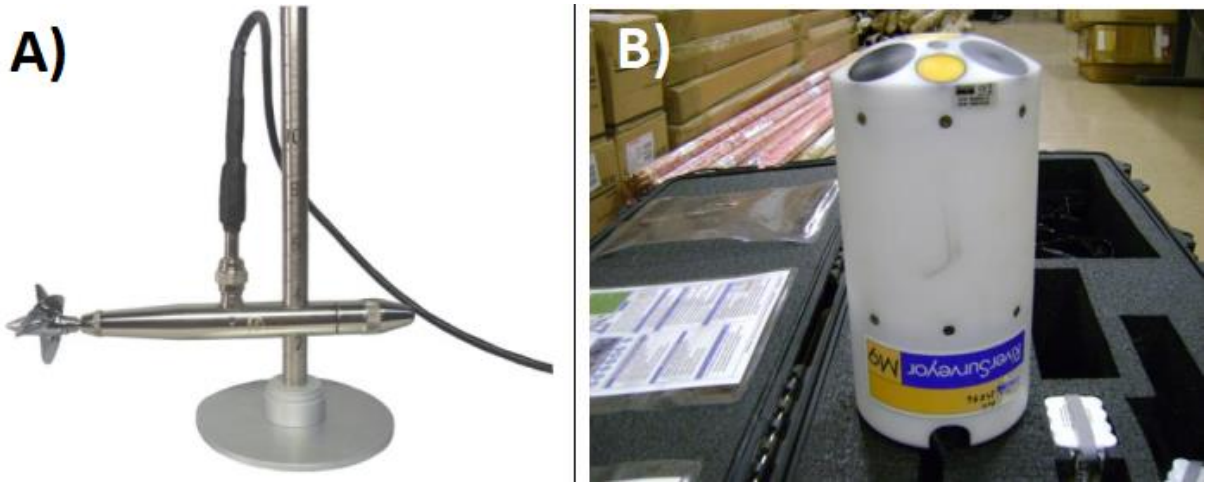

Figure 24: A) pluviometric micro-windlass; B) SonTek RiverSurveyor system for Acoustic Doppler Profile.

Water quality is measured using a multiparametric probe on water bodies to quantify water dissolved oxygen, conductivity, pH, temperature, and turbidity.

Figure 25: Multiparametric probe used to quantify dissolved oxygen, conductivity, pH, temperature, and turbidity.

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Dissemination of the monitoring plan will be carried out through the channels listed in Table 20 of section 2.3.8 Continued Consultation and Adaptive Management. The monitoring plan will be shared with landholders and landholders' associations before validation, and all engaged landholders will be informed prior to any monitoring activity in their landholding.

The summaries and the results of the monitoring plan will be shared with landholders via WhatsApp and email. Additionally, a hardcopy of the monitoring report in Portuguese will be available in accessible areas for landholders, such as landholder's associations and municipality secretariats.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

The project does not seek to be validated to the Gold Level for climate change adaptation benefits.

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

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