WESTERN AMAZON REDD+ GROUPED PROJECT

Document prepared by Carbon Credits Consulting Brazil

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Project Title	Western Amazon REDD+ Grouped Project
Version	01
Date of Issue	30-Apr-2022
Project Location	Brazil, State of Acre, Municipalities of Capixaba; Porto Acre; Sena Madureira; Senador Guiomard and State of Amazonas, Municipalities of Boca do Acre and Lábrea.
Project Proponent(s)	Carbon Credits Consulting SRL Dr. Davide Rossi dr@carboncreditsconsulting.com, +55 67 99254-3491
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Validation Body	Rina Brasil Serviços Técnicos LTDA saopaulo.office@rina.org, +55 11 9330-0817
Project Lifetime	01-Jan-2019 – 31-Dec-2048: 30 years
GHG Accounting Period	01-Jan-2019 – 31-Dec-2048: 30 years
History of CCB Status	First validation
Gold Level Criteria	Gold Level criteria *GL3. Exceptional Biodiversity Benefits,* meeting the CCB Standard vulnerability criterion for presenting critically endangered or threatened species (according to IUCN Red List).
Expected Verification Schedule	September 2022

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1 SUMMARY OF PROJECT BENEFITS

The Western Amazon REDD+ Grouped Project (WARG Project) arises from the initiative of Carbon Credits Consulting SRL and a group of landowners in the state of Acre to protect the forest remnants in their properties. These areas are in the region known as the Amazon deforestation arc and are situated in a context of high conversion rates from original forest habitat to pasture and/or large areas of agricultural crops.

Beyond the changing landscape context, these remaining threatened areas are not fully protected, as the state structure for monitoring and combating deforestation is inefficient, in addition to the failures of governments throughout history to properly enforce environmental laws.

The basis Brazil's economy in its recent history, especially in the south of the Brazilian Amazon region, was based on native forest clearing aiming at increasing economic gains through cattle-ranching, often without appropriate management technologies. Considering the infertile soil under the Amazon Forest, its exposure to the weather and to little improvement technology causes low productivity, which in term requires more and more forest clearing to ensure profitability.

Also associated in this context are the misappropriation of land by squatters, who occupy non-destined land, and sometimes the edges of protected areas. This phenomenon of illegal occupation is also an important driver of deforestation in the region.

Initiatives such as the WARG Project have great potential for preserving the remaining forest in the south of the Amazon, targeting deforestation control, and protecting these areas on properties. As complementary measures to the presence of the project, activities that benefits the climate, community and biodiversity will be developed.

Regarding climate benefits, the landowners were already developing activities to protect the forests with the implementation of delimiting fences to prevent invasions, and small local patrols to check the areas surroundings.

The WARG project intends to include significant improvements in the areas monitoring, with remote sensing technology implementation, to identify any signs of modification in the Project Area and surroundings, in addition to training staff for field monitoring. The project's presence is expected to reduce emissions in 3,548,472 tCO2eq in the first 10 years from 6,188 hectares of avoided deforestation.

Regarding communities' benefits, the initial focus will be on the educational part, with improvements in technical and fire mitigation training. Scientific research activities on biodiversity will also be carried out with community involvement.

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Climate Benefits: In the WARG Project, it is expected a benefit to mitigation of climate change due to the reduction of the emission of 3,548,472 tCO2eq in the first 10 years of the Project. This reduction is a result due to the avoidance of 6,188 ha of deforestation in the Project Areas in the next 10 years.	3

2) Community Benefits: The expected communities' benefits will be focused on educational issues, with training actions and research support in the property areas. The training will be in the technical/professional scope, and research will be for data collection, information production and scientific dissemination of the properties participating in the project. Actions will also be taken to improve the communication infrastructure, with the objective of increasing people's access to knowledge. Actions that benefit communities have the potential to generate positive impacts on quality of life, resilience to adverse events and knowledge of local communities.	4
3) Biodiversity Benefits: The WARG Project intends to generate benefits by maintaining and monitoring native forest cover of the Project Area, in parallel with habitats and local biodiversity conservation, including species with some level of threat according to IUCN Red List. It is intended to develop scientific research on fauna and flora in the Project Area and surroundings, to increase and improve the biodiversity database, improving the effectiveness of management project activities.	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	Not applicable	
	Net estimated emission reductions in the Project Area, in the first 10 years, measured against the without-project scenario	3,548,472 tCO2eq	3
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	6,188 ha	3
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the Project Area measured against the without-project scenario	Not applicable	-
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	60 people	2
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	Unknown	-

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)

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Employment	Total number of people expected to be employed in project activities,5 expressed as number of full-time employees6	Not applicable	-
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	Not applicable	-
Livelihoods	Total number of people expected to have improved livelihoods[7] or income generated as a result of project activities	Approximately 100 people	4
	Number of women expected to have improved livelihoods or income generated as a result of project activities	Approximately 34 women	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	60 people	4
	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	Unknown	-
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	Not applicable	-
	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	Not applicable	-
Well-being	Total number of community members whose well-being8 is expected to improve as a result of project activities	Approximately 100 people	4
	Number of women whose well-being is expected to improve as a result of project activities	Approximately 34 women	4

[5] 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.
[6] 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])
[7] 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.
[8] 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.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[9] measured against the without-project scenario	59,959 ha	5
	Expected number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of project activities,[11] measured against the without-project scenario	Unknown	-

[9] 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
[10] Per IUCN's Red List of Threatened Species
[11] 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 Western Amazon REDD+ Grouped Project's main objective is to reduce deforestation and forest degradation rates in one of South American's Continent most deforested areas, preserving continuous forest patches that total more than 50 thousand hectares within the Brazilian Amazon. The Project began in 2019 and will last for 30 years. It will be validated and verified by VCS and CCB Standards in the second half of 2022. The project's presence is expected to reduce emissions in 3,548,472 tCO2eq in the first 10 years from 6,188 hectares of avoided deforestation, in an average of 354,847 tCO2eq per year in the first 10 years of the project.

22 private properties are part of the project, most located in Acre State and some in Amazonas State, in Brazil's northern region, therefore, the project is characterized as grouped. These properties have similar ecological characteristics.

These properties are within a very fragmented landscape, with high deforestation rates each year due to unsustainable agricultural practices. The primary forest clearing for extensive cattle production, in addition to monocultures such as soy and corn expansion, land grabbing and speculation are part of the region's context.

The main activities will be regional deforestation vectors identification, implementation of sustainable practices in the communities involved, providing people firefighting training, in addition to scientific studies on biodiversity to identify which are the most vulnerable species and which measures must be taken to protect them.

Project's actions will allow local ecosystem protection and degraded or felled vegetation regeneration. Socioenvironmental activities will be promoted with the communities residing on project properties and their surroundings. It is also intended to restrain illegal practices, like wood extraction and hunting, stimulating sustainable activities development.

2.1.2 Project Scale

Project Scale	
Project	x
Large project	

2.1.3 Project Proponent (G1.1)

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2.1.5 Physical Parameters (G1.3)

Project Zone Location[12]

The WARG Project's zone is in the central-eastern portion of Acre state, bordered in its northern part by Amazonas state. The Project Zone is located between 8° S to 11° S latitudes and 66° W to 69° W longitudes, as shown in Figure 1. It includes 22 private properties grouped into 10 blocks, considering proximity between them as criteria. They are in 8 municipalities, 6 of which are in Acre (Sena Madureira, Porto Acre, Senador Guiomard, Capixaba, Bujari and Xapuri) and 2 in Amazonas (Lábrea and Boca do Acre).

The Project Zone, also corresponding to the Reference Region, encompasses some Conservation Units (UCs) within its boundaries, the largest being Chico Mendes RESEX in the southwest portion, Lago

[12] The following concepts were adopted:
Reference Region: "Spatial delimitation of the analytical domain from which information on rates, agents, vectors and land use and cover patterns (LU/LC-change) are obtained, projected, and monitored." (VM0015).
Project Zone: "Area encompassing the Project Area in which project activities that directly affect land and associated resources, including activities relating to the provision of livelihood alternatives and community development, are implemented." (CCBA).
Project Area: "Area or under the control of the project proponent in which the project proponent will carry out activities. On the project start date, the area needs to include only forest area". (VM0015) and "area in which project activities aim to generate net climate benefits." (CCBA).

do Amapá and Igarapé São Francisco APAs to the center east, in the northeast portion the Arapixi RESEX and Iquiri FLONA, finally to the west are São Francisco and Macauã FLONAs and Cazumbá-Iracema RESEX.

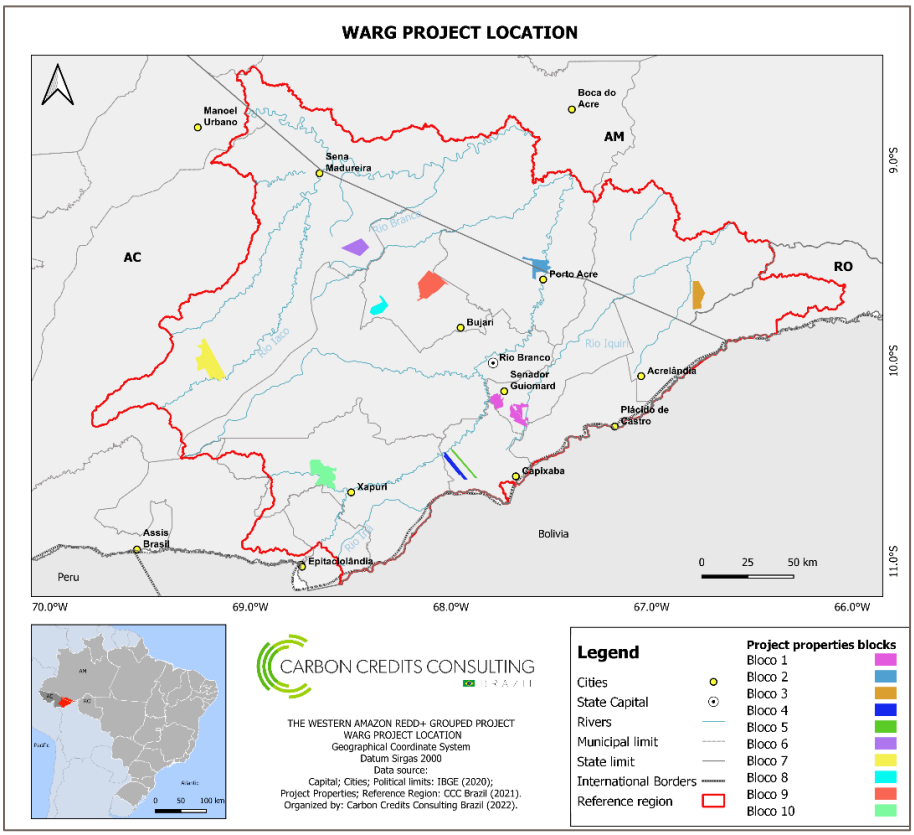


Figure 1: Project Location
Source: Carbon Credits Consulting Brazil (2022).

The predominant geological unit is the Solimões Formation, from the Cenozoic era, with sandstone, claystone, conglomerate, and siltstone rock compositions. The Project Zone encompasses the geological formations of river terraces (sand, clay, and gravel), alluvial deposits (sand, clay, gravel, and silt) and Jamari complex geological unit (with amphibolite, enderbite, tonalitic orthogneiss, quartz diorite, migmatite, granodiorite orthogneiss occurrence).

The following Geomorphological Units were identified: Purus River Depression, Ji-Paraná River Depression, Solimões River Depression, Amazon Plain and Acre Hills. The highest verified altitudes are to the southwest and west portions of Acre Hills units, which vary from 270 to 330 meters. In the other units the altitudes vary from 151 to 210 meters. Details about geological and geomorphological formations are presented in Figure 2 and Figure 3.

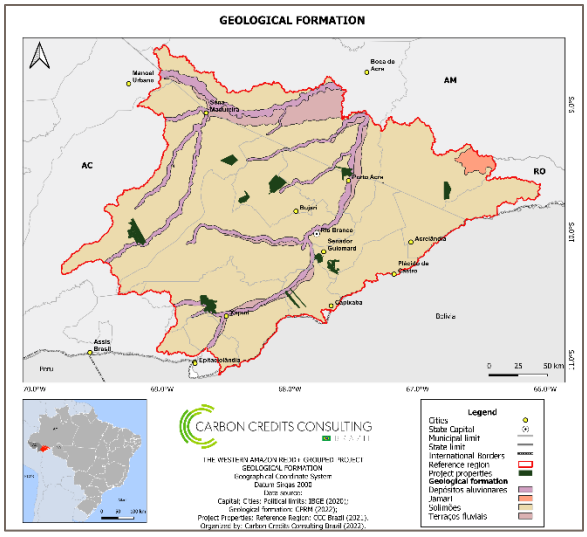


Figure 2: Project Geological Features
Source: Carbon Credits Consulting Brazil (2022).

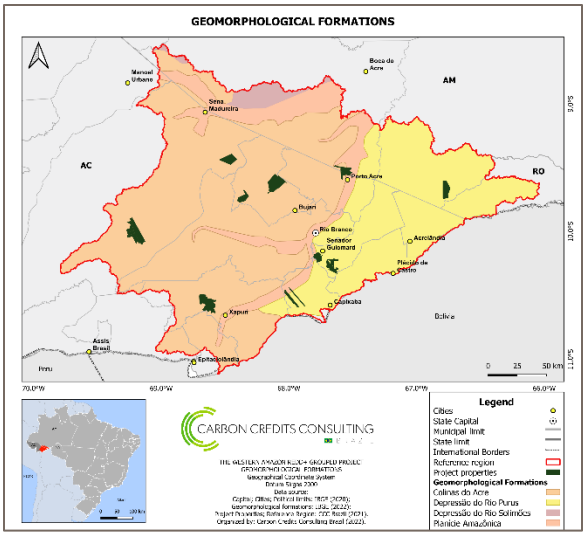


Figure 3: Geomorphological features of the Project Zone.
Source: Carbon Credits Consulting Brazil (2022).

In the Project Zone, clayey texture red-yellow Argisols prevail, below the A or E horizon, with lighter colors and sandy or medium texture, and low organic matter levels. There is also occurrence of haplic Cambisol type soils.

These soils are made up of mineral material with an incipient B horizon, underlying any type of surface horizon (except hisstic 40 cm or more thick) or chernozemic A horizon, when the incipient B presents high activity clay and high base saturation. Although on a smaller scale, there are soils of the Haplic Gleissolo, Red-Yellow Latosol, Chromic Luvissol and Haplic Plintosol[13].

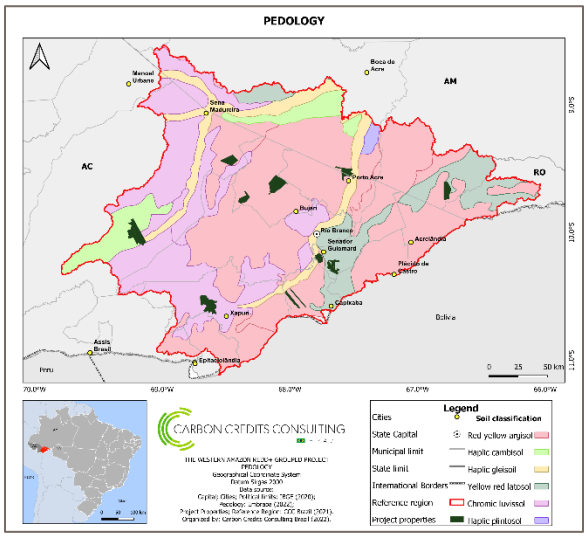


Figure 4: Soil types in the Project Zone.
Source: Carbon Credits Consulting Brazil (2022).

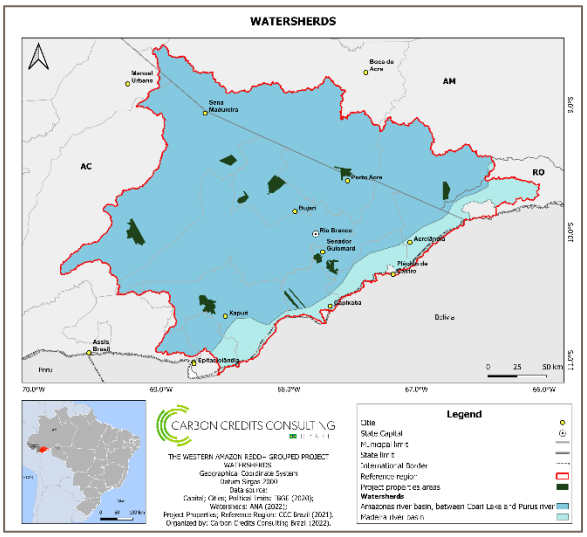


Figure 5: 5Watersheds in the Project Zone.
Source: Carbon Credits Consulting Brazil (2022).

13 DOS SANTOS, Humberto Gonçalves et al. *Sistema brasileiro de classificação de solos*. Brasília, DF: Embrapa, 2018., 2018.

The Project Zone is in the vast Amazon Basin, considered the world's largest watershed with approximately 6.1 million hectares. In the divisions by sub-basins, it is located in the Amazon sub-basin, between Lake Coari and Purus River, with a small stretch included in Madeira River sub-basin. Details on pedology and watersheds are presented in Figure 4 and Figure 5.

According to Alvares et al. (2013)[14], Acre state is classified in the Köppen system as belonging to a tropical climate without a dry season (Af) and monsoon (Am). In the Project Zone, annual rainfall varies from 1900 – 2200 mm. Based on data from the National Agency for Water and Basic Sanitation (ANA) rainfall stations made available online, rainfall history of the municipalities of Porto Acre (1972 - 2021), Rio Branco (1969 - 2019), Sena Madureira (2005 - 2021) and Xapuri (1978 - 2021) was consulted. Dry season is well defined between June and August, and the rainy season occurs from October to May. Details on Figure 6.

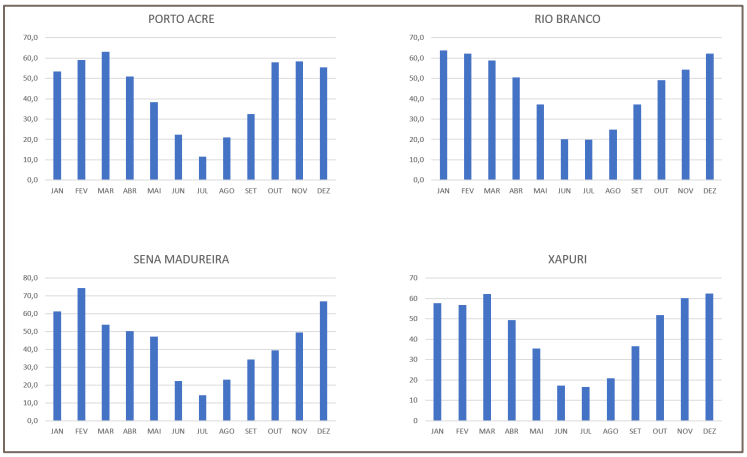


Figure 6: Historical rainfall data for some municipalities that are part of the Project Zone.
Source: Adapted from National Agency for Water and Basic Sanitation – ANA (2022).

2.1.6 Social Parameters (G1.3)

The WARG Project social parameters were formulated from the Socioeconomic Diagnosis document developed for the Project Zone, with a spatial focus on Baixo Acre's rural territory, where most of the zone is.

The Project's properties socioeconomic characteristics are a result of the region's occupation history, based, above all, on the removal of the original forest cover for extensive livestock production, soybean and corn monocultures planting, in addition to the irregular occupation by land squatters.

Knowledge of the Project's Zone socioenvironmental context will support decision-making to guide actions that reduce the negative impacts arising from the economic activities currently carried out in the area. In addition, this knowledge also serves as a basis for enhancing actions that improve the lives of communities and improve biodiversity indicators.

It is also considered that the Project must be aligned with public policies15 at the federal, state and/or municipal level. The effort to conserve and implement actions of natural resources sustainable use

[14] ALVARES, Clayton Alcarde et al. *Mapa de classificação climática de Köppen para o Brasil*. Meteorologische Zeitschrift, v. 22, n.6, pág. 711-728, 2013.
[15] For this study, the term "public policy" should be understood as the set of laws, policies, programs, and projects proposed and implemented by the State at its three spheres of action.

in the Project Area will be successful through synergies between these spheres and the private sector. In this way, it is possible to fill the gaps still present due to problems in the implementation of such policies.

The Project Area covers the municipalities of Bujari, Capixaba, Jordão, Porto Acre, Senador Guiomard, Sena Madureira, Xapuri and, even though they are not part of Acre State, the municipalities of Boca do Acre and Lábrea in the Amazonas State. There are no public protected lands or settlement projects directly involved in the project, all communities are privately owned, reside and work in these areas.

Communities involved work directly in the properties production. Through the Socioeconomic Diagnosis some incipient extractive activities were identified, but only for their own consumption and retail sale in neighboring locations, without a profit focus since community's people receive a monthly salary for their work on the properties.

Besides extractive activities for their consumption, communities also work on livestock management on the properties, as well as activities in soybean, corn, and sugarcane plantations, such as driving large machines, harvesting, planting, etc. There are also people involved in the properties' infrastructure maintenance, such as painters and janitors.

Below, in Table 1, is the list of properties participating in the project, with distances from Rio Branco city, how to access, and in which municipality they are located.

Table 1: Access to properties.

Property	Group	Distance to Rio Branco	Access	Road	Municipality
Fazenda Nictheroy A and B	Block 1	40km	Paved road	BR-317 / AC-040	Senador Guiomard – AC
Fazenda Charrua do Niteroi		40km	Paved road	AC-040	Senador Guiomard – AC
Fazenda Santa Paula		35km	Paved road + access road	AC-040	Senador Guiomard – AC
Fazendas Criciúma A and B	Block 2	45km	Paved road	AC-010	Boca do Acre – AM
Seringal Santo Antonio	Block 3	134km	Paved road	BR-364	Lábrea – AM
Fazendas Itaimbé I and II	Block 4	80km	Paved road	BR-317	Capixaba – AC
Fazenda Espigão	Block 5	72km	Paved road	BR-317	Capixaba – AC
Fazenda Castanhal A		72km	Paved road	BR-317	Capixaba – AC
Fazenda Uberaba	Block 6	90km	Paved road	BR-364	Sena Madureira – AC
Fazendas MAC Esperança I, II, III	Block 8	85km	Paved road + access road	BR-364	Bujari – AC
Fazenda Floresta	Block 9	55km	Paved road	BR-364	Bujari – AC
Fazenda Soberana	Block 10	200km	Paved road	BR-317	Xapuri – AC
Seringal Fonte II Seringal Fonte III Seringal Santo Elias 1016 Seringal Santo Elias 1014	Block 7	Approximately 2 days travel	Access road + River	Iaco River	Sena Madureira - AC

Most properties have land access via paved roads or in good traffic conditions throughout the year. It is possible to depart from Rio Branco city towards almost all areas using a common passenger car or 4X4 vehicle. There are some areas of rubber forests (seringal) where it is only possible to arrive with a 4X4 vehicle via access roads and then by boat.

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

The figure bellow shows the Project Zone boundary including Project Area, leakage management areas, potential future Project Areas, and High Conservation Value Areas (HCV).

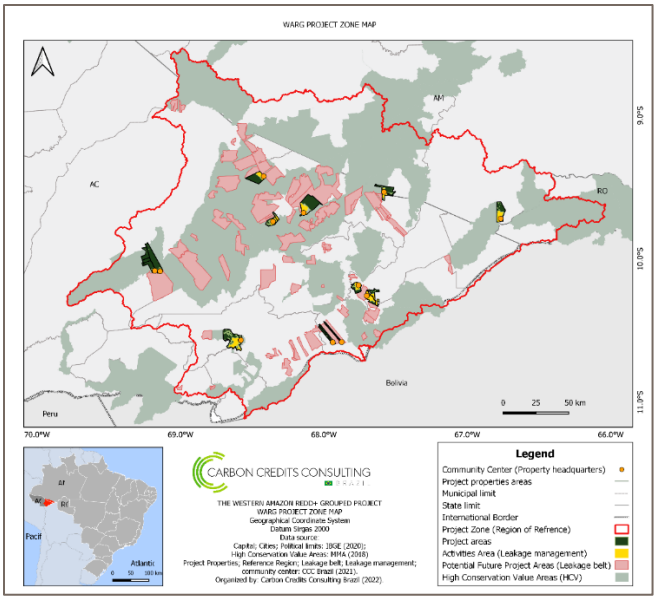


Figure 7: Map of the WARG Project zone.

2.1.8 Stakeholder Identification (G1.5)

The set of WARG Project's Stakeholders involves **landowners, communities[16] and public or private agents**. Landowners' identification criteria was their concern with the properties natural area protection. Landowners currently want to guarantee forest, its ecological and social benefits continuity, considering the legal support for these areas' preservation, also demonstrating a change in opinion on the lands' unsustainable use. The criteria for identifying the communities involved in the project was housing and a formal contract with the landowner and the people who live and work inside the properties that are part of the project were chosen. Public agents involved were identified by a previous survey of potential institutions that could contribute to the development of the project. Public agents dedicated to nature protection in Acre state, monitoring and research with communities and the environment and public agents dedicated to rural technical assistance are included.

Landowners have official possession of the lands on which the Project Area is included, with documentation provided and approved by the Brazilian land authority, and notary records. The community's rights are guaranteed considering the Brazilian labor law, taking into account their working relationship with the landowners. In this project, the community does not hold the land tenure rights.

The relevance of Landowners to this project is based on its areas spatial dimension, which, as they are in a context of original forest cover loss and degradation, they can help contain deforestation and guarantee environmental improvement in the region. The relevance of community to the project derives from the fact that they are key actors that will support the deforestation reduction in the region, as they are in direct contact with the Project Area in their daily work and way of life. The relevance of public agents is based on the control, regulation and monitoring structure made possible by the State. Such agents have the necessary experience in crisis situations, crimes, or incidents of natural or anthropic causes.

At a partnership level with the project, private agents are included. Companies that will provide technical support services for the implementation of activities and research development in the Project Zone

[16] By community the present project understands groups of people who inhabit the properties areas that are part of the project, have a work relationship with the landowners, and have a bond with the land by the use of natural resources.

are considered. Like the Public Agents, the Private Agents were identified for their technical potential with the capacity to implement the necessary activities to combat deforestation in the region.

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

In June 2021, the first stakeholder identification visit was carried out. In this field work, meetings were held with the group of public or private agents, with the objective of identifying the potential of partnerships for the development of the project. In August 2021, a local consultation visit was carried out with the communities and landowners, in which participatory workshops were held to survey local demands and direct future activities.

The local consultation process was based on social methodology to identify the problems, strengths and weaknesses of the community and its place. Didactic expositor activities were carried out with explanations about what a REDD project is and its concepts. Participatory maps were also made with the community, so that people could put on paper the way they see and experience their place of work and residence.

The occupational health theme of the properties is in accordance with the regulation standard No. 07, of the Ministry of Labor and Employment, with the Program for Medical Control of Occupational Health - PMCOH (PCMSO in portuguese), which establishes the mandatory creation and implementation, with the purpose of promoting and preserving the health of its employees. The properties involved own this document.

The communities' bond with properties participating in the project is based on a work relationship, with tasks that are performed based on the workers skills, assuming the functions demanded by the owners, such as cowboy, mechanic, painter, tamer, general services, among others.

Regarding the communities' relationship with the area natural resources, there are practices of extractivism for their own consumption, such as fishing, small gardens and small animal raising. Such activities do not have a negative impact on the residents' permanence on the properties and guarantee a continuous and integral presence on the site, considering that the residents are also professionally dependent on the Project Area for these purposes.

Independent producers (medium and large) and employees hired from properties, but who reside in urban centers, are excluded from this category. The project considered the presence of squatters residing in the Project Area vicinity and who are concerned with the preservation of nature and its resources.

Communities are important in the implementation of activities as a target audience. Workshops were be held for the creation and training of fire brigades with the properties' residents/employees, considering their ability to act immediately in the event of a fire beginning in the projects' area vicinity. Communities are also relevant in fire monitoring. A private company will be hired to monitor illegal fires, which will send the data to the local brigades in situations that require real-time action.

At the implementation of the communication infrastructure improvement activity, the community will be able to appoint representatives available to receive a technical training course in the antenna and internet systems manipulation. In this way, local personnel will be internally qualified and remunerated for the projects' technical needs.

In the biodiversity diagnosis activities, which will be carried out with public or private partners such as the communities will be relevant based on their local knowledge of the Project Area and surroundings. Foresters, guides, cooks, and other technical services of relevant interest for the research to be carried out may be hired. There is the possibility of direct involvement of local students in the research, to bring a

positive return in the educational field to the community. It is also intended to involve local schools as possible partners.

Potential Project partners, such as the Federal Universities of Acre and Amazonas or the National Institute of Amazonian Research, may be involved with scientific research development, data collection, use of infrastructure and production of scientific material of interest from all parties, especially with financial support from the Project.

Below is a brief description of other Projects' stakeholders and potential partners.

Landowners and Community:

- They are the fundamental components in the project, since they agree to contribute to activities in socioenvironmental benefits and control of deforestation, based on sustainable practices, together with the communities within their properties.

Public or private agents:

- Carbon Credits Consulting Brazil: is the technical body responsible for the development of studies and of the scope of activities to be developed.
- Greendata: is a socioeconomic, environmental management and innovation company, which will be able to contribute to the projects' implementation.
- SEMA – Acre: The Secretary of State for the Environment might be the essential point in the articulation of the relationship between the public authority and the communities demands. They are officially responsible for the development and implementation of public policies in the socioenvironmental and economic context.

Other potential partners (at this moment they are not stakeholders):

- IMC – Acre: Institute for Climate Change and Regulation of Environmental Services coordinates a system that aims to bring together a set of strategies and instruments that recognize and encourage the nature conservation resulting from environmental products and services.
- SOS Amazônia: is a Non-Governmental Organization (NGO) with the objective of promoting biodiversity conservation and raising environmental awareness in the Amazon. In addition to contributing to the articulation and strengthening of relationships between communities and project institutions.

2.1.10 Sectoral Scope and Project Type

The sectoral scope of the project is 14: Agriculture, Forestry and Other Land Uses (AFOLU). The project category is Reducing Emissions from Deforestation and Forest Degradation (REDD). The Avoided Unplanned Deforestation methodology (AUD) will be used. This is a grouped project.

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

The WARG Project aims to promote joint actions focused at reducing greenhouse gas emissions from deforestation and forest degradation. With responsible and sustainable natural resources usage, the Project intends to generate net benefits for climate, communities, and biodiversity. These actions will be definitive to encourage sustainable socioeconomic development and ensure environmental preservation.

Project activities are the means to achieve the expected positive socioenvironmental objectives and impacts. Through these objectives, the activities were then outlined, and some have already been

implemented or are in the initialization phase. This set of interconnected actions will allow achieving the project's foreseen climate, community, and biodiversity benefits.

The project is not located in a jurisdiction covered by an active jurisdictional REDD+ program.

Table 2 provides an activities description, the main short-medium and long-term results and impacts that will contribute to achieve the project's anticipated benefits. These activities will have a gradual implementation following a technically oriented strategic planning.

Table 2: Activities and Theory of Change.

Activity	Expected climate, community, and/or biodiversity			Planned deadline
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Legal Agreement and Management	Meetings Conduction. REDD+ proposal presentation.	Formalization of the agreement between the proponents for the project development.	Consolidation of a management model aimed at conserving forest areas and other natural resources, focusing on reducing socioenvironmental impacts and with the objective of promoting sustainable development.	Held between January 2019 and March 2021.
Environmental monitoring	Assessment of possible new areas of deforestation, based on official data from the PRODES/INPE project.	Greater understanding of deforestation dynamics to support a more effective monitoring and enforcement approach. To speed up the process of determining risk areas, thus preventing possible future deforestation.	Deforestation mitigation and prevention. Reduce greenhouse gas emissions from deforestation and forest degradation.	Start scheduled for 2022. Continues throughout the Project.
Population dynamics diagnosis	Identification, understanding and prioritization of the demands pointed out by the residents. Elaborate the socioeconomic context of the areas involved in the Project	Enable adaptive project management according to the needs of the families involved. Definition of parameters that will serve as a basis for the project, guiding expectations of impacts and benefits in the communities.	Improvement of socioeconomic conditions and quality of life. Ensuring the sustainable use of land and natural resources. Train communities about their rights, duties and the importance of the Project.	Held between January and December 2021.
Fire prevention	Implement instructions and forest fire-fighting training.	Create strategies and methods that assist in fire prevention practices. Encourage environmental education.	Generate community training related to fire, strengthening the management of possible fires that may occur. Minimize any future conflicts related to possible production or forest loss.	Start scheduled for April 2022. Continues throughout the Project.
Patrol and Surveillance	Carrying out property surveillance actions. Identification of areas sensitive to external invasions.	Greater understanding of the dynamics of the areas which will allow a more efficient inspection. Contribute to technical assistance work. Identify illegal activities.	Avoid preserved areas invasions by mitigating and preventing deforestation. Avoid conflicts related to illegal land tenure.	Start scheduled for April 2022. Continues throughout the Project.
Communication	Enabling residents' internet access with the installation of internet antennas and signal provision.	Residents will have greater access to information.	Enable the digital inclusion of the communities involved. Providing access to digital tools that benefit areas such as education, health, and well-being.	Start scheduled for April 2022. Continues throughout the Project.

			Minimize communities' vulnerability.	
Training and Qualifications	Conduct training and courses to improve the skills and knowledge of the communities involved.	Train and instruct residents so that they have the technical capacity to carry out activities within the properties with greater efficiency.	Generating new business opportunities for communities. Increase in members' self-esteem and confidence. Promote socioeconomic development and social inclusion.	Start scheduled for April 2022. Continues throughout the Project.
Partnerships with research and educational institutions	Conducting scientific research focusing on biodiversity and the environment.	Build partnerships with universities and research institutions. Implement a long-term study of biodiversity, fire scars and deforestation.	Production of scientific knowledge about local biodiversity and environmental dynamics. Provide access to the local community to the constant results of the surveys. Establish measures and adjustments based on the results of the studies conducted.	Start scheduled for April 2022. Continues throughout the Project.
Mitigation of Human-Wildlife Conflict	Ensure community safety and protect wild animals in the region.	Carrying out a diagnosis to enable the creation of a plan focused on improving herd facilities and cattle management.	Promote a better relationship between the community and animal biodiversity, mitigating possible conflicts.	Start scheduled for May 2022. Continues throughout the Project.
Land tenure regularization	Identify conflicts and enable access to land use rights.	Implement strategies that can mitigate conflicts related to land tenure and land speculation.	Generate actions that assist in the resolution of conflicts related to land tenure, promoting protection and sustainability.	Start scheduled for May 2022. Continues throughout the Project.
Signalization	Prevent illegal practices in the Project Areas	Make people aware of the importance of the forest and the project	Forest permanence guarantee	Start scheduled for May 2022.

Legal Agreement and Management

The signing of a legal agreement that will start the project's planning and execution will guarantee the commitment of landowners and residents with the conservation of the forest areas in their properties. Agreements are made for 30 years and can be renewed.

This adherence at the legal level promotes better management of properties, which aims to reduce deforestation by reducing the risk of fires and improve the relationship between conservation and land use.

Expected impacts are:

- Climate: reducing threats and preventing deforestation through actions that increase the capacity to manage programs, projects or plans focused on environmental preservation.
- Community: improving the well-being of communities associated with the project through management of the ecosystem and its associated services.
- Biodiversity: favoring a better integration between environmental conservation and human development.

Environmental monitoring

Greenhouse gas emissions from deforestation, agriculture and other land use conversion activities are an important part of the human impact on the ecosystem.

Activities that reduce greenhouse gas emissions and support the conscious use of natural resources are some of the measures needed to mitigate climate change, social conflicts, and the loss of biodiversity. For this, the areas will be monitored to track deforestation, fires and animal life in the Project Areas.

Expected impacts are:

- Climate: diagnose the ecosystem's current state and generate actions that allow an orderly and planned management, with monitoring of deforestation and fire scars in the region. They will serve as a support to guarantee environmental conservation by controlling deforestation, maintaining forest cover, and controlling fires, thus ensuring the reduction of greenhouse gas emissions and the maintenance of benefits for the climate.
- Community: enabling the community to understand the real conditions of the environment where they live, the dimension of human action impacts and the possibilities of mitigation, making them agents of change.
- Biodiversity: monitor and report the presence or absence of fauna and flora species that are considered of high conservation value in the ecosystem.

Population dynamics diagnosis

It is understood that the initial community diagnosis activity represents a planning basis for the project management strategies elaboration. These initial studies provide a better understanding of the community's social issues and how it relates to the environment.

Expected impacts are:

- Climate: surveying the profile and demands of the community is essential to define the relationship between residents and the land and thus outline a strategic action for more sustainable development.
- Community: with the definition of the residents' profile, it will be possible to understand and solve the main community's demands and vulnerabilities.
- Biodiversity: knowledge of the community's characteristics will allow the creation of alternatives capable of guaranteeing the sustainable use of natural resources, preserving the ecosystem.

Fire prevention

This approach aims to reduce the number of threats to fauna and flora caused by fires and forest fires. The prevention activities will focus on the execution of courses to fight forest fires, which will enable the creation of firefighting brigades within the properties, enabling residents to take quick and effective action in the event of forest fires, thus avoiding possible environmental damage.

This strategy is expected to contribute to the project's objectives by building community capacity in fire management, fire prevention, post-fire restoration and fire suppression.

Expected impacts are:

- Climate: maintain ecological dynamics, protecting forest areas in addition to introducing measures that encourage more sustainable land use, thus reducing the risk of forest fires.

- Community: enable residents and workers qualification and training.
- Biodiversity: protection of habitats for vulnerable species of both flora and fauna.

Patrol and Surveillance

The project aims to intensify and improve the efficiency of patrolling by making resources available for logistics in the areas of the properties, through remote monitoring using drones. In this way, it will be possible to devise strategies that provide greater efficiency in surveillance and strengthening of security in properties.

Expected impacts are:

- Climate: this type of monitoring will guarantee the commitment to reduce deforestation and, consequently, minimize greenhouse gas emissions.
- Community: the patrol will strengthen security on properties for residents and workers.
- Biodiversity: periodic surveillance seeks to inhibit deforestation and ecosystem degradation.

Communication

Most communities living in the Project areas face a reality of isolation, both physically and in terms of communication. These conditions reflect in the community's education, health, economy, and well-being, placing them in vulnerability. The installation of antennas for internet provision will be one of the activities implemented with the aim of mitigating this vulnerability.

Expected impacts are:

- Climate: providing access to knowledge of the ecosystem's importance, mitigating changes in land use, and ensuring a reduction in the emission of greenhouse gases.
- Community: improve communication skills and access to information.
- Biodiversity: contribute to the community's understanding of the importance of ecosystem protection.

Training and Qualifications

To boost the resident's autonomy, different courses and training will be offered to the communities. These trainings will be essential as they allow people to be the main actors in their own communities' resources maintenance and protection.

Expected impacts are:

- Climate: providing access to different socioenvironmental education approaches.
- Community: guarantee the community's autonomy and empowerment and also make it possible for training to serve as a basis for job creation and better working conditions.
- Biodiversity: allow residents to have access to technical knowledge capable of promoting sustainable actions that improve the relationship between man and nature.

Partnerships with research and educational institutions

To guarantee the conservation of biodiversity and promote sustainable development, partnerships with teaching and research institutions will be implemented, thus enabling biodiversity studies and

continuous monitoring in the Project areas. These activities include long-term project agreements to monitor and study the Project's impacts on local biodiversity.

Expected impacts are:

- Climate: will provide continuous monitoring and study of Project areas, ensuring preservation and reduction of greenhouse gas emissions.
- Community: encourage a good relationship between researchers and communities involved, disseminating knowledge to local society.
- Biodiversity: enable research related to biodiversity preservation.

Mitigation of Human-Wildlife Conflict

Wild animals attack, mainly jaguars, on the herd has been the cause of conflicts between the community and animal biodiversity. Avoiding these occurrences is a way of protecting both the community and wild animals.

A diagnosis will be made to enable the creation of a plan focused on improving herd facilities and improving cattle management, to avoid attacks by jaguars and other animals.

Expected impacts are:

- Climate: herd protection will allow existing areas intended for animal husbandry to be protected, thus preventing the conversion of new forest areas into pasture areas.
- Community: with the herd protected, attacks on livestock will be reduced, minimizing the community vulnerability.
- Biodiversity: the conflict generated between man and jaguar often results in the jaguar's death. With the implementation of the actions this conflict will be minimized.

Land tenure regularization

Land tenure regularization is an important tool that guarantees communities' security. Through it, it will be possible to promote social integration, access to public services and the maintenance and defense of landowners' rights.

Expected impacts are:

- Climate: land tenure regularization will facilitate the inspection and monitoring of deforestation by public agencies, preventing new forest areas from being converted and reducing land speculation.
- Community: community members will have their rights and duties over land established, promoting social integration and access to public services.
- Biodiversity: with the official definition of land limits, the inspection will curb illegal deforestation and thus preserve the biodiversity of the region.

Signalization

The signalization of activities that are prohibited in the Project Areas has an informative-educational character in the local and surrounding community. This activity will be of importance in establishing limits of practices that should not be carried out because they have a negative impact on the project objectives.

2.1.12 Sustainable Development

The promotion of sustainable development is one of the Projects' objectives. Ensuring that development must be based on a balance between social, economic, and environmental sustainability is an integral part of the 2030 Agenda for Sustainable Development, with its 17 global goals that guide development efforts. The REDD+ mechanism of this Project can directly contribute to the achievement of the following Sustainable Development Goals:

1) Poverty: The project seeks to implement social protection systems and measures to achieve substantial coverage of the poor and vulnerable.

2) Through the Population Dynamics Diagnosis, it will be possible to identify vulnerable nuclei within the communities and thus guarantee quick and effective actions in the fight against poverty.

3) Good Health and Well-Being: Good health is essential for sustainable development. Based on this, the fire monitoring activity and fire management course might reflect on the health and well-being of residents, since the reduction and control of fire outbreaks will improve air quality and consequently reflect on breathing problems reduction. In addition, the installation of internet antennas, together with the Population Dynamics Diagnosis, will guarantee universal access to information, enabling connection to education and integration programs related to health and well-being.

4) Quality education: Education is one of the most powerful and effective vehicles for sustainable development, and providing access to inclusive, quality education is one of the objects of the WARG Project. With the installation of internet antennas, it will be possible for residents to have access to educational digital content. The implementation of training courses will also guarantee the promotion of education, enabling a technical improvement that could open doors to the labor market.

5) Decent work and economic growth: The fundamental role of decent work for all in achieving sustainable development is an important objective of the WARG Project. With this, actions will be implemented that provide assistance to increase employment opportunities, such as: cooking courses, cutting and sewing, handicrafts, courses for handling agricultural machinery and handling livestock animals.

6) Climate action: The 2030 Agenda for Sustainable Development expresses the commitment to protect the planet from degradation and to take urgent action on climate change. These goals can be achieved with the integration of measures that stimulate environmental education, awareness and the mitigation and adaptation capacity. For this, a fire management course will be implemented, in addition to the implementation of fire brigades. We also consider that the very existence of the REDD+ project in the region is a climate contribution action.

7) Life on land: Protecting and sustainably using terrestrial ecosystems and combating land degradation and biodiversity loss are objectives implemented in the WARG Project. Activities related to social and biodiversity research will have the potential to bring relevant information about the way of life of local communities, as well as their relationship with nature. The involvement of the population with these activities is expected, either directly with local students or indirectly through their results. With this, the community is expected to create greater bonds of identification with the land on which they live.

2.1.13 Implementation Schedule (G1.9)

Below, Table 3, are the projects' main scheduled dates and milestones:

Table 3: Implementation schedule.

Scheduled Dates	Milestones in project development and implementation
(2019) 3 years before the first verification and validation	Beginning of the partnership agreement consolidation with landowners
	Baseline and credit generation potential determination
	Articulation with institutions for the development of possible partnerships
	Carbon stock estimate
	Conducting workshops on the properties
	Socioeconomic and Environmental Diagnosis
	Diagnosis of the region's fauna
	Schedule consolidation of the activities to be developed in the project
	Stakeholder consultation meetings
	Review and translation of the project description document
(2022) Year of First Verification and Validation	Selection and hiring of the credit validator/verifier registration platform
	Field audit follow-up
	Registration of Projects and Credits
Following years from first verification and validation	Development and monitoring of environmental and social actions management activities
	Monitoring deforestation and emissions
	Biodiversity Monitoring (Fauna and Flora)
	Credit verification (Selection and hiring of a verification body)
	Production of monitoring bulletins of the Verification Project; Field audit monitoring; Credit record
	Leading the credit marketing process

2.1.14 Project Start Date

The WARG Project start date was set on January 1, 2019, as it represents the moment of the first contract signed to establish the partnership for a conservation initiative in the region. CCC had its first contact with the Nicteroy, Santa Paula, Criciúma and Santo Antônio property owner in 2018, when one of the company's partners visited the Fazenda Nicteroy. On that same occasion, the owner of the Fazenda Castanhal and Fazenda Espigão was also present. During this first meeting, CCC identified the desire on the landowners' part to develop a project that could preserve the vegetation areas, still present on the properties, as they were at that moment threatened by fires and illegal deforestation.

The Fazenda Uberaba joined the project with a contract established on February 1, 2019, however, the conservation activities started in January 2019 were aimed at preventing invasions by people from neighboring settlements, illegal hunting and logging. Fazenda Soberana and Fazenda Floresta joined the project in 2019, as the landowner was having trouble with land invasions and illegal deforestation. The first meeting between the owner and CCC professionals was held in 2018 and the contract was signed on February 8, 2019, for the 2 properties to participate in the project

The owner of Seringais Santo Elias 1014, Santo Elias 1016 (São Jorge), Palmares, Fonte II and Fonte III, contacted the CCC, to seek solutions to the deforestation problem that was occurring on her properties. On March 1, 2021, the contract was signed. In summary, the properties in Block 1, Block 2, Block 3, Block 5, Block 6, and Block 10 have a start date set in January of 2019, while the properties in Block 4, Block 8, and Block 7 have a start dated as January of 2021. A detailed report and supporting documents with information on the properties since the landowners' contract with CCC start will be delivered for evaluation by the auditors.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The WARG Project's crediting period start date is January 1, 2019. It will end on December 31, 2048. The benefits to climate, communities and biodiversity will be monitored on an ongoing basis, with a verification process with the Verra, for at least every 2 years for the project's duration.

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

Not applicable to WARG Project.

2.1.17 Estimated GHG Emission Reductions or Removals

Estimated reductions or removals of GHG emissions fort the first 10 years of the WARG Project are presented in Table 4.

Table 4: Estimated reductions or removals of GHG emissions fort the first 10 years of the WARG Project.

Year	Estimated GHG emission reductions or removals (tCO2e)
2019	200,372
2020	218,580
2021	242,368
2022	355,992
2023	379,576
2024	437,055
2025	371,881
2026	359,277
2027	491,275
2028	492,095
Total estimated ERs	3,548,472
Total number of crediting years	10
Average annual ERs	354,847

2.1.18 Risks to the Project (G1.10)

The risks associated with the WARG project were assessed through the AFOLU Non-permanence Risk Report Calculation Tool, v4.0. The identified risks are summarized in Table 5.

Table 5: Summary of non-permanence risk of WARG project.

Risk Category	Rating
Internal Risk	0
External Risk	12%
Natural Risk	1%
Overall Risk Rating (a + b + c)	13%

The likely risks to the expected benefits to climate, community, and biodiversity during the Project life, as well as their mitigating measures, are described Table 6.

Table 6: Summary of non-permanence risk of WARG project.

Risk Identified	Potential impacts	Mitigation
Forest fires	Fires caused by natural causes can have negative impacts on the climate, such as the large emissions of gases observed in these events, on biodiversity, such as the burning of habitats, the death of animal and plant species, and for communities in terms of health, and loss of agricultural areas.	To mitigate the risk of fires in the area, the WARG Project will implement a monitoring system, including the use of a software that provides timely identification of fires warnings and fires hotspots. Besides that, the project will provide firefighting training and equipment to form fire brigades that will be prepared for any fire occurrence.

Illegal hunting and logging	Illegal hunting and illegal extraction of timber have impacts on biodiversity, and can be a risk to endemic, endangered, and vulnerable ecologically important species of local fauna and flora.	To mitigate those illegal activities a few measures will be taken, mainly related to the monitoring of the Project Area. The Project WARG will implement demarcation of the areas (with fences, information boards), direct monitoring with patrols and remote sensed data (UAV, high resolution images), and will provide training to the community involved.
Invasion of private land	The invasion of areas by squatters usually is followed by the clearing of the area to implement agriculture and pasture activities	The risk of illegal invasion of the areas will be mitigated by the demarcation of the area and by the monitoring. In case of any invasion, an internal committee (with members of property management, residents, employee representant, and possible law enforcement) will be call on to take any necessary measures.

2.1.19 Benefit Permanence (G1.11)

The activities developed by the WARG Project aim to encourage the land sustainable use, allowing the protection of natural resources, ensuring social benefits and biodiversity preservation.

To make these benefits permanent, the Project proposes to maintain the continuity of already under development activities, as well as guarantee the execution of future actions, keeping the socioenvironmental benefits process active (Table 7).

Table 7: Benefit permanence.

Activity	Description
Legal Agreement and Management	The signing of the contractual agreement will guarantee the community's commitment to environmental preservation. Agreements are made for 30 years and can be renewed. This adherence at the legal level promotes better properties management, which aims to reduce deforestation by reducing the fire risk and improving the relationship between conservation and land use.
Environmental monitoring	Permanent monitoring of deforestation and fires are important measures to contribute to the greenhouse gas emissions reduction and support the conscious use of natural resources, resulting in the mitigation of climate change, social conflicts, and the loss of biodiversity.
Population dynamics diagnosis	The population dynamics diagnosis represents a planning basis for the elaboration of project management strategies. These initial studies provide a better understanding of the community's social issues and how it relates to the environment.
Fire prevention	It aims to reduce the number of threats to fauna and flora due to fires. This strategy is expected to contribute to community empowerment in fire management, fire prevention, post-fire restoration and fire suppression.
Patrol and Surveillance	It aims to improve and intensify patrolling efficiency through logistics' resource availability in the properties' areas, e.g., remote monitoring via drone use. In this way, it will be possible to devise strategies that provide greater surveillance efficiency and strengthening of properties' security.
Communication	The installation of antennas for internet provision aims to mitigate the community's vulnerability in terms of information access and digital inclusion. These conditions reflect on the education, health, economy, and well-being of the community.
Training and Qualifications	Training and qualifications building will allow community members to be the main actors in the maintenance and protection of resources in the area where they live.

Partnerships with research and educational institutions	To guarantee biodiversity conservation and promote sustainable development, partnerships will be implemented with educational and research institutions, thus enabling biodiversity studies and continuous monitoring in the Project areas. These activities include long-term project agreements to monitor and study the project's impacts on local biodiversity.
Herd protection	The creation of a plan focused on improving herd facilities and livestock management will prevent attacks by jaguars and other animals on the herd, improving the community's relationship with animal biodiversity.
Land tenure regularization	Land tenure regularization will represent an important tool that will guarantee security to communities. Promoting social integration, access to public services and maintenance and defense of rights.

2.1.20 Financial Sustainability (G1.12)

By the analysis of a business plan of the WARG Project, after the selling of the credits related to the first monitoring, all the expenses from the years 2019, 2020, 2021 and 2022 will be covered. Also, it is expected to have enough revenue to cover the expenses for the proposed activities until the next monitoring period. Details of this business plan will be available to the VVB during validation and verification.

2.1.21 Grouped Projects

The WARG Project, as a grouped project, may receive new private properties, with new Project Areas, provided that such areas comply with the following criteria presented below.

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

- Meet the applicability conditions established in the VM0015 methodology.
- Project activities must aim to protect the forest.
- Properties must use and apply the same technologies and measurements specified in the Project Description.
- Geographic location within the Reference Region.
- Areas must be subject to the baseline scenario determined for the Reference Region.
- They must present additionality characteristics consistent with the validated project's initial properties.

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

The WARG Project scalability limits define parameters beyond which, if new activities are added to the project, they may not generate net positive benefits for climate, community, or biodiversity. Below are the limits considered:

- Capacity limits: for project activities to be positive and efficient, the work limit involved in these actions must be respected, allowing the project development to be managed in a way that prevents community overload. Limits on the number of people involved in the activities will be considered, it will not be possible to carry out actions that require a greater number of people than are available on the properties; people hired by the project for local coordination, it will not be possible to cover a certain number of activities simultaneously beyond the available personnel capacity; logistics

and access limits, these criteria will be considered to establish the amount of inputs, equipment and people involved in properties with scarce access; we will consider activities by blocks, so that all the properties involved are covered in some way, ensuring greater coverage of activities in most of the project.

- Expansion limits: the activities implemented must meet criteria pre-established by the proponent and stakeholders, aiming not to interfere negatively in the community's social dynamics, nor to impose changes in traditional habits that are not negative to the project's objectives.

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

To guarantee efficiency and positive results, WARG Project's activities will respect both the capacity limits of the actors involved in the activities, as well as the physical and dynamic limits of expansion. Thus, allowing the process to be managed in a way that prevents the community from being overloaded without imposing changes in habits or interfering with land issues.

2.2 Without-project Land Use Scenario and Additionality

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

For determination of the without-project land use scenario (baseline scenario) the methodology VCS VM0015 version 1.1 was used in conjunction with the VCS approved tool VT0001 – Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, version 3.0.

The analysis of deforestation, vector agents, and underlines causes, and the most likely scenarios of without-project land use were performed based on the baseline scenario and detailed in Section 3.1.4 (Baseline Scenario).

The range of potential land use scenarios and the associated drivers of land use changes most likely to occur within the Project Zone in the without-project scenario, are:

- Deforestation for livestock and agricultural activities expansion
- Deforestation for illegal occupation of land by invasion (land grabbing)

2.2.2 Most-Likely Scenario Justification (G2.1)

The most-likely land use scenario in WARG Project's absence is the continuation and expansion of livestock and agricultural activities, parallel to illegal land grabbing. Mode details can be found in the item 3.1.5 Additionality.

2.2.3 Community and Biodiversity Additionality (G2.2)

Without WARG Project, the current scenario would not bring benefits to the climate, community and biodiversity. The scenario without a project would advance towards the original forest cover clearing by the illegal occupation of land, associated with livestock and agriculture activities expansion, with prevalence low productivity and environmental degradation areas. This context contributes to the maintenance of poverty and low social indices such as education, sanitation, and infrastructure.

The scenario with WARG Project is positive for communities and biodiversity. The implementation of training activities such as fire brigades and fire management will have a positive impact on community decision-making in situations that put the forests and areas used by these people at risk.

Communication infrastructure improvement has the potential to expand access to knowledge in communities, which can positively impact education quality, associated with biodiversity research activities in partnership with the local University, can bring significant gains in staff training and ensure the permanence of people involved with the project. The quality of education improving factor can guarantee a better relationship between the communities involved and the properties' biodiversity.

Activity related to livestock safety against predators within the limits of existing pastures is also intended, as a way of protecting the integrity of native wild animals from invading areas already consolidated with human presence, which could put people and animals at risk. This activity can have a positive impact on the maintenance of biodiversity with a focus on fauna.

The WARG Project, with its mechanisms, will guarantee the forest permanence and consequent biodiversity conservation through continuous monitoring activities using supporting technology, such as drones and satellite images. Such monitoring activities will contribute to climate benefits from maintaining the region's ecosystem services, regulating the micro-climate, climate, and water quality, with the present springs and streams preservation.

The scenarios described in this section are consistent with the legal framework already presented in item 2.5 Legal Status and Property Rights. The Project Area is made up of several private properties and complies with the respective properties' municipalities, as well as the landowners have their right of use according to the legislation. Carbon Credits Consulting has no financial impediments that would make the project unfeasible. Significant expenses were invested for VCS and CCB Standards prior to the Verra registration, and given the future VCS income, the project is financially viable.

It is known that the Brazilian Forest Code defines that 80% of the forest within a private property in the Brazilian Amazon must be preserved as a Legal Reserve. However, from the vast literature, and considering our historical spatial analyzes (Baseline), it is understood that such legislation is not widely applied in the way it should be. The federal government and state and municipal bodies do not have funds for managing projects in this category.

Other relevant information about the Project's additionality for community and biodiversity is in sections 4.1.4 Without-Project Scenario: Community e 5.1.3 Without-Project Scenario: Biodiversity.

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

The WARG Project does not intend to use any of the other community offsets or biodiversity benefits listed above. The project aims to produce only offsets related to Reducing Emissions from Avoided Deforestation, as described in Section 3 – Climate.

Additionality for community and biodiversity has been fully demonstrated, but these benefits are not used in other offset programs.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The WARG Project will have some forms of communication with involved parties, aiming to guarantee access to non-sensitive documents, and all other information that are parties' collective interest, through printed, in-person and virtual means, as described below.

Printed: a printed version of each document, such as the monitoring report, validation and verification report, and the summary, will be available for consultation by stakeholders at each blocks' main headquarters, and will be updated whenever necessary.

Online: the documents will be available online on Verra Registry and on Carbon Credits Consulting's official website. News and updates will be published by the company through social media.

Orally: information and news will also be transmitted orally in meetings between the company's technicians together with landowners and communities involved.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Documents related to WARG Project will be available online on the Verra Registry and Carbon Credits Consulting's websites. Printed bulletins will be produced, which will be available at each blocks' main offices for communities' consultation. All information and news will be reported orally in annual meetings on the properties between the technical team, stakeholders, and communities.

2.3.3 Informational Meetings with Stakeholders (G3.1)

In 2021, participatory workshops were held with the communities of the WARG Project. The meetings occurred in Seringal Santo Antônio, Fazenda MAC Esperança, Fazenda Santa Paula and Fazenda Nictheroy in August of 2021, Seringal Fonte 2, Seringal Fonte 3, Seringal Palmares, Seringal Santo Elias 1014, and Seringal Santo Elias – 1016 on October of 2021, and Fazenda Soberana and Fazenda Floresta in December of 2021. With appropriate language and use of expository panels, the information, objectives, execution stages and the survey of local demands were presented.

For the next phases, follow-up meetings will be held with the Stakeholders. These meetings will be held whenever necessary for decision-making in relation to the activities that are and/or will be developed, either virtual or in person.

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

Relevant information related to potential communities' costs, risks and benefits will be analyzed through a participatory and transparent process with communities. All pertinent information regarding validation and verification will always be provided in a timely manner prior to any important decision being taken.

The WARG Project management team will provide full transparency to this process through consultations with community representatives. The joint work between the community and the team is based on participatory and convenient communication, always through means established according to the profile of the community (telephone contact, face-to-face meetings, e-mail, etc.).

The objective is not only to hold informational meetings, but also to carry out joint construction activities that encourage the community to commit to the project and its activities, understanding its' potentialities, risks, and costs.

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

The communities participating in the WARG Project will be informed about the validation and verification through face-to-face meetings, telephone calls or amateur radio for community leaders. Other forms of communication will also be adopted, if possible and necessary.

Likewise, virtual channels will be used with other interested parties, such as social media and the CCC's official website, where information about the public consultation, the validation and verification process and the certification approval will be available.

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

The VVB site visit will be informed to communities and other interested parties prior to the event, through the locally responsible technician.

During this period, Carbon Credits Consulting will also send a team to prepare local communities and stakeholders for the audit. The community and other interested parties will have the opportunity to speak freely with the auditor.

2.3.7 Stakeholder Consultations (G3.4)

A prior analysis of all potential project stakeholders was carried out, considering all communities and other stakeholders. The entire design of the project was conceived based on the profile of the communities and the characteristics and cultures of the region. A detailed and in-depth analysis of traditional communities and other stakeholders will be carried out in the project's installation phase.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The plan for maintaining ongoing communication with communities includes:

- a communication channel that addresses possible PQRSD (see Section 2.3.13).
- qualification building and training activities, as part of the strategic line's implementation and project activities (see Section 2.3.14).
- dissemination of project information (see Section 2.3.2).
- other project-related events, such as consultation processes (see Section 2.3.3).

2.3.9 Stakeholder Consultation Channels (G3.5)

The WARG Project's activities will be defined and implemented considering the socioeconomic diagnosis carried out in the communities.

Communication and discussion access on the activities' progress will occur continuously throughout the Project's duration. A suggestion box for feedback will also be implemented at the properties' headquarters.

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

For the elaboration of the proposed activities, the community's demands were considered.

Landowners participated in the WARG Project's decision-making process through a face-to-face meeting, with the authorization of their parties to implement the activities.

2.3.11 Anti-Discrimination Assurance (G3.7)

Carbon Credits Consulting has a solid human rights and social responsibility policy based on its "Code of Ethics and Conduct", which aims to guide and direct the attitude of all its employees.

The company is committed to the safety, health, and life of its employees. And it repudiates any discrimination based on race, color, nationality, age, religion, sexual orientation, physical or mental disability. In addition to not allowing moral or sexual harassment within its work environments, whether with its employees and partners.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

A person will be hired as responsible for the WARG Project local support. In-person demands will be forwarded to this person, who will forward them to the company's administrative headquarters, which will define the necessary referrals.

The community will have free access to CCC Brazil's technicians through digital means, telephone and face-to-face visits whenever they are carried out.

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

The CCC Brazil team will be available to assist communities in resolving conflicts, receiving feedback, and redressing complaints.

Suggestion boxes will be implemented in each blocks' main offices, so that the community can express themselves, anonymously or not, with comments, criticisms, or suggestions about the WARG Project.

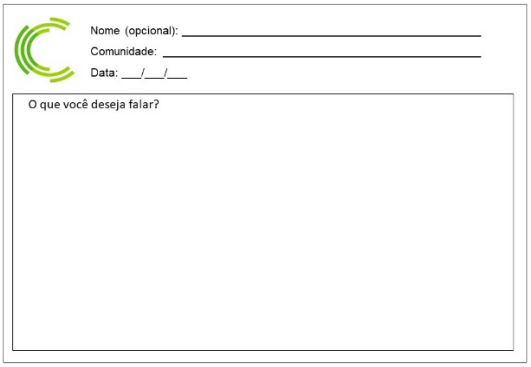


Figure 8: Proposed template of feedback form.

Information boards for contacting Carbon Credits Consulting Brazil will also be implemented, distributed at the properties participating in the WARG Project so that communities can have free access and thus solve their doubts and make suggestions directly. An option to make public comments on CCC website will be implemented in the future, and an email is being made available for comments.

2.3.14 Worker Training (G3.9)

The communities' qualification is important for the WARG Project's development and the conduction of activities, to guarantee the results' quality and perpetuation in the long term.

Among the various activities that will be carried out on the properties, qualification courses stand out, which may result in the generation of income and jobs.

- Training/Capacitation: Involves a fire management course and a fire brigade implementation, which is related to the effective local communities' participation in the joint planning and implementation of controlled fires. There will be a participation certificate. In the future, people will be able to act as professional or volunteer firefighters.

- Technical assistance/communication: Community's members training to carry out maintenance and minor repairs on the internet provider's equipment, becoming the community's technical support.
- Gender inclusion: Cooking, sewing, gardening, and handicraft courses, with the goal of training the community, especially the female audience (demand pointed out in the socioeconomic diagnosis) so that they can improve their knowledge and undertake autonomously, aiming to promote income generation and economic development through a collective organization.

2.3.15 Community Employment Opportunities (G3.10)

The project has the prospect of generating employment and income through the implementation and development of some activities, such as communication and fire brigade technical assistance, in addition to gender inclusion courses, like cooking, sewing, gardening, and handicrafts. There will be no ethnic, gender, sexuality, or religious practices distinction in the selections for future vacancies, considering the demands offered in the socioeconomic diagnosis and the interest of people in their respective work activities.

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

All employees belonging to CCC Brazil, as well as workers of WARG Project and service providers, are legally hired in compliance with Brazilian labor law. Also, international agreements ratified by Brazil and issues related to worker well-being are respected.

After hiring and before the beginning of the worker's activities, there are training and qualification on technical procedures and empowerment promotion regarding their rights and applicable legislation. In addition, employees are directed to join the institution responsible for their rights, the respective unions to the area of work.

The relevant work legislation is contained in the Brazilian Constitution, Chapter II-Social Rights, Articles 7- 11 address labor and social rights, such as: minimum wage, normal working hours, guidance on vacation and weekly leave, guidance on maternity and paternity leave, recognition of collective negotiation with employers, prohibition of discrimination, among others.

In addition to the Constitution, there are two additional decrees related to Brazilian labor laws:

Decree-Law No. 5,452, May 1st, 1943, the so-called Consolidate of Working Laws - CLT (Consolidação das Leis do Trabalho) that provides clarification on hourly, daily, weekly and monthly work hours, employment of minors and women, establishes a minimum wage, establishes worker safety and safe working environments, defines penalties for non-compliance by employers, and establishes a judicial work-related process for addressing all worker related issues.

Law No. 5,889, June 8th, 1973: provides regulation norms to the rural work. This is a complimentary law to the aforementioned 1943 decree because prior to 1973, rural workers did not have the same rights as urban workers. In 1973, this law was established to specify the equality between urban and rural workers, along with compensation for overtime.

There are also several regulation norms from the Ministry of Labor applied to health safety conditions in the labor site, called NRs and described below:

- NR 01 - General Provisions.
- NR 02 - Previous Inspection.

- NR 03 - Embargo or Interdiction.
- NR 04 - Specialized Services in Safety Engineering and Occupational Medicine.
- NR 05 - Internal Accident Prevention Commission.
- NR 06 - Personal Protective Equipment – PPE.
- NR 07 - Occupational Health Medical Control Programs.
- NR 08 – Buildings.
- NR 09 - Environmental Risk Prevention Programs.
- NR 10 - Safety in Electricity Facilities and Services.
- NR 11 - Transport, Handling, Storage and Material Handling.
- NR 12 - Machines and Equipment.
- NR 13 - Boilers, Pressure Vessels and Tabs and Metallic Storage Tanks.
- NR 14 – Ovens.
- NR 15 - Unhealthy Activities and Operations.
- NR 16 - Hazardous Activities and Operations.
- NR 17 – Ergonomics.
- NR 18 - Working Conditions and Environment in the Construction Industry.
- NR 19 – Explosives.
- NR 20 - Safety and Health at Work with Flammables and Fuels.
- NR 21 - Open Pit Works.
- NR 22 - Occupational Health and Safety in Mining.
- NR 23 - Fire Protection.
- NR 24 - Sanitary and Comfort Conditions in the Workplaces.
- NR 25 - Industrial Waste.
- NR 26 - Safety Signaling.
- NR 27 - Professional Registration of the Occupational Safety Technician at the MTB (Revoked by Ordinance GM No. 262/2008).
- NR 28 - Inspection and Penalties.
- NR 29 - Safety and Health in Port Work.
- NR 30 - Safety and Health in Waterway Work.
- NR 31 - Occupational Health and Safety in Agriculture, Livestock, Forestry, Forestry and Aquaculture.
- NR 32 - Occupational Health and Safety in Health Establishments.
- NR 33 - Safety and Health at Work in Confined Spaces.

- NR 34 - Working Conditions and Environment in the Naval Construction, Repair and Dismantling Industry.
- NR 35 - Work at Height.
- NR 36 - Occupational Health and Safety in Meat and Meat Products Slaughter and Processing Companies.
- NR 37 - Safety and Health on Oil Rigs.
- NRR 1 - General Provisions (Revoked by MTE Ordinance 191/2008).
- NRR 2 - Specialized Service in Prevention of Rural Work Accidents (Revoked by MTE Ordinance 191/2008).
- NRR 3 - Internal Commission for the Prevention of Accidents in Rural Work (Revoked by Ordinance MTE 191/2008).
- NRR 4 - Personal Protective Equipment - PPE (Revoked by MTE Ordinance 191/2008).
- NRR 5 - Chemical Products (Revoked by MTE Ordinance 191/2008).

All other regulatory frameworks applicable to the case shall also be adopted by the WARG Project proponents.

2.3.17 Occupational Safety Assessment (G3.12)

As described in section 2.3.14, there is a system of programmed training and qualifications aimed at preparing the residents themselves and employees involved in project related activities.

To reduce the risk associated with each activity, the project proponent will hold meetings prior to the activity development in which, in addition to discussing technical issues, existing risks and measures to mitigate them are explored. In addition to training and qualifications, all personnel involved will receive individual and collective protective equipment.

It is important to emphasize that the property's residents/employees have employment contracts backed by the Brazilian labor legislation in force, the Consolidation of Labor Laws (CLT), which together with Regulatory Norms, aims to ensure that the exercise of labor functions is carried out as free as possible from unwanted occurrences and accidents.

The measures proposed to minimize the risks are designed so that they are aligned with the cultural practices of the community, so that these security measures are easily accepted and complied with by the communities involved.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

The WARG Project will have three governance spheres: Deliberative Sphere, which will be constituted by Carbon Credits Consulting SRL (Italy) as proponent, landowners, and community's representatives. Entities that will participate in the activities may also be involved, such as the Federal University of Acre. This deliberative sphere will be responsible for decision-making.

Management Sphere will be constituted by Carbon Credits Consulting Brazil, responsible for receiving decision-making from the previous sphere, and defining the guidelines for each project part,

especially in activities' implementation and involved teams' coordination. It will also oversee receiving and handling communities', landowners', and other stakeholders' demands.

Technical sphere will be the entire technical staff that leads the implementation and development of *in loco* activities. All the executive part related to courses, visits, studies, monitoring, and reports on the project's status locally will be carried out by this team. This part will receive directives from management sphere. Community members, Carbon Credits Consulting Brazil's team and external professionals will also be involved.

2.4.2 Required Technical Skills (G4.2)

The technical team that will participate in the Project's implementation and development is a multidisciplinary team, and has the knowledge, experience and skills listed below:

- Carbon projects' implementation and management.
- Deforestation monitoring.
- Forest inventory.
- Research, conservation and management of biodiversity and ecosystem services.
- Skills in community management, environmental education, and conflict resolution.
- Land use planning and local development.

2.4.3 Management Team Experience (G4.2)

Table 8 presents the project management team composition.

Table 8: CCC Project management team.

Name	Role	Description
David Rossi	CCC Italy Founder & Managing Director	Doctor in Veterinary Medicine, PhD in Epidemiology and Control of Zoonosis. Experience in Project Management in Developing Countries (Latin America and Africa). Experience in Forest Management (Brazil)
Ângela Maria Klein Hentz	Project Analyst	Forest Engineer, Master, and Doctor in Forestry with emphasis on Forest Management. Experience in forest measurement; Forest Inventory; spatial analyses; digital image processing; GIS; climate change and carbon quantification; geostatistical analyses.
Cristiano Alves	Project Analyst	Geography Bachelor and Master student of the Graduate Program in Geography from UFAM. Experience in geoprocessing, land use mapping, georeferencing, elaboration of maps and charts, experience with riverside communities and family farming.
Nayara Diniz	Project Assistant	Geography Bachelor and Master in Geosciences from UFAM. Experience in geoprocessing, land use mapping, mapping.
Felipe Góes de Moraes	Project Assistant	Forest Engineer and Master in Forest Science from UNESP. Experience in native forest inventories and field navigation; ecological restoration projects' implementation; geoprocessing and analysis of geographic data.
Vanessa de Almeida Stamberg	Project Assistant	Forest Engineer from UFPR. Experience in rural extension, communication and environmental education, Agroforestry Systems projects, forest conservation and agroecology.

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

Not applicable.

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

Carbon Credits Consulting is a company specialized in the development of projects with a high environmental, social and biodiversity impact with the objective of eliminating greenhouse gas emissions.

The company's main activity is based on the development of afforestation (ARR) and conservation of natural forests (REDD+) projects that generate Certified Carbon Credits recognized by UNFCCC.

Documents supporting the company's financial health are considered commercially sensitive information and will be shared with the audit team on a confidential basis.

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

Carbon Credits Consulting Brazil has a Code of Ethics and Conduct that aims to guarantee actions based on the highest principles and values, not tolerating bribes or acts of corruption of any kind or under any circumstances by its employees, agents, consultants, licensees, suppliers or representatives.

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

No commercially sensitive information is presented in this version of the document.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

The WARG Project's current Reference Region has an area of 5,424,828 hectares. 20% of this land is classified as protected areas (Conservation Units and Indigenous Lands) at both, federal and state levels. About 22% of the Reference Region is covered by areas of "land agrarian reform settlements", managed by the National Institute for Colonization and Agrarian Reform (INCRA), an agency under the Brazilian Ministry of Agriculture.

The permanence of the properties included in the Project is guaranteed by a legal contract signed between the parties (CCC Italy and each landowner, either by personal ownership or business ownership). All properties are registered as private properties under the national system for land tenure management (SIGEF in the Portuguese acronym) and in INCRA.

The WARG Project Area is not located in protected areas, where private ownership is not allowed, nor does it have overlapping areas with protected areas, nor does it intend to use direct natural resources from protected areas.

Concerning the proximity with protected public areas in the Reference Region, we observed a group of Project properties located in the influence zone (or buffer zone) of Chico Mendes RESEX. The influence zone, according to the RESEX Management Plan, is a minimum of 10 km belt in the limits of the area. The properties under the RESEX buffer zone are Fazendas Itaimbe I and II, Castanhal, Espigão, Fazenda Soberana and the group of Seringais. Also, the group of Seringais (Group 7) is also in the influence zone of Macauã and São Francisco National Forests (FLONAs), according to each Management plan.

Therefore, despite the lack of overlap with land categories already mentioned, it is necessary to know the legislation pertinent to each one, to safeguard the Project, considering the presence and proximity

of such areas in the Reference Region, and the possibility of the involvement of populations residing in such areas, indirectly, in the Project's activities.

According to Federal Law No. 9,985 of July 18, 2000, a Conservation Unit (UC in the Portuguese acronym) is a territorial space and its environmental resources, including jurisdictional waters, with relevant natural characteristics, legally established by the Public Authorities, with conservation objectives and defined borders, under special administration, to which adequate protection guarantees apply.

Brazil has a mechanism known as the National System of Conservation Units (SNUC in the Portuguese acronym) (Chapter II of Federal Law No. 9,985 of July 18, 2000), which consists of all the UCs in the territory, and has objectives related to biodiversity such as the ecosystems' protection, maintenance, and recovery.

Furthermore, there are social objectives, which relate to the native populations living within the protected areas, such as respecting and valuing their knowledge and culture. Chapter III of Federal Law No. 9,985/2000 covers the categories of Conservation Units, prescribing which categories include the presence of private lands and which criteria and regulations are applied in each situation.

At the state level, Acre has the State Law No. 1,426 of December 27, 2001, that provides for the preservation and conservation of the forests of the State of Acre, and creates the State System of Natural Protected Areas, creating the State Forestry Council and the State Forest Fund of Acre. This Law aims in Art. 4, paragraph VI, to encourage the rational use of the forest and to foment ecotourism, recreation, research, and forest education. This passage covers the possibility of local community involvement in protected areas of Acre, in Project activities with a focus on environmental education and research.

About the Indigenous Lands, according to article 231 of the Brazilian Constitution, they are "lands inhabited by them (indigenous people) on a permanent basis, those used for their productive activities, those indispensable to the preservation of the environmental resources necessary for their well-being, and those necessary for their physical and cultural reproduction, according to their uses, customs, and traditions". Article 20 of the Brazilian Constitution also establishes that these lands belong to the Union, with the recognition to the indigenous peoples the permanent possession and usufruct of the rivers, lakes, and soil present riches in these territories.

The specific legislation for Indigenous Lands is called "Estatuto do Índio", Federal Law No. 6,001 of December 19, 1973, which regulates the legal status of indigenous people, forest dwellers, and indigenous communities. Chapter IV refers to Indigenous Domain Lands, and grantees full ownership to indigenous persons or the indigenous community, of the lands owned due to any of the forms of acquisition of domain under civil law, not applying to the lands of the Union domain, nor to other reserved areas referred to in the law, nor to the collectively owned lands of any other tribal group. Article 33 of Chapter IV also states that an indigenous person who occupies a certain land for 10 consecutive years, in a size of less than fifty hectares, will have the right to acquire full ownership. The Paragraph 2 of Art. 45, Chapter IV of Law No. 6,001/73, states that, due to the interests of the Indigenous Heritage and the well-being of the forest dwellers, the authorization of research to third parties will be conditioned to the prior understanding of the Indigenous Peoples' Assistance Body.

Regarding the Settlement Projects, according to INCRA, an agrarian reform settlement is a set of agricultural units, installed by INCRA where originally there was a property without social function.

Each unit, also called parcel or lot, is destined to a family of rural worker or farmer who does not have economic conditions to buy a property. According to INCRA, a rural property is: "the area formed by one or more continuous land registrations, belonging to the same holder (either owner or squatter), located

both in the rural and urban areas of the municipality". While there are no settlements in our Project's area, this type of property occurs in the Reference Region.

The most important Brazilian agrarian laws are Federal Law No. 4,504 of November 30, 1964, which provides for the Land Statute, and the Agrarian Reform Law, Law No. 8,629 of February 25, 1993, which provides for the regulation of the constitutional provisions to agrarian reform, provided for in Chapter III, Title VII, of the Federal Constitution. The Laws dispose of all the activities allowed in these Union and private territories, as well as the procedures of purchase, sale, use, delimitation, and other elements involving the land.

According to Chapter I, Art. 2, Paragraph 1 of Federal Law No. 4,504/64, land ownership fully fulfills its social function when it favors the well-being of the owners and workers and their families; maintains satisfactory levels of productivity; ensures the conservation of natural resources and observes the legal provisions that regulate the fair labor relations between those who own and cultivate it. Section II, among Art. 12 and Art. 15, disposes about Private Lands, conditioning its continuity related to the existence of a social function, besides establishing the constitution of associations and corporate entities that aim at the use of private lands.

The Federal Law No. 10,267 of August 28, 2001, sets directives to the official recognition of private properties based on its documentation. Those can be certificates issued by a notary's office linked to the property number ID, Rural Property Registration Certificate (CCIR in the Portuguese acronym), certificate of property sale, or others.

INCRA also defines, in terms of the agrarian legislation in force in Brazil, some documents so that the Property can be registered in the agency and be regularized, being document of Registered Area (Inteiro Teor); Area of Possession by Fair Title; Judicial Title; Title Issued by the Public Power; Certificate issued by the Board of Trade or Registry Office of Legal Entities; Area of Possession by Simple Occupation issued by Trade Union, Embrapa or Emater.

2.5.2 Recognition of Property Rights (G5.1)

Considering that the WARG Project's Area involves private properties (rural properties), the recognition of the property right of the participating properties occurs through supporting documentation, defined by the National Institute of Colonization and Agrarian Reform (INCRA), in the terms of the agrarian legislation in effect.

The Project landowners have the following land documentation listed CCIR (Document Issued by INCRA, which proves the registration of the rural property); Certificate of Registration of the property (Issued by the Rural Property Registry Office); Certificate of Entire Title (Linked to the registration, it is a descriptive of the land's history, from its first acquisition to the last movement/modification carried out); Georeferencing of the areas with a cartographic file of the property's official delimitation.

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

The WARG Project is developed within private properties as established in Section 2.5.2, duly delineated by the documentation submitted, therefore, there is no overlap with community property or public areas.

No property rights will be affected, no population relocation or important activities that reflect the way of life of these people, their culture, or of surrounding populations.

There will be no restitution or compensation of parts affected by the Project, considering the contractual clauses agreed upon in a legal document between Carbon Credits Consulting and the Project areas' landowners.

2.5.4 Property Rights Protection (G5.3)

The WARG Project Area is entirely located within private properties, with no overlapping or boundary conflicts with protected areas, therefore, there is no removal of Indigenous Peoples from Indigenous Lands and/or traditional populations living in Protected Areas, nor direct negative impacts anticipated on their way of life, culture, or traditions.

2.5.5 Illegal Activity Identification (G5.4)

Invasion of private land

Mitigation measures for private lands invasion by illegal squatters, within the properties participating in the WARG Project, involve the identification by satellite imaging of the invaded areas, together with the creation of a team to monitor this activity with the property employees/landowners who will personally visit the invaded areas in case there is no risk to the personal safety of those involved.

We intend to strengthen the employees/landowners' engagement in this activity with the establishment of an immediate communication line through messaging technologies or phone calls with the Project management team, on the proponent part, and the property's internal team, for the definition of the specific strategy to be taken in each situation.

A properties' internal committee will be created, made up of a property management member, an employees' representative, a representative of the residents, and depending on the invasion complexity (personal security, clearing of vegetation, non-familiar squatters [and other criteria yet to be defined]), a member of the state and/or federal environmental enforcement agency. In cases needed, the enforcement agency will visit the invaded areas to advise the squatters about their action's illegality and what legal measures can be taken if they do not back down.

Illegal Logging

In the occurrence of illegal timber extraction, we aim to use the property's internal committee structure described in the previous item, with the support of Remote Sensing and Geoprocessing resources to identify the locations where illegal acts occur.

It is intended to implement the use of a smartphone application [under construction] to support the monitoring of illegal logging activities occurrence. The application is composed of blocks to be filled out in writing, describing the occurrence, with the possibility of inserting photographic and audio records and geolocation points. The records in the smartphone application will be stored in the online cloud as soon as there is an internet connection.

The Project will support educational initiatives in schools related to the Project Area (where the residents/employees and their children study), promoting environmental education activities throughout the school year. Such initiatives aim to strengthen and often build the collective sense of nature protection relevance in the community. School managers, teachers, and educators will be involved, with the ability to mobilize parents and students in activities (seminars, fairs, lectures, school cinema day, etc.) and the creation/sharing of graphic material such as books, pamphlets, and comics with an environmental theme.

Illegal Hunting

For the occurrence of illegal hunting, it is intended to use the property's internal committee described above, for the mobilization of residents/employees in the identification of illegal hunting agents. The identification of illegal hunting on properties is an activity that requires the establishment of trust bonds in the community and has the possibility of failure in implementation.

It is proposed to develop annual questionnaires to be applied with the residents/employees for this activity identification. The questionnaire will not identify the interviewee and will be applied after relationships of trust are established between the proponent and those involved and will include questions about the number of animals hunted in the period, which animals were captured, where on the properties the animals were captured, what was the destination of the hunt, and if there is an occurrence of people from outside the properties hunting inside the properties.

With the questionnaire, we intend to create a diagnosis and an annual census of hunting on the properties, which will be used as documentary proof of the illegal hunting that occurs inside the areas and will be used in environmental education presentations in schools.

2.5.6 Ongoing Disputes (G5.5)

One of the Project's properties needs to have its boundary validated by the National Institute for Colonization and Agrarian Reform (INCRA), since there is some overlapping with a neighbor property. This is the case of Seringal Santo Elias 1016.

The landowner gathered documentation proving its ownership, but there is still the need to make an official arrangement with the neighbor landowner about both properties correct boundary. This process requires an official georeferencing of the property by surveyors, and it is an activity proposed in the project.

2.5.7 National and Local Laws (G5.6)

One of the WARG Project's planned activities is the implementation of equipment for communication (such as internet), including a communication tower in Fazenda Santo Antonio and Fazenda Soberana. For those activities, it will be respected the regulations presented in the General Law of towers (Federal Law No. 13,116 of 2015), which establishes the general rules for the implantation and sharing of the telecommunications infrastructure in Brazil.

Project activities related to fire monitoring and fire management will be developed considering the regulation presented in the National Policy for Integrated Fire Management, which is currently under approval process as a law. This proposed law (Federal Law project No. 11,276 of 2018) was approved by the House of Representatives in October 2021 and provides for the regulation of fire usage as a practice for preventing and fighting fires in natural areas.

Activities concerning fauna monitoring are regimented by the Federal Law No. 11,794 of 2008, which establishes the rules and procedures for scientific research with animals. Also, Federal Law No. 9,605 of February 12 of 1998 supports the activities of the Project so that irregularities do not occur.

In Chapter V of this Law are presented the "Crimes against the Environment", and in Section II are presented the "Crimes against Fauna", with the resolution of fines and penalties for damages caused to certain types of native vegetation in Brazilian territory, for activities without permissions from the competent environmental agencies. Also, Chapter V prescribes fines and penalties for crimes committed against wild animals, without the necessary permissions from the competent environmental agencies, and against domestic animals.

At the State level, the Acre State Law No. 3,757 of June 13 of 2021 determines regulation for crimes against wild and domestic fauna and prescribes penalties to individuals that endanger the health or physical integrity of animals. Other Environmental protection measures are presented in Acre State Law No. 1,117 of January 26 of 1994, which regulates the Acre state Environmental Policy.

Lastly, it is important to note that all properties in the Project are also regulated by Federal Law No. 12.651 from May 28 of 2012, known as the Brazilian Forest Code. This law regulates the use of private properties in Brazil and specifies two main conservation measures for private properties in Brazil, the Permanent Preservation Areas (APP) and Legal Reserves (RL).

In this Law, it was determined that each property in the Brazilian territory should be registered in a system known as CAR (Cadastro Ambiental Rural). During the registry in CAR, each landowner is prompted to join a program known as PRA (Programa de Regularização Ambiental - Environmental Regularization Program), which will guide the restoration of areas such as APPs and RL. Those landowners are exempt from fines and administrative process if they join the program.

2.5.8 Approvals (G5.7)

The WARG Project is being developed within private areas, with the proper contractual documents signed between the parties (Carbon Credits Consulting and the individual landowners), so it is not subject to the authorizations of any agency or civil society group.

2.5.9 Project Ownership (G5.8)

Carbon Credits Consulting and the individual landowners have a contractual agreement for the development of the project, and details about the property's ownership are presented in Table 9.

Table 9: Land tenure documentation evidence.

Property Name	Owner	CCIR[17]	Property code	Registration		Inteiro Teor
				ID	Certif.	
Fazenda Charrua do Niteroi	Flávio Maia Cardoso	43501139218	012.068.000.531-7	2142	Yes	No
Fazenda Criciuma AB		43592126211	023.019.003.360-6	3405	No	Yes
Fazenda Criciuma B		43592126211	023.019.003.360-6	2228	No	No
MAC Esperança I		-	-	-	No	No
MAC Esperança II		-	-	-	No	No
MAC Esperança III		-	-	-	No	No
Fazenda Itaimbé I		43586616210	012.041.014.800-0	593	Yes	No
Fazenda Itaimbé II		43586616210	012.041.014.800-0	638	Yes	No
Fazenda Nictheroy A		43501306211	000.035.832.685-4	4392	Yes	No
Fazenda Nictheroy B		43501363215	000.035.832.693-5	4393	Yes	No
Seringal Santo Antonio		-	-	1204	Yes	Yes
Seringal Santo Antonio II		-	-	2757	Yes	No
Fazenda Santa Paula		43501269219	012.025.017.779-3	4391	Yes	No
Fazenda Castanhal A	Henrique Luis Cardoso Neto	42946106210	951.030.965.790-0	561	Yes	No
Fazenda Espigão		42947075211	951.030.967.181-4	560	Yes	No
Fazenda Uberaba	Nivaldo de Souza Morais	42960016215	012.033.015.890-0	2915	No	Yes
Fazenda Floresta	Julio Cesar Moraes Nantes	44246092221	012.025.020.613-0	1661	No	Yes
Fazenda Soberana		44244761223	012.041.010.960-9	664	No	Yes
Seringal Fonte II		-	-	1818	No	Yes
Seringal Fonte III		-	-	666	No	Yes

[17] Some properties don't have a CCIR number available due to a few different reasons. Fazendas MAC Esperanca (I, II and III) and Seringal Santo Antonio were recently acquired, and the registration process of the new owner is still ongoing. Seringal Fonte II, Seringal Fonte III, Seringal Palmares, Seringal Santo Elias -1016, and Seringal Santo Elias - 1014 are pending registration due to the need to complete the Georreferencing of the area.

Seringal Palmares	M. Bezerra (Luciana Maria Silva Macedo)	-	-	2264	No	Yes
Seringal Santo Elias - 1016		-	-	1016	No	Yes
Seringal Santo Elias - 1014	Agropecuária Santo Elias Ltda (Luciana Maria Silva Macedo)	-	-	1014	No	Yes

2.5.10 Management of Double Counting Risk (G5.9)

The WARG Project has not and does not intend to generate any other forms of GHG-related environmental credit, considering emission reductions or removals under the VCS program. We understand that the VCS program holds a database of approved project information and data, therefore a registry of all projects validated against the VCS criteria and all Verified Carbon Units (VCUs).

Each VCU can be tracked from its issuance until its retirement in the database, allowing buyers to be assured that each credit is real, additional, permanent, and independently verified, with a unique numbering and fully traceable.

In addition, Acre state does not yet have a jurisdictional program validated by a carbon market standard and does not conduct market operations, either voluntary or regulated.

Consequently, there is no risk of double-counting in this project.

2.5.11 Emissions Trading Programs and Other Binding Limits

The WARG Project activities are not included in an Emissions Trading Scheme or any other GHG allowance trading mechanism.

2.5.12 Other Forms of Environmental Credit

No other form of environmental credit has been created in the WARG Project area. This project has not been registered under any other credited activity.

2.5.13 Participation under Other GHG Programs

This Project has not been registered in any other GHG reduction or removal program.

2.5.14 Projects Rejected by Other GHG Programs

This Project has not been rejected in any other GHG program.

2.5.15 Double Counting (G5.9)

This Project has no risk of double counting.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

Verified Carbon Standard (VCS) Approved Methodology VM0015 – Methodology for Avoided Unplanned Deforestation, version 1.1, from December 03, 2012.

3.1.2 Applicability of Methodology

The methodology VM0015 is applicable to the Western Amazon REDD+ Grouped Project because the following criteria are applicable:

- The baseline activities include unplanned deforestation as result from agricultural and pasture activities, as set in the most recent VCS AFOLU requirements.
- Project activities include forest protection with selective wood logging, as allowed in the methodology description scope "D" (details in VCS VM0015 document, page 12, table 1 and figure 2-D).
- Project area includes different forest types, mainly mature forests (or primary forests) as described by the national definition of forest.
- Project area includes only areas classified as "forest" for at least 10 years form the project starting date.
- Forest types in the projects are do not include forested wetlands neither peatswamp forests.

3.1.3 Project Boundary

Step 1.1 of VM0015 – Spatial Boundaries

Reference Region

The proposed Reference Region (RR) for this baseline scenario covers the east part of Acre State (municipalities of Acrelândia, Bujari, Capixaba, Epitaciolândia, Plácido de Castro, Porto Acre, Rio Branco, Sena Madureira, Senador Guiomard and Xapuri), part of south the Amazonas State (municipalities of Boca do Acre and Lábrea), and part of west of Rondonia State (municipality of Porto Velho). The RR is located between the latitudes 8.53° S and 11.15° S, and between the longitudes of 66.03° W and 69.79° W

Since there isn't a national or subnational deforestation baseline in place, the delimitation of the RR was done considering the historical regional land use, the spatial distribution of the properties in the first instance of the WARG project, and environmental aspects.

To determine the RR spatial boundaries, it was taken into account the spatial boundaries of sub watersheds, the land tenure situation in the properties and region, and the drivers of deforestation in the past years in Acre and South Amazonas, being those: old rubber forests (Seringal) areas, areas with recent deforestation (last 20 years), forest degradation with removal of commercial valuable wood, deforestation to grantee land possession, and pasture with low productivity[18]. In the RR occur different patters if deforestation, such as fish spine (*espinha de peixe*), multidirectional, and consolidate, resulting from distinct land use patterns[19], as well as deforestation along river edges and old rubber forests.

To fulfil with the compatibility criteria of land use and land occupation in the RR and the Project Areas, the following criteria (from pages 18 and 19 of VM0015) were considered:

- **Deforestation agents and drivers**: The deforestation drivers identified are the large-scale productive activities on the project properties and neighboring properties, such as livestock and

[18] FEARNSIDE, P. M. Land-tenure issues as factors in environmental destruction in Brazilian Amazonia: the case of southern Pará. World Dev 29, pp.1361-1372, 2001.
[19] GAVLAK, A. A. Padrões de mudança de cobertura da terra e dinâmica populacional no Distrito Florestal Sustentável da BR-163: população, espaço e ambiente. Dissertação (Mestrado em Sensoriamento Remoto) - Instituto Nacional de Pesquisas Espaciais, São José dos Campos, 2011.

grain monocultures, and the illegal occupation of land (land grabbing) by land speculation. Agents are the people involved in productive practices that cause negative impacts and in land speculation.

- **Infrastructure drivers:** there is no infrastructure, such as new roads, hydroelectric power plants, or bridges, expected to be implemented in the RR.
- **Landscape structure and ecological conditions**: 100% of Project Areas have the same vegetation classes found in the RR; 100% of slope variation on the Project Area are withing the slope range in the RR; the Project Area has the same range of mean annual rainfall as the RR. The values observed in both Project Area (PA) and RR are shown in Table 10.
- **Socioeconomic and cultural conditions:** the land tenure situation in the PA under this baseline scenario can also be observed in a large part of the RR. The land tenure status of the PA (composed by private properties) also happens in 82% of the Reference Region. The same land use and land occupation classes observed in the Project Area also happened in the RR. Also, the PA is governed by the same laws and regulations as the RR.

Table 10: Spatial attributes of landscape structure and ecological conditions in the RR and PA

Vegetation	Source	Reference Region	Project Area
Lowland Open Ombrophilous Forest (1)	IBGE	Yes	Yes
Lowland Dense Ombrophilous Forest (2)		Yes	Yes
Alluvial Open Ombrophilous Forest (3)		Yes	Yes
Alluvial Dense Ombrophilous Forest (4)		Yes	No
Alluvial Open Ombrophilous Forest with bamboo (7)		Yes	No
Submontane Alluvial Dense Ombrophilous Forest with palms (8)		Yes	No
Elevation (m)	SRTM	107-321	124-280
Mean Annual Rainfall (mm)	CHIRPS V.2	1421-2046	1730-1995

REDD+ Project Areas

The WARG Project Areas (PA) totalled 59,959.3 ha of forests in 2021, and its where the conservation activities will occur. The PA is managed in a partnership between Carbon Credits Consulting and the property owners. The limits of the Project Area were determined by the remaining forest area in each property according to its starting date (2019 and 2021). The Project Areas spatial boundaries are based on the geographical coordinates of the property vertices from the documents of land tenure that will be presented for validation with the VCS standard.

Leakage Belt

The leakage belt was defined using the Mobility approach, according to option II of VM0015. This option was chosen based on the analysis of land occupation in the area, and economical data analysis. According to data from TerraClass project of 2014, mora than 80% of the deforested area in the RR is pasture, usually used for livestock. While that could indicate an economical interest, data on costs of production and sell prices indicate that profit is not a major driver of deforestation in the region. Also, livestock is used in the region as an activity to promote land ownership.

In the mobility approach we applied a multicriteria analysis considering the following characteristics:

- Areas with High Deforestation Risk – using the risk map.
- Properties with similar structure, considering size (larger than 250 ha), and ownership (private).

We used spatial limit of properties available from INCRA to define the areas. Details are presented in Figure 9. The leakage belt has an area of 471,241.42 ha and its spread across most of the Reference Region.

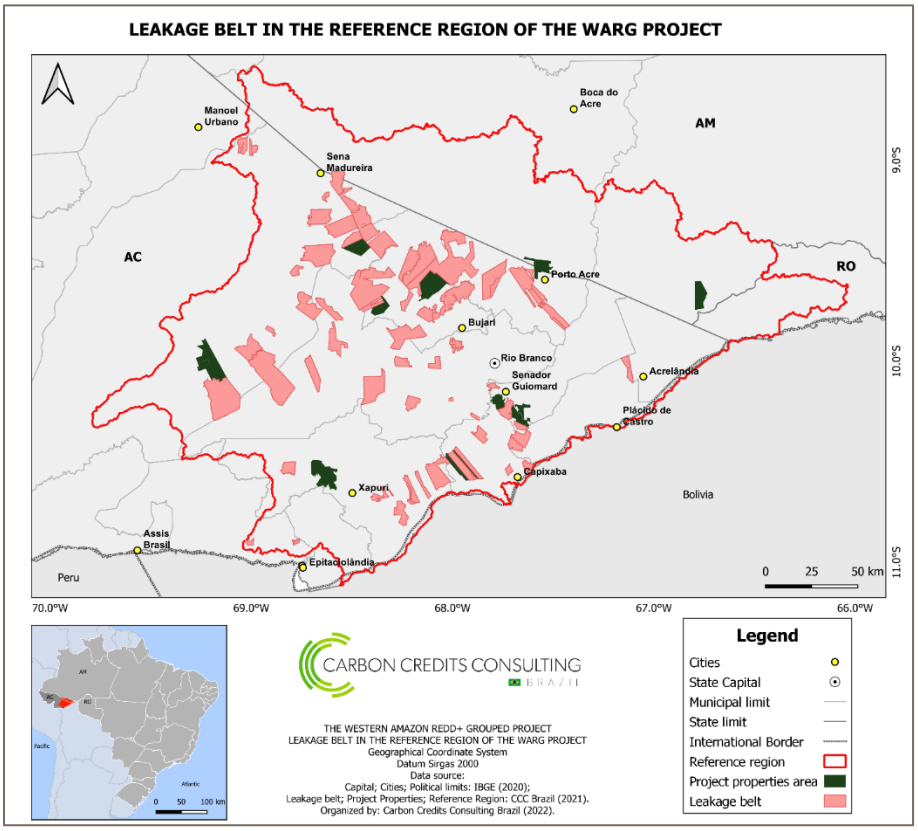


Figure 9: Leakage Belt spatial limits.

Leakage Management areas

Leakage management areas (LMA) are the areas where project activities aiming to reduce the risk of activity displacement leakage will occur. According to VM0015 they should be non-forest at the beginning of the project. In the WARG project we selected areas within the project properties that are non-forest and where we intend to concentrate the project activities. Details of the areas are presented in Figure 10. Leakage Management areas correspond to 27,066.3 ha.

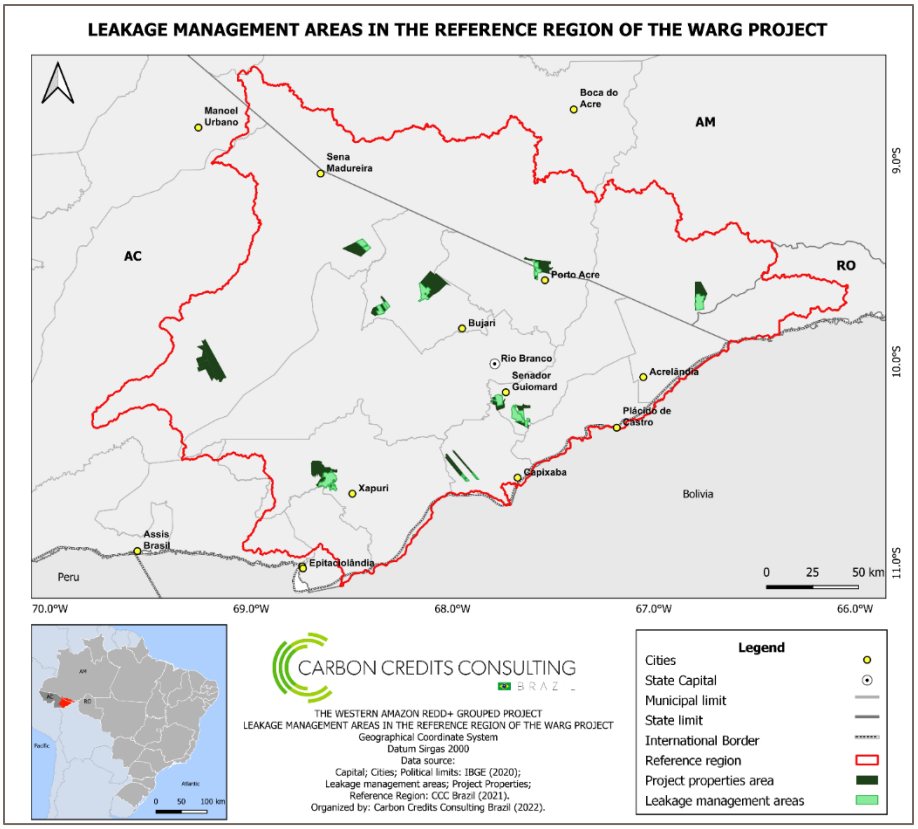


Figure 10: Leakage Management Areas spatial limits.

Forest

The definition of "forest" applied in the project is in accordance with Resolution 2 of the Interministerial Commission on Global Climate Change (CIMGC7). Data from the Deforestation Monitoring System in the Legal Amazon (PRODES), provided by the National Space Research Institute (INPE) was used to generate the forest coverage map in the area (Step 1.1.5 of VM0015). PRODES Minimum Mapping Unit (MMU) is 1 ha[20].

Temporal Boundaries

- Starting date for conservation activities: 01/01/2019.
- Starting date of the historical reference period for Land Use/Land Cover Change (LULCC): 2003.
- Starting and end date of First Fixed Baseline Period: the fixed baseline period is 10 years from the project activities started, with revalidation until 01/01/2029.
- Monitoring period: the monitoring period is 1 year, with activities beginning in 2019.

[20] GOFC-GOLD - Global Observation of Forest and Land Cover Dynamics. A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals caused by deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation. Alberta: Canada, 2011

Step 1.3 of VM0015 - Carbon Pools

The carbon pools considered in the Project are presented in Table 11. The GHG sources are presented in Table 12 and Table 13.

Table 11: Carbon pools included in the WARG Project boundary

Carbon Pool	Included/Excluded	Justification/Explanation
Aboveground biomass	Included	Mandatory by methodology. Included because tree aboveground biomass generally is the greatest carbon pool in forest biomass. It includes non-tree woody biomass because stocks of non-tree aboveground biomass are greater in the baseline than in the project scenario, and also because non-tree aboveground biomass is determined to be significant (more than 5% of the tree aboveground biomass).
Belowground biomass	Included	Not mandatory by methodology. Included in the project because it is generally the second most significant carbon pool in forest biomass and because it is significant (represents more than 5% of the of the tree woody biomass).
Deadwood	Included	Not mandatory by methodology. Included in the project because it represents more than 5% of the of the tree woody biomass, hence significant.
Litter	Excluded	Excluded according to "VCS AFOLU Requirements, v3.6.
Soil Organic Carbon	Excluded	Not mandatory by methodology. Conservatively excluded.

Table 12: GHG included or not in the WARG Project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Carbon Stock Changes	CO_2	Yes	Stock changes were included, once they are mandatory in the methodology.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
		Other	No	Not applicable.
	Biomass Burning	CO_2	No	CO_2 emissions are already considered in carbon stock changes.
		CH_4	No	Conservatively omitted as allowed by VM00015.
		N_2O	No	
		Other	No	No relevant source identified.
	Fossil fuel Combustion	CO_2	No	Emissions from fossil fuel combustion in the baseline and project case are minimal. As per methodology module E-FCC "Fossil fuel combustion in all situations is an optional emission source."
		CH_4	No	
		N_2O	No	
		Other	No	
	Use of Fertilizers	CO_2	No	Excluded. No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.
		CH_4	No	
		N_2O	No	
		Other	No	
	Enteric fermentation of bovine cattle	CO_2	No	Excluded. GHG emissions from enteric fermentation in baseline scenario is not significant.
		CH_4	No	
		N_2O	No	
		Other	No	

Table 13: GHG included or not in the WARG Project boundary - Continuation

Source		Gas	Included?	Justification/Explanation
Project	Carbon Stock Changes	CO_2	Yes	Stock changes were included, once they are mandatory in the methodology.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
		Other	No	Not applicable.
	Biomass Burning	CO_2	No	CO_2 emissions are already considered in carbon stock changes.
		CH_4	No	Conservatively omitted as allowed by VM00015.
		N_2O	No	
		Other	No	No relevant source identified.
	Fossil fuel Combustion	CO_2	No	Emissions from fossil fuel combustion in the baseline and project case are minimal. As per methodology module E-FCC "Fossil fuel combustion in all situations is an optional emission source."
		CH_4	No	
		N_2O	No	
		Other	No	
	Use of Fertilizers	CO_2	No	

Source		Gas	Included?	Justification/Explanation
		CH_4	No	Excluded. No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.
		N_2O	No	
		Other	No	
	Enteric fermentation of bovine cattle	CO_2	No	Excluded. GHG emissions from enteric fermentation in baseline scenario is not significant.
		CH_4	No	
		N_2O	No	
		Other	No	

3.1.4 Baseline Scenario

Analysis of Historical Land-Use and Land-Cover Change

Collection of appropriated data sources

Data from PRODES Digital Program were used to map the land use and land cover. PRODES mainly uses images form Landsat mission to map classes of Forest, Non-Forest Vegetation, Hydrography, and Deforestation (used here as Anthropized Vegetation in Equilibrium). Data from PRODES are available for the historical reference period (2003 to 2018) and correspond to the scenes 001/66, 001/67, 002/66, 002/67, 003/67, as details in Table 14. The data from PRODES are recognized by the international scientific community[21] as reliable and accurate for classes mapping[22].

Table 14: Images used by PRODES to map the land use and land cover classes in the Reference Region (Table 5 of VM0015)

Vector (Satellite or airplane)	Sensor	Resolution		Coverage	Acquisition date	Scene identifier	
		Spatial (m)	Spectral	(km^2)	(MM/DD/YY)	Path/ Latitude	Row/ Longitude
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	26/07/2008	001	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	26/07/2008	001	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	18/08/2008	002	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	18/08/2008	002	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	26/08/2008	003	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	20/08/2011	001	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	05/09/2011	001	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	11/08/2011	002	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	11/08/2011	002	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	18/08/2011	003	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	30/07/2015	001	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	30/07/2015	001	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	06/08/2015	002	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	21/07/2015	002	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	14/09/2015	003	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	23/08/2018	001	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	23/08/2018	001	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	29/07/2018	002	66
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	29/07/2018	002	67
Satellite	Landsat	30	0.45 – 2.35 µm	34,225	20/07/2018	003	67

Definition of classes of Land-Use and Land-Cover (LULC)

[21] KINTISCH, Eli. Improved monitoring of rainforests helps pierce haze of deforestation. Science (2007).

[22] MAURANO, L. E. P.; ESCADA, M. I. S.; RENNO, C. D. Padrões espaciais de desmatamento e a estimativa da exatidão dos mapas do PRODES para Amazônia Legal Brasileira. Ciência Florestal, Santa Maria, v. 29, n. 4, pp. 1763-1775

The LULC classes present in the RR in the start of the project are Forest, Non-Forest Vegetation, Hydrography, and Anthropized Vegetation in Equilibrium, as details in Table 15. The description of each class of LULC at the beginning of the project is presented as follows:

- **Forest:** area of remaining forest belonging to different Phyto-physiognomies of the Ombrophilous Forest.
- **Non-Forest Vegetation**: areas with natural vegetation with a physiognomy different from forest, regionally known as Campinarana, Savanna or Cerrado.
- **Hydrography:** water bodies such as rivers, lakes, streams, and others.
- **Anthropogenic Vegetation in Equilibrium**: deforested forests converted to other land uses (mosaic of different types of vegetation that includes pastures, shifting agriculture, plantations, and secondary vegetation).

Table 15: List of LULC classes in the Reference Region of WARG project at the star of the project (Table 6 of VM0015).

Class		Carbon Stock trend	Present in[1]	Baseline activity[2]			Description
IDcl	Nome			LG	FW	CP	
1	Anthropized Vegetation in Equilibrium	Constant	RR, LM.	Yes	Yes	No	Forest areas deforested by clear-cutting and with different types of vegetation from the Ombrophilous Forest.
2	Forest	Constant	RR, PA, LK.	Yes	Yes	Yes	Remaining forest.
3	Hydrography	Constant	RR	No	No	No	Water sources
4	Non-Forest Vegetation	Constant	RR	No	No	No	Natural non-forest vegetation cover.

Notes: [1]RR: Reference Region; LK: Leakage Belt; LM: Leakage Management Area; PA: Project Area. [2]LG: Logging; FW: Fuel-Wood Collection; CP: Charcoal Production

Definition of Categories of Land-Use and Land-Cover change (LULCC)

The project presents two categories of land use and land cover change that are expected to occur within the Project Areas and in the leakage belt: change from areas with Forest to areas with Anthropogenic Vegetation in Equilibrium (Table 16).

Table 16: List of LULCC classes in the WARG project (Table 7.b of VM0015).

IDcl	Name	Carbon Stock trend	Present in	Activity in Baseline			Name	Trend in Carbon Stock	Present in	Activity in case of Project		
				LG	FW	CP				LG	FW	CP
I1/F1	Forest	Constant	PA	No	No	No	Anthropized Vegetation in Equilibrium	Constant	RR. LM			
I1/F1	Forest	Constant	LK	Yes	Yes	No	Anthropized Vegetation in Equilibrium	Constant	RR. LM			

Historical Land Use and Land Change

As data from PRODES was used to analyze the historical land use and land chance, the main steps applied in PRODES to classify the deforestation in the Brazilian Amazon are described in the following.

- **Pre-processing:** According to Câmara et al. (2006)[23] the main pre-processing procedures applied to the images for PRODES are: a) image selection, with the goal to select images with minimum cloud cover, acquisition date as close as possible to the Amazonia dry season, and with equate radiometric quality; b) georeferencing of the 30 m resolution images using both topographic maps in the scale of 1:100,000 and images MrSID orthorectified by NASA. In the present baseline the geometric quality of the images was evaluated, and the results showed an RMS bellow 1 pixel.
- **Image interpretation and classification:** PRODES image classification method has four steps: i) a spectral mixture model is generated by the identification of vegetation, soil and shadows in the images. This technique is known linear spectral mixture model (MLME) and it aims to estimate the percentage of vegetation, soil and shadows in each cell (pixel) of the image; ii) use of segmentation technique to identify adjacent regions (segments) in the image with similar spectral characteristics; iii) automatic classification of individual segments to identify the classes of Forest, Non-Forest Vegetation, Hydrography, and Deforestation (Anthropized Vegetation in Equilibrium); iv) visual interpretation in computer screen using the GIS TerraAmazon.
- **Accuracy Mapping:** According to results from Maurano et al. (2019)[24], the global accuracy of PRODES mapping in the Legal Amazonia is 93%.

Historical land use and land change analysis result

The results of historical land use and deforestation occurred between the years of 2003 and 2018 in the RR are presented in Table 17. Data from PRODES showed 447,044 hectares of deforestation, corresponding to 12% reduction of the remaining forest in 2003. In the RR it is observed a deforestation rate of 31,806 hectares by years (0.85% year) during the historical reference period. In Figure 11 it is presented the historical deforestation by year in the period, for the RR in states of Acre and in the Legal Amazon.

Table 17: Matrix of land use change in the Reference Region between 2003 and 2018 (Table 7.a of VM0015)

IDcl			Initial LU/LC Class (2003)				Total (ha)
		Name	Anthropized vegetation	Forest	Hydrography	Non-forest vegetation	
			i1	i2	i3	i4	
Final LU/LC class (2018)	F1	Anthropized vegetation	1,389,705	477,044			1,864,951
	F2	Forest		3,523,172			3,523,172
	F3	Hydrography			8,182		8,182
	F4	Non-forest vegetation				5,981	5,981
Total (ha)			1,389,705	4,000,216	7,965	6,005	5,403,891

[23] CÂMARA, G.; VALERIANO, D. M.; SOARES, J. V. Metodologia para o Cálculo da Taxa Anual de Desmatamento na Amazônia Legal. Instituto Nacional de Pesquisas Espaciais, São José dos Campos, 2006.

[24] MAURANO, L. E. P.; ESCADA, M. I. S.; RENNO, C. D. Padrões espaciais de desmatamento e a estimativa da exatidão dos mapas do PRODES para Amazônia Legal Brasileira. Ciência Florestal, Santa Maria, v. 29, n. 4, pp. 1763-1775.

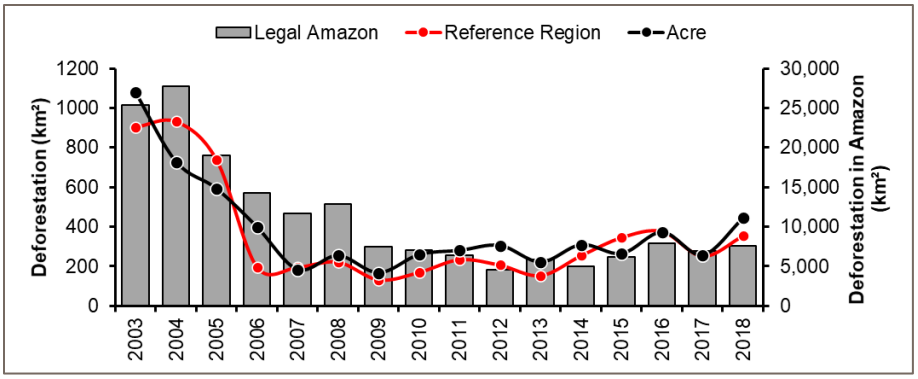


Figure 11: Deforestation evolution in the Reference Region, state of Acre and Legal Amazon.

In the historical reference period, it is observed that the deforested area presented a large reduction between 2003 and 2012 in the Reference Region, however, from 2013 onwards, an increase in the deforested area was observed, showing an increasing trend. From 2003 to 2009, the average deforestation rate in the Reference Region was 47,443 ha/year, with a minimum of 13,300 ha/year in 2009 and a maximum of 90,252 ha/year in 2003. From 2010 to 2018, the average deforestation rate in the Reference Region was 26,133 ha/year, with a minimum of 15,451 ha/year in 2013 and a maximum of 37,679 ha/year in 2016, a scenario that well reflects the recent context of lack of control of the government to avoid unplanned deforestation throughout the Brazilian Amazon, which started with the political and economic instability of 2016[25].

Spatial Analysis of Deforestation Drivers

To meet the requirements of substeps 3.2b and 4.2 of VM0015 methodology, four spatial variables were analyzed to identify the factors that may have greater influence on the location of deforestation observed in the Reference Region.

To estimate the variables importance, the weight of evidence method (WoE) proposed by Bonham-Carter (1994) and implemented in the Dinamica EGO software was used. In this Reference Region, the WoE analysis results indicated values that vary between +1.27 and -2.65, where positive and negative values represent, respectively, a greater or lesser influence of the factor on the occurrence of deforestation in each location in the Reference Region.

The spatial variables that best represent the deforestation pattern in the model calibration period were: i) distance from old deforestation (forest edges); ii) distance from communities; iii); distance from access roads (highways, rural roads, and navigable rivers); iv) land tenure status. The results of the WoE analysis are shown in Figure 12, where the highest and lowest values indicate areas with greater or lower probability of deforestation.

[25] FERRANTE, L.; FEARNSIDE, P. M. Brazil's new president and 'ruralists' threaten Amazonia's environment, traditional peoples and the global climate. Environmental Conservation v. 46, pp. 261–263, 2019.

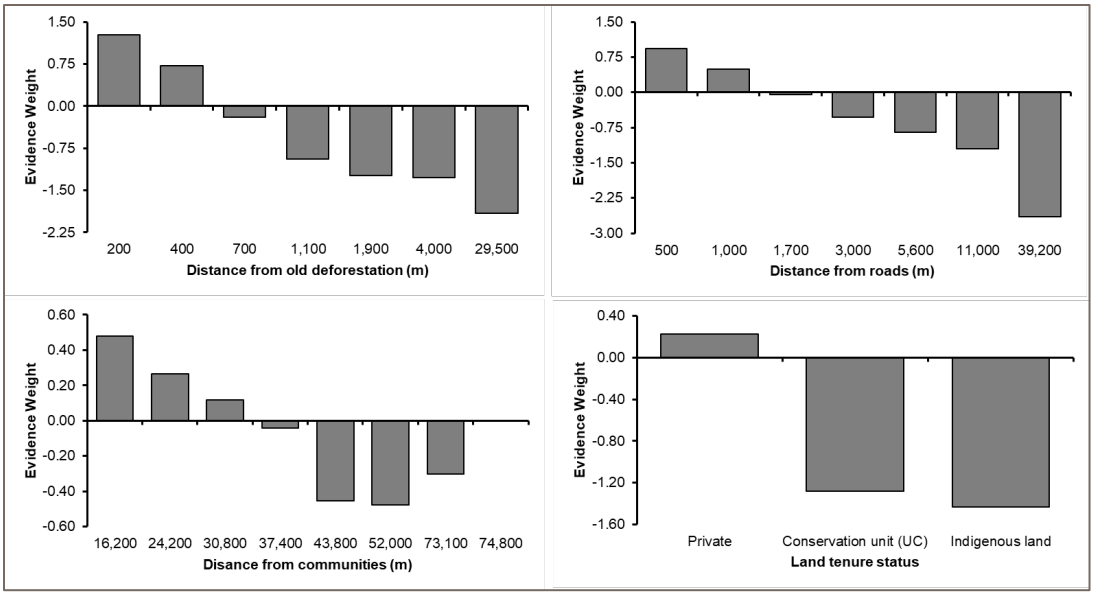


Figure 12: Weights of evidence (WoE) of the spatial vectors analyzed and their influence on deforestation.

The description of the variables analyzed to explain the occurrence of deforestation in the historical reference period is presented below:

- **Distance of old deforestation:** forest edges areas that represent the initial access of agents and drivers of deforestation in the Reference Region.
- **Distance from highways, rural roads, and navigable rivers:** forests close to these roads are more accessible and thus become more susceptible to deforestation.
- **Distance from communities:** in the Reference Region there are several communities with concentrated human occupation (for example, towns, villages, communities, cities), and their proximity to the forest contributes to a greater risk of new deforestation.
- **Land tenure status:** in the Reference Region there are protected areas (conservation units and indigenous lands) and private areas (farmsteads, lots, farms, and former rubber forests) where the agents and drivers of deforestation can take effect. Literature highlights the influence of deforestation agents in the process of land concentration in lots of settlement projects and its relationship with the local dynamics of deforestation[26]. Therefore, the influence of the land tenure situation on the historical deforestation observed in the region was evaluated.

Projection of Future Deforestation

Approach "a" (historical average) of step 4.1.1 of VM0015 methodology was selected to project the deforestation baseline. In this approach, the baseline annual deforestation in year t for the Reference Region was calculated as indicated in equation 03 of VM0015 methodology. The deforestation rate

[26] YANAI, A. M. et al. Deforestation dynamics in Brazil's Amazonian settlements: Effects of land-tenure concentration. Journal of environmental management, v. 268, p. 110555, 2020.

observed between 2003 and 2018 was 0.85%. Deforestation projected for the 10-year period (2019-2028) in the Reference Region is 285,988 hectares.

Annual projection of baseline deforestation areas in the Project Area

The Reference Region does not have stratified spatial limits, as the actions of agents, drivers, and the causes of deforestation are the same throughout its extension. The baseline deforestation for the Project Areas and Leakage Belt was spatially projected over the Reference Region, following the recommendations of step 4.2.4 of Methodology VM0015. The projected future deforestation for the period 2019-2028 in the Reference Region (Step 4.1.2) and Project Areas is presented in Table 18, Table 19, and Table 20.

Table 18: Projected deforestation for the Reference Region (Table 9a of VM0015 methodology).

Project year *t*	Stratum *i* in the Reference Region	Total	
	1	annual	cumulative
	$ABSLRR_{i,t}$	$ABSLRR_t$	ABSLRR
	(ha)	(ha)	(ha)
2019	29,700	29,700	29,700
2020	29,450	29,450	59,151
2021	29,202	29,202	88,352
2022	28,956	28,956	117,308
2023	28,712	28,712	146,020
2024	28,470	28,470	174,489
2025	28,230	28,230	202,719
2026	27,992	27,992	230,710
2027	27,756	27,756	258,466
2028	27,522	27,522	285,988

Table 19: Projected deforestation in the Project Areas (Table 9b of VM0015 methodology).

Project year *t*	Stratum i of the Reference Region in the Project Area	Total	
	1	annual	cumulative
	$ABSLPA_{i,t}$	$ABSLPA_t$	ABSLPA
	ha	ha	ha
2019	463	463	463
2020	474	474	937
2021	495	495	1,432
2022	699	699	2,131
2023	703	703	2,834
2024	771	771	3,605
2025	602	602	4,207
2026	542	542	4,749
2027	741	741	5,490
2028	698	698	6,188

Table 20: Projected deforestation in the leakage belt (Table 9c of VM0015 methodology).

Project year t	Stratum i of the Reference Region in the leakage belt	Total	
	1	annual	cumulative
	ABSLPAi,t	ABSLPAt	ABSLPA
	ha	ha	ha
2019	2,038	2,038	2,038
2020	1,972	1,972	4,010
2021	1,969	1,969	5,979
2022	2,130	2,130	8,109
2023	2,253	2,253	10,362
2024	2,414	2,414	12,776
2025	2,477	2,477	15,253
2026	2,218	2,218	17,471
2027	2,184	2,184	19,655
2028	2,441	2,441	22,096

Projection of the future deforestation location

Dinamica EGO software was used to project the location of future deforestation. This software is indicated by the VM0015 methodology as appropriate for baseline modelling of REDD+ projects*, including for* avoid unplanned deforestation (AUD). Dinamica EGO was chosen for the following reasons: a) it is a model available in scientific publications[27][28][29]; b) has a transparent process for data input and output, and has parameters processed with an easy-to-understand graphical interface; c) incorporates the use of appropriate data to explain the location of deforestation; d) has an appropriate tool for assessing uncertainties[30]

The main steps performed in this stage were:

- Organization of land use and land cover georeferenced maps, and georeferenced maps with the explanatory factors of deforestation.
- Model calibration by determining the weights of evidence (WoE presented in Figure 12) and analyzing the correlation between variables.
- Model accuracy assessment.
- Development of baseline deforestation scenarios.

Preparation of variables maps

An empirical approach was used to create variable maps (variables to explain the pattern of deforestation). Studies on deforestation in the Amazon show that maps of distances of spatial attributes (roads, locations, e.g.) and ecological aspects of the landscape (slope, soil and vegetation, e.g.) have a high correlation with the location of new deforestation[31].

To produce the risk map and calibrate the model for projecting future deforestation, Dinamica EGO requires that the spatial input variables be independent. Four independent spatial variables were used to produce the deforestation risk map (Table 21), as described previously (variables that explain the location of the deforestation occurrence). The spatial data was processed in Dinamica EGO with a pixel size of 100 x 100 meters (01 hectare), GeoTiff format (Datum WGS84, UTM Zone 19S) and with dimensions of 4119 lines by 2854 columns.

[27] SOARES-FILHO, B. et al. Modeling conservation in the Amazon Basin. Nature 440, pp.520-523, 2006.
[28] YANAI, A. M.; FEARNSIDE, P. M.; GRACA, P. M. L. A.; NOGUEIRA, E. M. Avoided deforestation in Brazilian Amazonia: Simulating the effect of the Juma Sustainable Development Reserve. Forest Ecology and Management, v. 282, p. 78-91, 2012.
[29] VITEL, C.; CARRERO, G.; CENAMO, M. et al. Land-use Change Modeling in a Brazilian Indigenous Reserve: Construction of a Reference Scenario for the Suruí REDD Project. Human Ecology. vol. 41. 2013.
[30] HAGEN, A. Fuzzy set approach to assessing similarity of categorical maps. International Journal of Geographical Information Science, 17, pp.235-249, 2003.
[31] BARRETO, P., BRANDÃO Jr., A., MARTINS, H., SILVA, D., SOUZA Jr., C., SALES, M., & FEITOSA, T. 2011. Risco de Desmatamento Associado à Hidrelétrica de Belo Monte (p. 98). Belém: Imazon.

Table 21: List of maps, variables, and variables maps (Table 10 of VM0015).

Factor Maps		Source	Variable represented		Meaning of the categories or pixel value		Other Maps and Variables used to create the factor Map		Algorithm or Equation used
ID	File Name		Unit	Description	Range	Meaning	ID	File Name	
1	distance_to_4	INPE	Meters	Continuous variable	0 - 29500	Distance from old deforestation	1	lulc2008.tif	Euclidian distance (Dinamica EGO 3)
2	land_status	MMA, INCRA and FUNAI	Category	Land tenure category	1 = private 2 = Indigenous 3 = UC	Land tenure status	2	land_status.tiff	
3	d_estrada	RAISG	Meters	Continuous variable	0 - 39200	Distance from highways, rural roads, and navigable rivers	3	vias2020.shp	Euclidian distance (ArcGIS 10.1)
4	d_local	IBGE	Meters	Continuous variable	0 - 74800	Distance from communities	4	cadastro_localidades_selecionadas.mdb	Euclidian distance (ArcGIS 10.1)

Preparation of the deforestation risk map

Deforestation risk maps show the regions with the highest (risk values close to 1) or least likely to occur (risk values close to 0). In this project, the risk map was produced using the weights of evidence method[32], available in Dinamica EGO.

This method calculates the probability of each pixel in the Reference Region to transition from forest to deforestation, using the sum of all evidence weights overlapping in each pixel, and are dependent on the combination of all static and dynamic maps[33].

The result of applying the weights of evidence method in Dinamica EGO is a deforestation risk map that identifies areas with higher (~1.0) and lower (~0.0) probability of deforestation (Figure 13). The spatial variables (Table 21), together with the deforestation risk map, are the starting point for future deforestation baseline scenarios.

[32] BONHAM-CARTER, G. Geographic information systens for geoscientists: modeling with GIS. New York: Pergamon, 1994. pp.398
[33] SOARES-FILHO, B. et al. Modeling conservation in the Amazon Basin. Nature 440, pp.520-523, 2006.

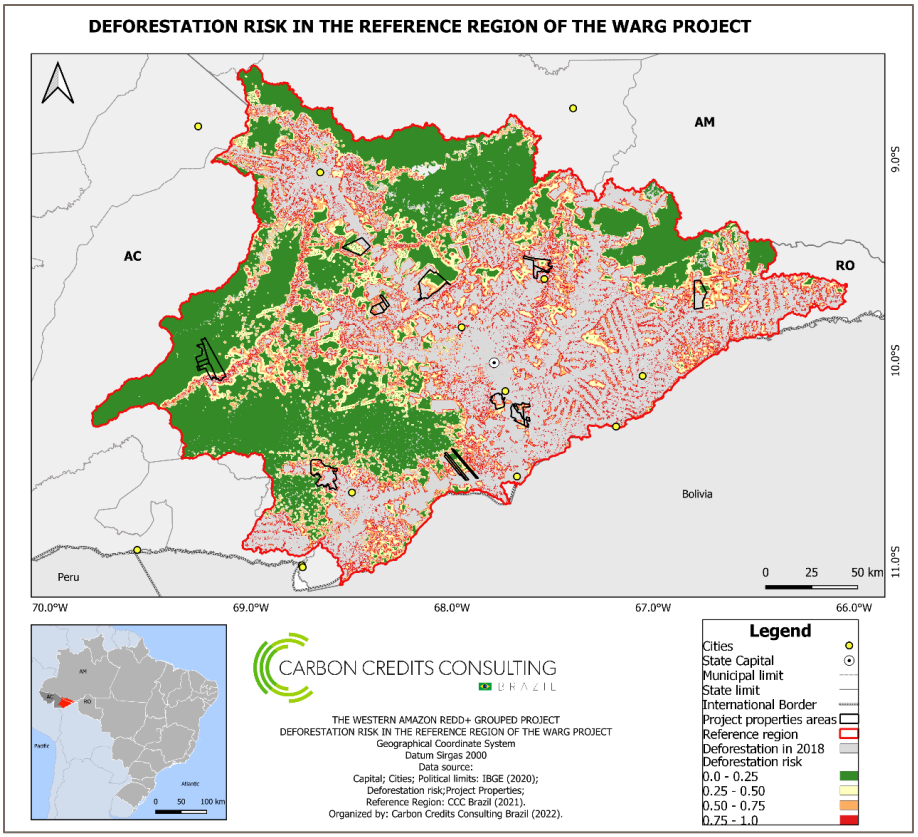


Figure 13. Deforestation Risk Map in the Reference Region.

Selecting the most accurate deforestation risk map

To assess the quality of the produced model, option "a" (calibration and confirmation using two historical sub-periods) available in methodology VM0015 version 1.1 was selected. Deforestation data that occurred between the years 2011 and 2018 and the variables listed in Table 13 were used to calibrate the model, while the deforestation mapped by PRODES in 2018 was used for the confirmation process. In this process, a 2018 deforestation map was simulated from the data observed between the years 2011 and 2018.

The FOM (Figure of Merit) technique was applied to assess the accuracy of the 2018 simulated map. The FOM results in the ratio of the observed changes intersection (changes between the reference map at time 1 and at time 2) and the simulated changes (changes between the reference map at time 1 and the reference map at time 2), creating the union of the observed change and the predicted variation, as defined in equation 9 of the VM0015 methodology.

The VM0015 methodology recommends that the minimum threshold for the best fit measured by the FOM should be defined by the net change observed in the Reference Region for the model calibration period. The observed net change must be calculated as the total area of change modelled in the Reference Region during the calibration period (percentage of the total area of the Reference Region), and the FOM value must be at least equivalent to this value. If the FOM value is below this threshold, the project proponent must demonstrate that at least three models have been tested (three deforestation risk maps), and the one with the best FOM must be used.

The net changes observed in the Reference Region was 3.60%, and the FOM value obtained by applying equation 9 of VM0015 was 84%. Thus, the FOM of the risk map produced above the threshold

required (Step 4.2.4 of VM0015) and the model shows good accuracy, with a value greater than 80%. As a result, the deforestation risk map developed in the calibration stage Figure 13 offers good performance to project land use changes up to 2028 in the WARG Project's Reference Region.

Mapping the location of future deforestation

The procedure of selecting the pixels with the highest risk of deforestation and preparing the deforestation baseline maps was performed automatically by Dinamica EGO for the 10-year period, starting in 2019. The results are shown in Figure 14 with the projected future deforestation in the Reference Region for the first 10 years of the project.

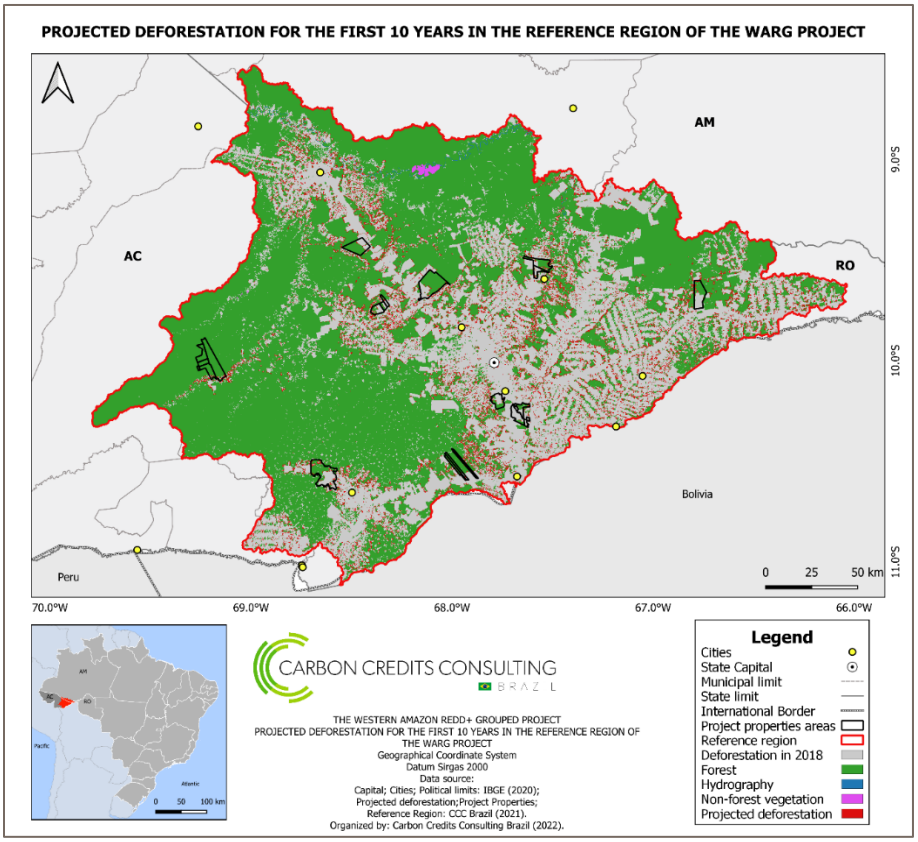


Figure 14: Projected deforestation for the first 10 years of the project in the Reference Region.

3.1.5 Additionality

The additionality of the WARG Project was assessed using the VCS approved tool "Tool for The Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities", version 7.0.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

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

The alternative land use scenarios that could occur in the Reference Region of the WARG Project, in the absence of the proposed VCS AFOLU Project, are:

i) **Continuation of the pre-project land use:** according to the baseline, in this scenario the predominant land use would be for agricultural and livestock activities. In this context we characterize drivers and agents of deforestation, the first being the activities themselves, and the agents being mainly landowners and/or illegal squatters. For both activities (agriculture and livestock) landowners make the purchase of land legally or illegally, and in the case of squatters, the majority of land occupation occurs illegally, either by land grabbing, or by the invasion of private and undesignated lands. Usually the large and medium-sized farmers are responsible for the vast majority of deforestation in the Amazon, but small farmers also have an important impact in places where they are concentrated[34].

After the land occupation, the forest is converted to deforested areas for extensive livestock farming, and to a lesser extent, for agricultural use (mainly monocultures such as soybean, corn and others). In the WARG Reference Region, a deforestation rate of 0.85% was observed based on the historical series of the last 15 years. The regeneration of secondary forest is slow because most deforested areas are degraded pastures with compacted and nutrient-deficient soils. The observed deforestation in the Reference Region has a great impact in the loss of local biodiversity. Its impacts are also related to the loss of forest's environmental services, affecting its role in carbon storage and in the hydrological cycle, both locally and in the South American continent[35].

Without the additional financial support expected by the implementation of the WARG project and the activities planned to reduce deforestation, there will be no control or guarantees of a reduction in the historical forest loss observed in the Reference Region, directly impacting the permanence of carbon stocks in the remaining forest in the area. With the continuity of the historical practices of removing the forest for cattle production and monoculture agriculture, the climatic and biodiversity benefits of the forest that still exist today will not be observed in the future, significantly impacting the quality of life of communities and small towns in the Reference Region.

The degradation and consequent reduction of current carbon stocks would also have negative implications for the climate, which could adversely affect the productivity and economy of local properties withing the years, with changes in rainfall cycles, longer periods of drought and an increase in temperatures.

ii) **Project activity on the land within the Project boundary performed without being registered as the VCS AFOLU project:** The activities to be developed by the WARG project will complement and optimize, through investments, activities that are already occurring in an incipient way in the Reference Region and in the properties participating in the project. Currently, the landowners have small fire-fighting brigades that are articulated when necessary. However, in the way they occur now, these brigades are not enough for effective control fires, considering the lack of qualified personnel (currently properties employees participate voluntarily and without training). Also, due to the lack of safety and firefighting equipment, fires arriving in the vicinity of the Project Area may not be controlled. The proposed activity of training fire brigades in the WARG project aims to improve

[34] Fearnside, P.M. 2020. Desmatamento na Amazônia: Dinâmica, impactos e controle. P. 265-272. In: Fearnside, P.M. (ed.) Destruição e Conservação da Floresta Amazônica, Vol. 1. Editora do INPA, Manaus. 368 p. (no prelo).

[35] Fearnside, P.M. 2017. Deforestation of the Brazilian Amazon. In: H. Shugart (ed.) *Oxford Research Encyclopedia of Environmental Science.* Oxford University Press, New York, USA.

the technical knowledge of the people involved in these possible events, as well as to equip them with the necessary and most appropriate material for fighting fires.

Another activity in this scenario that could occur without registration as a VCS AFOLU project is the deforestation monitoring. As it currently occurs, in an incipient manner and without qualified personnel or necessary equipment, it is not efficient in identifying the main agents of deforestation. Landowners often call on local employees with their own resources to make rounds, which are carried out in an amateur way and without support equipment. There is also some monitoring at the state level (Secretariat of the State for the Environment and Indigenous Policies of Acre) which identifies the location of illegally opened areas, but is not effective in identifying the deforestation agents, nor in taking preventive actions. The activities that will be developed to monitor deforestation and that will receive project funding from the commercialization of VCUs, will be supported by qualified company using drones, and will monthly identify new and potential deforestation zones, focusing in the areas of greatest risk to the project. There will also be investment in equipment such as GPS, improvement of the conditions of vehicles already used, and training of local personnel to work in this activity, in order to make it more efficient than it would have been without the project implementation.

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

Scenario II is in compliance with applicable laws and regulations.

Scenario I is not in compliance with applicable laws and regulations. The activities in the baseline scenario are considered illegal activities, since they relay in the deforestation of areas that should maintain forest cover based on the stipulations of Brazilian Forest Code (Federal Law 12.727 of 2012). This is corroborated by the analysis of remaining forest cover in each property, which should maintain 80% of forest according to the Federal Law 12.727 of 2012.

Even in the presence of regulations, the deforestation in Acre and Legal Amazon region continues to advance[36], as observed in the Reference Region of this project. The reasons for the grown in the deforestation rates area many, but one important factor observed in studies is the lack of enforcement. For example, it was observed that between 2019 and 2020 only 1.3% of the deforestation alerts (by MapBiomass) actually resulted in lawsuits and infraction notices brought by public agencies[37]. Therefore, we can assume that those applicable mandatory legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread.

Sub-step 1c. Selection of the baseline scenario:

Described in item 3.1.4 – Baseline scenario.

Step 3. Barrier analysis

[36] ACRE. Dinâmica do Desmatamento em 2019 no Estado do Acre-Prodes. 2020. http://semapi.acre.gov.br/wp-content/uploads/sites/20/2020/08/Relatorio-Desmatamento-PRODES-2019_20200707_v1_FINAL_20200731.pdf
[37] Coelho-Junior, Marcondes G., et al. "Unmasking the impunity of illegal deforestation in the Brazilian Amazon: a call for enforcement and accountability." Environmental Research Letters 17.4 (2022): 041001.

Sub-step 3a. Identify barriers that would prevent the implementation of the type of proposed project activity

In this analysis step we selected the Barrier Analysis, as one of the available options according to the VCS approved tool "Tool for The Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities". The barrier analysis shows how the project activities would not occur without revenue of the VCUs sale'.

Sub-step 3a – Identify barriers that would prevent the implementation of activities proposed by the Project

a) Institutional barriers: Lack of enforcement of forest or land-use-related legislation. Private areas in the Amazon Biome should have at least 80% of its areas with the original forest cover, according to the Federal Law 12.727 of 2012 (Brazilian Forest Code). Those areas of protected forest aim to: "ensure the sustainable economic use of the natural resources of the rural property, help the conservation and rehabilitation of ecological processes and promote the conservation of biodiversity, as well as the shelter and protection of wild fauna and native flora[38]". As observed in the historical land use in the Reference Region, as well as data from monitoring agencies, the deforestation in the Amazon continues to happen and it shows to be increasing since 2012[39]. According to studies, one of the main reasons it's the lack of law enforcement[34].

b) Barriers related to lack of organization of local communities: No significant community organizations that could support the implementation of activities were observed in the Socioeconomic Diagnosis study carried out in the Reference Region. In the WARG project there are two sets of groups identified as "community". One is composed of residents/employees of the properties participating in the project. The other is the groups of residents who occupy the properties with old rubber forests and live on the banks of the rivers. No organization (association, cooperative, i.e.) was observed in any of those communities. This lack of organization can be a barrier to the implementation of the activities of the WARG project due to the individualist profile of occupation, therefore the social mobilization and changing practices will likely face difficulties.

c) Technological barriers, inter alia: There is a lack of investment in technology equipment for communication in the Reference Region, especially on properties that are further away from the capital Rio Branco. One of the reasons for this lack is the geographic conditions of the region, such as access and climate, with areas of closed forest, rivers, or hot and humid weather, and the low demand for this technology. Those factors that can make it difficult to implement the technology necessary for access to telecommunications and the internet. This barrier has a relevant weight in the implementation of WARG project activities, due to the need for continuous monitoring of the Project Area, and the need to establish a communication channel between the executing and managing team of the project, not having the required infrastructure can make it difficult to carry out project stages. The local need in communication technologies were raised in the Socioeconomic Diagnosis study of the project and are also included in the Technical Bulletin 01/2022 of Carbon Credits Consulting Brazil.

[38] BRASIL. Lei nº 12.651, de 25 de maio de 2012. Institui o novo código florestal brasileiro.
[39] INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS. COORDENAÇÃO GERAL DE OBSERVAÇÃO DA TERRA. PROGRAMA DE MONITORAMENTO DA AMAZÔNIA E DEMAIS BIOMAS. Desmatamento – Amazônia Legal – Disponível em: http://terrabrasilis.dpi.inpe.br/downloads/.

d) Barriers related to local tradition: The traditional practices observed in the community located in the old rubber properties may be barriers to the implementation of the WARG project activities. As it was identified in the Socioeconomic Diagnosis, the populations that live in those areas still practice traditional planting systems based on clearing and burning primary (and secondary) forests for the cultivation of cassava, fruit trees and small/medium herds of cattle. The change of such practices, considering the organizational barrier, involves approximation with the residents, establishment of a bond of trust, identification of alternatives to traditional ways, attempt at social organization at the local level and implementation of the actions planned in the project. This kind of approach requires a longer implementation period to generate the expected results, which is characterized as a possible barrier to project activities.

Sub-step 3b – Show that the identified barriers would not prevent the implementation of at least one alternative scenario of land use

All identified barriers prevent the implementation of the proposed project activities in the absence of the VCU sales, but do not prevent the continuation of the alternative scenario identified in Step 1.

Step 4. Common practice analysis

The State of Acre has mechanisms for monitoring and controlling illegal deforestation within its territory. The Secretary of State for the Environment and Indigenous Policies of the State of Acre (SEMAPI-AC) has the Integrated Center for Geoprocessing and Environmental Monitoring, which is responsible for obtaining relevant information to directs the government's policy strategies[40]. Also in the State, Acre Environment Institute (IMAC) is a State Authority that executes the State's environmental policy, and develops control actions (Licensing, Monitoring, Inspection) as well as environmental education campaigns, aiming to prevent, encourage, and preserve the environment[41]. Such State agencies develop activities similar to the proposals of the VCS AFOLU project, with the intention of monitoring, controlling and reducing deforestation; occur in a comparable environment, within the territory of the Acre state; have an equivalent scale of action considering the forest remnants and land boundaries of the state[42]; and are under the same regulatory framework[43].

Fazenda Santa Ana da Rosa, located in the municipality of Bujari, was selected as an example of common practice in the region, since it has similar characteristics with the properties of WARG project, such as of geographic location, economic activity, and size. This property is 4,170 hectares in size. According to TerraClass data, about 42% of the area is classified as agricultural/pasture use. The same percentage was observed as accumulated deforestation by PRODES until the year 2018[44]. 16% of the total accumulated deforestation (considering the historical series of PRODES) occurred in the last 10 years, with 2012 being the most expressive year in terms of forest loss, as shown in Table 22. Therefore, even after the establishment of the forest code Law N° 12.651/2012, forest areas are still being deforested, which

[40] Integrated Center for Geoprocessing and Environmental Monitoring – SEMAPI – Secretary of State for the Environment and Indigenous Policies: http://semapi.acre.gov.br/cigma
[41] IMAC Portal - Acre Environmental Institute: http://imac.ac.gov.br/quem-somos
[42] For this analysis we had considered similarities to WARG project properties related to a similar land tenure (rubber forests and farms), and similar average size. The selected property is located withing the reference region, therefore, is inserted in the same context of land use change as the other properties that are part of the project.
[43] Details in item 2.5: Legal Status and Property Rights
[44] Data analyzed by Carbon Credits Consulting Brazil, results available in Technical Bulletin N°01/2022.

goes beyond the definitions of the aforementioned law, that requires of at least 80% of Legal Reserve on private properties in the Amazon biome.

Table 22. Deforestation in Fazenda Santa Ana da Rosa between 2009 and 2018.

Year	Deforestation (ha)
2009	32.28
2010	9.66
2011	27.85
2012	78.96
2013	-
2014	18.10
2015	15.45
2016	26.70
2017	-
2018	11.24
Deforestation (2009 to 2018)	220.24
Total area	4,163.32
Total deforestation up to 2018	1,722.18 (41.37%)

The deforestation to clear new pasture areas, which took place on this property, indicates some flaws in the State control system. Considering the state and federal regulatory framework, and the Acre deforestation monitoring and control system, no loss of forest cover should be observed. Yet, this practice is common, both on the presented example as well as in other properties in the Reference Region and it shows the importance of developing the REDD+ AFOLU AUD project with targeted measures and focused investment in the fight against illegal deforestation. Therefore, the WARG Project is additional.

3.1.6 Methodology Deviations

No methodology deviations are reported.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Step 5 of VM0015 – Definition of the Land-Use and Land-Cover change component of the Baseline

Step 5.1 Calculation of baseline activity data per forest class

Calculation of annual baseline deforestation for each future year was accomplished using the projected map of deforestation for each year, combined with the land use and land cover map of the last historical year (2018). This result shows for each year the polygons that would be deforested each year without the project activities. The results from the baseline projections shows an approximated deforestation of 6,188 hain the Project Area (Table 23), and 25,342 ha in the leakage belt (Table 24), in the first 10 years of the project (2019 to 2028).

Table 23: Annual areas deforested per forest class icl within the Project Area in the baseline case (Table 11.b of VM0015).

Area deforested per forest class *icl* within the Project Area		Total baseline deforestation in the Project Area	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	cumulative
Project $year_t$	ha	ha	ha
1	463	463	463
2	474	474	937
3	495	495	1,432
4	699	699	2,131
5	703	703	2,834
6	771	771	3,605
7	602	602	4,207
8	542	542	4,749
9	741	741	5,490
10	698	698	6,188

Table 24: Annual areas deforested per forest class icl within the leakage belt area in the baseline case (Table 11.c of VM0015).

Area deforested per forest class icl within the leakage belt area		Total baseline deforestation in the Project Area	
IDicl>	icl1	ABSLPAt	ABSLPA
Name>	Forest	annual	cumulative
Project yeart	ha	ha	ha
1	2,038	2,038	2,038
2	1,972	1,972	4,010
3	1,969	1,969	5,979
4	2,130	2,130	8,109
5	2,253	2,253	10,362
6	2,414	2,414	12,776
7	2,477	2,477	15,253
8	2,218	2,218	17,471
9	2,184	2,184	19,655
10	2,441	2,441	22,096

Step 5.2 Calculation of baseline activity data per post-deforestation forest class

Method 1 of VM0015 methodology was used to define the class that will replace the forest cover in the baseline of the project (Anthropic Vegetation in equilibrium). Zone 1 encompasses the Project Area (PA), leakage belt (LK) and leakage management areas (LMA). Table 25 shows zone 1 areas and the corresponding area of each class of use and coverage after deforestation for the first 10 years of project.

Table 25: Zones of the Reference Region encompassing different combinations of potential post-deforestation LU/LC (Table 12 VM0015).

Zone		Name		Total of all other LU/LC classes present in the zone		Total area of each Zone	
		Zone 1					
		IDfcl	1				
		Area	% of Zone	Area	% of Zone	Area	% of Zone
Idz	Name	ha	%	ha	%	ha	%
1	Zone 1	558267.62	100	28414.00	5.09	558267.62	100
Total area of each class fcl		558267.62	100	28414.00	5.09	558267.62	100

Table 26 and Table 27 shows the area projected to be deforested in each zone for the Project Area and Leakage Belt, respectively.

Table 26: Annual areas deforested in each zone within the Project Area in the baseline case (Table 13.b of VM0015).

Area established after deforestation per zone within the Project Area		Total baseline deforestation in the Project Area	
IDz>	1		
Name>	Zone 1	$ABSLPA_t$	ABSLPA
Project year$_t$	ha	ha	ha
1	463	463	463
2	474	474	937
3	495	495	1,432
4	699	699	2,131
5	703	703	2,834
6	771	771	3,605
7	602	602	4,207
8	542	542	4,749
9	741	741	5,490
10	698	698	6,188

Table 27: Annual areas deforested in each zone within the leakage belt in the baseline case (Table 13.c of VM0015).

Area established after deforestation per zone within the leakage belt		Total baseline deforestation in the leakage belt	
IDz>	1		
Name>	Zone 1	$ABSLLK_t$	ABSLLK
Project year$_t$	ha	ha	ha
1	2,038	2,038	2,038
2	1,972	1,972	4,010
3	1,969	1,969	5,979
4	2,130	2,130	8,109
5	2,253	2,253	10,362
6	2,414	2,414	12,776
7	2,477	2,477	15,253
8	2,218	2,218	17,471
9	2,184	2,184	19,655
10	2,441	2,441	22,096

Step 5.3 Calculation of baseline activity data per LU/LC change category

Does not apply, the Method 2 was not applied.

Step 6 of VM0015 - Estimation of baseline carbon stock changes and Non-CO_2 emissions

To estimate the carbon stock changes first we needed to estimate the carbon stock in the forest. The carbon was estimated by a forest inventory carried by “Mikiun Consultorias e Projetos Sociambientais” in 2021. The main results are presented in the following, and more details can be found in the Technical Report related to this activity.

Step 6.1 Estimation of baseline carbon stock changes

Step 6.1.1 Estimation of the average carbon stocks of each LU/LC class

To determine the carbon stock in the Project Areas a forest inventory was performed in two of the properties, Fazenda Nictheroy and Fazenda Uberaba. The selection was based on the analysis of forest typology in the Project Area, using the Economic Ecological Zoning (ZEE) of Acre State as reference. In

the Project Area there are some variations of Ombrophilous Forest, both Open and Dense, with presence of Palms and Bamboo, and alluvial areas. Details are presented in Table 28.

Table 28: Forest classes in the Project Area.

Group	Properties	Forest Area (PA)	Predominant Forest (ZEE vegetation class)
Block 1	Fazenda Charrua do Niteroi, Fazenda Nictheroy A, Fazenda Nictheroy B	2529.01	FAP + FD
Block 1	Fazenda Santa Paula	2143.72	FAB + FAP
Block 2	Fazenda Criciuma A, Fazenda Criciuma B	5036.1	FAB + FAP
Block 3	Fazenda Santo Antonio	4188.55	FAP + FAB
Block 4	Fazenda Itaimbe I, Fazenda Itaimbe II	3030.02	FAP + FD
Block 5	Fazenda Castanhal, Fazenda Espigao	1484.17	FAP + FD
Block 6	Fazenda Uberaba	5439.83	FAP + FAB
Block 7	Seringal Fonte II, Seringal Fonte III, Seringal Palmares, Seringal Santo Elias 1014, Seringal Santo Elias 1016	16786.2	FAP + FAB
Block 8	Fazenda Mac Esperanca	2213.93	FAB + FAP
Block 9	Fazenda Floresta	9710.78	FAB + FAP
Block 10	Fazenda Soberana	7396.99	FAB + FAP + FD

Notes: FAP: Open Forest with Palms; FD: Dense Forest; FAB: Open Forest with Bamboo.

The selected properties are located in areas with FAP + FD (Open Forest with Palms and Dense Forest), and FAP + FAB (Open Forest with Palms and Open Forest with Bamboo), for Fazenda Nictheroy and Fazenda Uberaba II, respectively. The inventory was carried out in the months of May and June of 2021.

A systematic sampling was applied, and a grid of possible sample locations was generated with a space of 850m between points, and 300 meters far from the forest edge (Figure 15). In each property 4 sample plots were selected, being two temporary and two permanent plots. The later can be used in subsequent monitoring. Each plot has 1 ha in a conglomerated form, being 4 plots of 10 m x 250 m in cross arrangement, 10 m distant to the center of the plot.

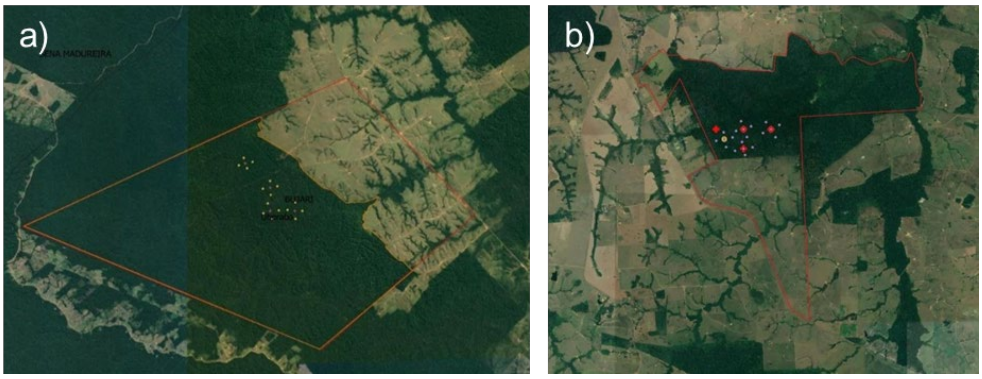


Figure 15: Plot locations. a) Uberaba and b) Nictheroy.

In the plots all tress with diameter at breast height (DBH, 1.3 m) higher than 10 cm had their DBH recorded with a measuring tape. The data was recorded in electronic spreadsheets. In the Permanent plots all the trees were signalized with spray paint for posterior measurements.

Estimated variables

For the choice of a trustable equation, it was considered the equation applied for the Acre State in a study conducted by Salimon et al. (2001)[45] in partnership with the Brazilian agricultural research company (EMBRAPA) and Federal University of Acre (UFAC). The equation used in the study was developed for tropical moist forests by Brown (1997)[46] and used the DBH as independent variable to estimate the aboveground biomass (AGB). A maximum limit of error of 10% and a confidence interval of 95% were also selected.

$AGB= 42,69 – 12,800*(DHB)+1,242*(DHB^2)$

Where:

AGB: Aboveground biomass;

DHB: Diameter at breast height.

To transform the biomass in carbon stocks the equation developed by Silva (2007)[47] was applied, in where the proportion of carbon is considered as 48.5% of the biomass. The values of carbon where then transformed to carbon dioxide equivalent in tons per hectare (tCO_2-e ha^{-1}) by multiplying the net carbon stock by 44/12[48].

CAGB =AGB*0.485

Where:

CAGB: Aboveground carbon;

AGB: Aboveground biomass.

The belowground biomass (BGB) was calculated by the standard values of root to shoot ratios published by VM0015 (from table 4.4 in IPCC GL AFOLU, Modified by GOFC-GOLD, 2008)[49], being in this case used the value of 0.24, recommended for tropical rainforests with AGB >125 t ha^{-1}.

Dead aboveground biomass (DW) was also estimated using expansion factor of 0.137 from a study conducted on the Amazon region[50].

[45] SALIMON,C.I; PUTZ, F.E.; MENEZES-FILHO, L.; ANDERSON,A.; SILVEIRA, M.; FOSTER BROWN, I.; OLIVEIRA, L.C. Estimating state-wide biomass carbon stocks for a REDD plan in Acre, Brazil. 2011, Forest Ecology and Management, 262, p. 555–560, 2011.
46 Brown, S., 1997. Estimating biomass and biomass change of tropical forests: A primer. FAO Forestry Paper: vii, 55 p.
47 Silva, R.P. 2007. Alometria, estoque e dinâmica da biomassa de florestas primárias e secundárias na região de Manaus (AM). Tese de Doutorado, Curso de Ciências de Florestas Tropicais. Insituto Nacional de Pesquisas da Amazônia (INPA). 135p
48 IPCC - National Greenhouse Gas Inventories Programme. 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry.
49 GOFC-GOLD, 2016, A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation. GOFC-GOLD Report version COP22-1, (GOFC-GOLD Land Cover Project Office, Wageningen University, The Netherlands).
50 NOGUEIRA, E. M.; FEARNSIDE, P. M.; NELSON, B. W.; BARBOSA, R. I. E KEIZER, E. W. H. 2008. Estimates of forest biomass in the Brazilian Amazon: new allometric equations and adjustments to biomass from wood-volume inventories. Forest Ecology and Management, 256 (11): 1853-1857.

Carbon stock

The carbon stock observed in Fazenda Nictheroy was 175 t C ha^{-1} in the AGB and 42.14 t C ha^{-1} in the BGB. In Fazenda Uberaba it was observed 135.02 t C ha^{-1} in the AGB and 32.04 t C ha^{-1} in the BGB. These values correspond to an average of 569.5 t CO_2-e ha^{-1} for AGB, and 136.7 t CO_2-e ha^{-1} for BGB, considering both inventoried areas. The average carbon values per hectare for the initial class of LULC (forest) considered for the baseline scenario present in the area of the project and Leakage Belt is presented in Table 29.

Table 29: Carbon stocks per hectare for existing icl initial class in the Project Area and leakage belt (Table 15a from VM0015).

Initial forest class $_{icl}$							
Name:		Initial forest					
IDicl		1					
Average carbon stock per hectare + 95% CI							
Cab_{icl}		Cbb_{icl}		Cdw_{icl}		$Ctot_{icl}$	
C stock	± 95% CI	C stock	± 95% CI	C stock	± 95% CI	C stock	± 95% CI
tCO2e ha^{-1}	tCO2e ha^{-1}	tCO2e ha^{-1}	tCO2e ha^{-1}	tCO2e ha^{-1}	tCO2e ha^{-1}	tCO2e ha^{-1}	tCO2e ha^{-1}
569.5	-	136.7	-	78.0	-	784.2	-

For the class of post deforestation, a value from a local study was selected. The value of 61.2 tCO2e ha^{-1} from Fearnside (1996)[51] was used as a reference for carbon storage of anthropogenic vegetation class in equilibrium, as projected class to replace the forest in the Project Area and Leakage Belt. This value was obtained from a long-term study in a landscape composed by a matrix of pastures, small-scale agriculture, and plantations (permanent and temporary). This reflects the scenario of deforestation usually observed in the Amazon region. The value is conservative since reflects an average and a 30% increase in the value reported by the author (as per VM0015 requirements).

Calculation of carbon stock change factors

Carbon stock change factors were calculated using Method 1 available in VM00015 methodology. VM00015 suggest the use of method 1 when activity data is available for classes, as in this case. In this baseline scenario we are considering the changes in carbon stock caused by the replacement of forest by an anthropic vegetation in equilibrium (such as pasture small scale plantation, agricultural crops, i.e.). The calculation proposed by VM00015 accounts for the changes in the organic soil carbon pools, being a decay in the forest class, and increase in the post-deforestation class. Values for the initial and final classes are presented in Table 30 and Table 31.

Table 30: Carbon stock change factors for initial forest classes icl (Method 1, Table 20.a of VM0015).

Year after deforestation		ΔCabicl,t	ΔCbbicl,t	ΔCdwicl,t	ΔCtotcl,t
1	t*	569.5	13.7	7.8	590.9
2	t*+1	0	13.7	7.8	21.5
3	t*+2	0	13.7	7.8	21.5
4	t*+3	0	13.7	7.8	21.5
5	t*+4	0	13.7	7.8	21.5
6	t*+5	0	13.7	7.8	21.5
7	t*+6	0	13.7	7.8	21.5
8	t*+7	0	13.7	7.8	21.5

[51] FEARNSIDE PM (1997) Greenhouse gases from deforestation in Brazilian Amazonia: net committed emissions. Climatic Change. 35:321–360.

9	t*+8	0	13.7	7.8	21.5
10	t*+9	0	13.7	7.8	21.5
11	t*+10				
12	t*+11				
13	t*+12				
14	t*+13				
15	t*+14				
16	t*+15				
17	t*+16				
18	t*+17				
19	t*+18				
20	t*+19				
21-T	t*+20...				

Table 31: Carbon stock change factors for final classes fcl or zones z (Method 1, Table 20.b of VM0015)

Year after deforestation		ΔCtotfcl,t
1	t*	6.1
2	t*+1	6.1
3	t*+2	6.1
4	t*+3	6.1
5	t*+4	6.1
6	t*+5	6.1
7	t*+6	6.1
8	t*+7	6.1
9	t*+8	6.1
10	t*+9	6.1
11	t*+10	
12	t*+11	
13	t*+12	
14	t*+13	
15	t*+14	
16	t*+15	
17	t*+16	
18	t*+17	
19	t*+18	
20	t*+19	
21-T	t*+20...	

Calculation of baseline carbon stock changes

Baseline carbon stock changes were calculated using Method 1 of VM0015 (Equation 10). Results for year t are presented in Table 32 for the Project Area and Table 33 for Leakage Belt.

Table 32: Baseline carbon stock change in the Project Area (Table 21.b of VM0015).

Carbon stock changes per initial forest class icl		Total carbon stock change of initial forest class in the Project Area	Carbon stock changes per post-deforestation zone z	Total carbon stock change of post-deforestation zones in the Project Area	Total net carbon stock change of the Project Area	
IDicl>	1	ΔCBSLPAicl	1	ΔCBSLPAz	ΔCBSLPAt	ΔCBSLPA
Name>	Forest	cumulative	Zone 1	cumulative	annual	cumulative
Project Year t	tCO2-e	tCO2-e	tCO2-e	tCO2-e	tCO2-e	tCO2-e
1	273,604.8	273,604.8	2,832.1	2,832.1	270,772.6	270,772.6
2	290,045.3	563,650.0	5,731.6	8,563.7	284,313.7	555,086.3
3	312,631.3	876,281.3	8,759.4	17,323.1	303,871.9	858,958.2
4	443,810.0	1,320,091.3	13,035.2	30,358.3	430,774.9	1,289,733.0
5	461,180.6	1,781,271.9	17,335.3	47,693.6	443,845.3	1,733,578.3
6	516,457.2	2,297,729.1	22,051.5	69,745.1	494,405.7	2,227,984.0
7	433,141.1	2,730,870.2	25,733.9	95,479.0	407,407.2	2,635,391.2
8	410,609.1	3,141,479.3	29,049.2	124,528.2	381,559.9	3,016,951.1
9	539,842.2	3,681,321.5	33,581.9	158,110.1	506,260.3	3,523,211.4
10	530,340.3	4,211,661.9	37,851.5	195,961.6	492,488.9	4,015,700.3

Table 33: Baseline carbon stock change in the leakage belt area (Tables 21.c of VM0015).

Carbon stock changes per initial forest class icl		Total carbon stock change of initial forest class in the leakage belt area	Carbon stock changes per post-deforestation zone z	Total carbon stock change of post-deforestation zones in leakage belt area	Total net carbon stock change of the leakage belt area	
IDicl>	1	ΔCBSLLKicl	1	ΔCBSLLKz	ΔCBSLLKt	ΔCBSLLK
Name>	Forest	cumulative	Zone 1	cumulative	annual	cumulative
Project Year t	tCO2-e	tCO2-e	tCO2-e	tCO2-e	tCO2-e	tCO2-e
1	1,204,333.7	1,204,333.7	12,466.3	12,466.3	1,191,867.4	1,191,867.4
2	1,209,085.6	2,413,419.3	24,528.8	36,995.1	1,184,556.8	2,376,424.2
3	1,249,649.7	3,663,069.0	36,573.1	73,568.2	1,213,076.6	3,589,500.8
4	1,387,063.4	5,050,132.4	49,602.1	123,170.3	1,337,461.3	4,926,962.1
5	1,505,477.9	6,555,610.3	63,383.5	186,553.8	1,442,094.4	6,369,056.5
6	1,648,988.8	8,204,599.0	78,149.7	264,703.5	1,570,839.0	7,939,895.5
7	1,738,044.1	9,942,643.2	93,301.3	358,004.9	1,644,742.8	9,584,638.3
8	1,638,169.7	11,580,812.9	106,868.7	464,873.5	1,531,301.0	11,115,939.3
9	1,665,696.0	13,246,508.9	120,228.0	585,101.6	1,545,468.0	12,661,407.4
10	1,864,455.7	15,110,964.6	135,159.4	720,261.0	1,729,296.3	14,390,703.7

Baseline non-CO2 emissions from forest fires

Non-CO2 emissions were not considered and accounted for the WARG Project.

3.2.2 Project Emissions

Step 7.1 of VM0015 - Ex ante estimation of actual carbon stock changes

Step 7.1.1 of VM0015 - Ex ante estimation of actual carbon stock changes due to planned activities

None of the Project Areas in WARG Project area are under logging activities, therefore no carbon stock decrease due to planed activities is projected. Yet, the forest in the Project Area can be eligible for Sustainable Forest Management logging activities. In the case of any Project Area being deforested due to this type of activity in the future, the area will be accounted in the future Monitoring Reports. In the same way, we don't have any planned activity to increase the carbon stocks in the project.

Step 7.1.2 of VM0015 - Ex ante estimation of carbon stock changes due to unavoidable unplanned deforestation within the Project Area

While we expect the unplanned deforestation in the project scenario to decrease significantly compared to the baseline scenario, depending on the effectiveness of the Project, it is possible that some deforestation will still occur even with the existence of the REDD+ project. According to VM0015, the level at which deforestation will actually be reduced in the project depends on the effectiveness of the proposed activities, which cannot be measured ex ante, therefore the ex post measurements will be important to determine real emission reductions.

To allow ex ante projections to be made, a conservative assumption was made applying an Effectiveness Index (EI) proposed by VM00015. The EI varies between 0 (no effectiveness) and 1 (maximum effectiveness), and this value is multiplied by the baseline projections (Equation 16 of VM0015). The Effectiveness Index (EI) of project activities was conservatively assumed as 87% in the first year, based on the risk assessment of 13%. The EI is projected to increase gradually over the 10 first years until reach 100%. Results are presented in Table 34.

Step 7.2 of VM0015 - Ex ante estimation of actual non-CO2 emissions from forest fires

Emissions of no-CO2 from forest fires were not accounted for the baseline scenario.

Step 7.3 of VM00415 - Total ex ante estimations for the Project Area

The total expected carbon stock changes and emissions of non-CO2 gasses in the Project Area are presented in Table 34.

Table 34: Total ex ante estimated actual net carbon stock changes and emissions of non-CO2 gasses in the Project Area (Table 29 of VM0015).

Project Year t	Total ex ante carbon stock decrease due to unavoided unplanned deforestation		Total ex ante net carbon stock change	
	annual	cumulative	annual	cumulative
	$\Delta CUDdPA_t$	$\Delta CUDdPA$	$\Delta CPSPA_t$	$\Delta CPSPA$
	tCO_2e	tCO_2e	tCO_2e	tCO_2e
1	35,200.4	35,200.4	35,200.4	35,200.4
2	32,866.7	68,067.1	32,866.7	68,067.1
3	30,751.8	98,818.9	30,751.8	98,818.9
4	37,391.3	136,210.2	37,391.3	136,210.2
5	32,134.4	168,344.6	32,134.4	168,344.6
6	28,675.5	197,020.1	28,675.5	197,020.1
7	17,763.0	214,783.1	17,763.0	214,783.1
8	11,141.5	225,924.6	11,141.5	225,924.6
9	7,492.7	233,417.3	7,492.7	233,417.3
10	197.0	233,614.3	197.0	233,614.3

3.2.3 Leakage

Step 8 of VM0015 – Ex ante estimation of leakage

Step 8.1 of VM0015 - Ex ante estimation of the decrease in carbon stocks and increase in GHG emissions due to leakage prevention measures

The leakage prevention measures for the WARG project will take place in the Leakage Management Areas, defined in this project as areas inside the properties of the project, but where there is no forest cover, therefore are not project areas. At this point it is not expected the development of any activity that could lead to the reduction of carbon stocks or the increase of GHG emissions compared to the baseline scenario. If there are significant changes in carbon stock, these activities will be monitored, accounted for, and reported.

Step 8.1.1 - Carbon stock changes due to activities implemented in Leakage Management Areas

Not applicable because no reduction is expected due to the implementation of activities. If there are significant changes in carbon stock, these activities will be monitored, accounted for, and reported.

Step 8.1.2 - Ex ante estimation of CH_4 and N_2O emissions from grazing animals intensification of livestock

Not applicable because no activities that will lead to a significant increase in methane and nitrous oxide emissions.

Step 8.1.3 - Total ex-ante estimated carbon stock changes and increases in GHG emissions due to leakage prevention measures

Not applicable.

Step 8.2 of VM0015 - Ex ante estimation of the decrease in carbon stocks and increase in GHG emissions due to activity displacement leakage

Activities that will cause deforestation within the Project Area in the baseline case could be displaced outside the project boundary due to the implementation of the AUD project activity. A large decrease in carbon stocks in the leakage belt during the project scenario could indicate displacement leakage.

Leakage due to activity displacement will be estimated by ex post monitoring of deforestation in the leakage belt and comparing ex post observed deforestation with ex ante projected baseline deforestation. Ex ante activity displacement leakage was calculated based on the anticipated combined effectiveness of the proposed leakage prevention measures and project activities, represented by a “Displacement Leakage Factor” (DLF).

DLF represents the percent of deforestation expected to be displaced outside the project boundary. In this case we considered the same rationality applied in Step 7, based in the project risk assessment, and considered a DLF of 13% in the first year, decreasing gradually each year for the first 10 years. The DLF is multiplied by the baseline carbon stock change in the Project Area at year t, and the results are presented in Table 35.

Table 35: Ex ante estimated total leakage (Table 35 of VM0015).

Project Year t	Total ex ante decrease in carbon stocks due to displaced deforestation	Total net carbon stock change due to leakage

	annual	cumulative	annual	cumulative
	ΔCADLKt	ΔCADLK	ΔCLKt	ΔCLK
	tCO2e	tCO2e	tCO2e	tCO2e
1	35,200.4	35,200.4	35,200.4	35,200.4
2	32,866.7	68,067.1	32,866.7	68,067.1
3	30,751.8	98,818.9	30,751.8	98,818.9
4	37,391.3	136,210.2	37,391.3	136,210.2
5	32,134.4	168,344.6	32,134.4	168,344.6
6	28,675.5	197,020.1	28,675.5	197,020.1
7	17,763.0	214,783.1	17,763.0	214,783.1
8	11,141.5	225,924.6	11,141.5	225,924.6
9	7,492.7	233,417.3	7,492.7	233,417.3
10	35,200.4	35,200.4	35,200.4	35,200.4

3.2.4 Net GHG Emission Reductions and Removals

Step 9 of VM0015 – Ex ante total net anthropogenic GHG emission reductions

Step 9.1 of VM0015 - Significance assessment

The significance of carbon pools and sources of GHG emissions considered was tested using the EB-CDM approved "Tool for testing significance of GHG emissions in A/R CDM project activities" Version 01. Based on the tool, 73% of the expected emissions in the baseline scenario are from aboveground biomass, 17% from belowground biomass, and 10% from dead biomass. Those three carbon pools are therefore considered significant.

Step 9.2 of VM0015 - Calculation of ex-ante estimation of total net GHG emissions reductions

The net anthropogenic GHG emission reduction of the WARG Project was calculated following the equation proposed by VM0015 (Equation 16 of VM00015), presented bellow.

$$\Delta REDD_t = (\Delta CBSLPA_t + EBBBSLPA_t) - (\Delta CPSPA_t + EBBPSPA_t) - (\Delta CLK_t + ELK_t)$$

Where:

$\Delta REDD_t$ = Ex ante estimated net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t; tCO2e

$\Delta CBSLPA_t$ = Sum of baseline carbon stock changes in the Project Area at year t; tCO2e

$EBBBSLPA_t$ = Sum of baseline emissions from biomass burning in the Project Area at year t; tCO2e

$\Delta CPSPA_t$ = Sum of ex ante estimated actual carbon stock changes in the Project Area at year t; tCO2e

$EBBPSPA_t$ = Sum of (ex ante estimated) actual emissions from biomass burning in the Project Area at year t; tCO2e

ΔCLK_t = Sum of ex ante estimated leakage net carbon stock changes at year t; tCO2e

ELK_t = Sum of ex ante estimated leakage emissions at year t; tCO2e

t = 1, 2, 3 … T, a year of the proposed project crediting period; dimensionless

Step 9.3 of VM0015 - Calculation of ex-ante Verified Carbon Units (VCUs)

The number of Verified Carbon Units (VCUs) was calculated by the equation proposed by VM0015 (Equations 20 and 21 of VM00015). The tradable VCUs are calculated as the difference between the net anthropogenic GHG emission reduction and the number of VCUs deposited in the Buffer pool. The risk factor, calculated by the VCS AFOLU Non-Permanence Risk Tool was set at 13%. Results of the calculation of VCUs are presented in Table 36.

Table 36: Ex ante estimated net anthropogenic GHG emission reductions (ΔREDDt) and Verified Carbon Units (VCUt) (Table 36 of VM0015).

Project Year t	Baseline carbon stock changes		Baseline GHG emissions		Ex ante project carbon stock changes		Ex ante project GHG emissions		Ex ante leakage carbon stock changes		Ex ante leakage GHG emissions	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	$\Delta CBSLPA_t$	ΔCBSLPA	$\Delta EBBBSLPA_t$	ΔEBBBSLPA	$\Delta CPSPA_t$	ΔCPSPA	$EBBPSPA_t$	EBBPSPA	ΔCLK_t	ΔCLK	ELK_t	ELK
	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
1	270,773	270,773	0	0	35,200	35,200	0	0	35,200	35,200	0	0
2	284,314	555,086	0	0	32,867	68,067	0	0	32,867	68,067	0	0
3	303,872	858,958	0	0	30,752	98,819	0	0	30,752	98,819	0	0
4	430,775	1,289,733	0	0	37,391	136,210	0	0	37,391	136,210	0	0
5	443,845	1,733,578	0	0	32,134	168,345	0	0	32,134	168,345	0	0
6	494,406	2,227,984	0	0	28,676	197,020	0	0	28,676	197,020	0	0
7	407,407	2,635,391	0	0	17,763	214,783	0	0	17,763	214,783	0	0
8	381,560	3,016,951	0	0	11,142	225,925	0	0	11,142	225,925	0	0
9	506,260	3,523,211	0	0	7,493	233,417	0	0	7,493	233,417	0	0
10	492,489	4,015,700	0	0	197	233,614	0	0	197	233,614	0	0

Table 36: Ex ante estimated net anthropogenic GHG emission reductions (ΔREDDt) and Verified Carbon Units (VCUt) (Table 36 of VM0015) - Continuation.

Project Year t	Ex ante net anthropogenic GHG emission reductions		Ex ante VCUs tradable		Ex ante buffer credits	
	annual	cumulative	annual	cumulative	annual	cumulative
	$\Delta REDD_t$	ΔREDD	VCU_t	VCU	VCB_t	VCB
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
1	200,372	200,372	169,747	169,747	30,624	30,624
2	218,580	418,952	185,892	355,640	32,688	63,312
3	242,368	661,320	206,863	562,502	35,506	98,818
4	355,992	1,017,313	304,852	867,355	51,140	149,958
5	379,576	1,396,889	326,054	1,193,409	53,522	203,480
6	437,055	1,833,944	376,510	1,569,918	60,545	264,025
7	371,881	2,205,825	321,228	1,891,146	50,654	314,679
8	359,277	2,565,102	311,122	2,202,268	48,154	362,833
9	491,275	3,056,377	426,435	2,628,704	64,840	427,673
10	492,095	3,548,472	428,097	3,056,801	63,998	491,671

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Below is the data and parameters description available in the validation.

Data / Parameter	C_{tot}
Data unit	tCO2e ha-1
Description	Average carbon stock per hectare in all carbon pools in the forest class used in the baseline scenario
Source of data	Calculated by allometric equations, conversion factors, and field-measured data
Value applied	569,50 tCO2e ha-1
Justification of choice of data or description of measurement methods and procedures applied	The biomass estimates above and below the ground were made using forest inventory data and allometric equations applied in the Project's area state (Salimon et al., 2011)
Purpose of data	Determination of baseline scenario Calculation of baseline *emissions* Calculation of project emissions Calculation of leakage
Comments	Supplementary information in the attached documents

Data / Parameter	DBH
Data unit	cm
Description	Diameter at breast height (130 cm) for each tree with DBH equal to or greater than 10 cm in each plot of the forest inventory
Source of data	Measured in the field by Mikuin Consultoria
Value applied	See worksheet with field data
Justification of choice of data or description of measurement methods and procedures applied	Requirement demanded by Methodology VCS VM0015. Forest inventory data collected in 2021 in multiple plots across the Project Area
Purpose of data	Determination of baseline scenario Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	Main variable for the carbon stock estimation of the WARG Project

Data / Parameter	AGB= 42,69 – 12,800*(DBH)+1,242*(DBH²)
Data unit	Kg (weight)
Description	Equation to convert DBH to biomass for each tree
Source of data	Brown et al. (1998)
Value applied	AGB= 42,69 – 12,800*(DBH)+1,242*(DBH²)
Justification of choice of data or description of measurement methods and procedures applied	Equation developed for forests with forest-like characteristics in the reference region
Purpose of data	Determination of baseline scenario *(for AFOLU projects only)* Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	-

Data / Parameter	CF
Data unit	t
Description	Carbon contained in dry biomass
Source of data	Brown et al. (1998)
Value applied	0.485
Justification of choice of data or description of measurement	Value found in scientific literature

methods and procedures applied	
Purpose of data	Determination of baseline *scenario* Calculation of baseline emissions Calculation of project emissions Calculation of leakage
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.
Source of data	Table 4.4 in IPCC GL AFOLU, modified by GOFC-GOLD, 2008
Value applied	0.24
Justification of choice of data or description of measurement methods and procedures applied	Standard values of root to shoot ratios published by VM0015
Purpose of data	Determination of baseline scenario Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	-

Data / Parameter	EF_{DW}
Data unit	Dimensionless
Description	Dead aboveground biomass (DW) expansion factor
Source of data	Nogueira et al. (2008)
Value applied	0.137
Justification of choice of data or description of measurement methods and procedures applied	Value found in scientific literature study conducted in Amazon region in similar conditions to Project Area.
Purpose of data	Determination of baseline scenario Calculation of baseline *emissions* Calculation of project emissions Calculation of leakage
Comments	-

Data / Parameter	44/12
Data unit	tCO2e
Description	Carbon mass conversion factor for mass of CO2e
Source of data	Scientific literature: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 AFOLU
Value applied	44/12
Justification of choice of data or description of measurement methods and procedures applied	Standard IPCC value
Purpose of data	Determination of baseline scenario *(for AFOLU projects only)* Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	-

3.3.2 Data and Parameters Monitored

Below is data and monitored parameters description subsequent to validation.

Data / Parameter	$ABSLPA_{icl,t}$
Data unit	Hectare (ha)
Description	Areas of forest cover converted into non-forest cover areas within the Project area of the WARG Project
Source of data	Calculated by means of remote sensing imagery
Description of measurement methods and procedures to be applied	Monitoring of forest cover in the Project area will be performed through satellite imagery analysis. When PRODES system data are not available, monitoring of forest cover will be by automatic classification and visual interpretation of images
Frequency of monitoring/recording	Annual
Value applied	Annual average deforestation in the Project Area during the crediting period: 632 ha.
Monitoring equipment	Remote sensing images of digital processing program, geographic information system
QA/QC procedures to be applied	Images with special resolution of 30 m or more will be used in the mapping and the minimum mapping unit is 1 ha. The minimum accuracy of use classification map and ground cover is 80%
Purpose of data	Calculation of project emissions
Calculation method	If unplanned deforestation areas are detected, the Forest Cover BenchMark Map will be updated by map algebra
Comments	PRODES Digital Project: *http://www.dpi.inpe.br/prodesdigital/prodes.php* More information on quality assurance and control available at: Câmara et al. 2006. Methodology for the calculation of the annual rate of deforestation in the Legal Amazon

Data / Parameter	$ABSLLK_{icl,t}$
Data unit	Hectare (ha)
Description	Areas of forest cover converted into non-forest cover areas within the leakage belt of the WARG Project
Source of data	Calculated by means of remote sensing imagery
Description of measurement methods and procedures to be applied	Monitoring of forest cover in the leakage belt will be performed through satellite imagery analysis. When PRODES system data are not available, monitoring of forest cover will be by automatic classification and visual interpretation of images
Frequency of monitoring/recording	Annual
Value applied	Annual average deforestation in the Project Area during the crediting period: 632 ha.
Monitoring equipment	Remote sensing images of digital processing program, geographic information system
QA/QC procedures to be applied	Images with special resolution of 30 m or more will be used in the mapping and the minimum mapping unit is 1 ha. The minimum accuracy of use classification map and ground cover is 80%
Purpose of data	Calculation of leakage
Calculation method	If unplanned deforestation areas are detected, the Forest Cover BenchMark Map will be updated by map algebra
Comments	PRODES Digital Project: *http://www.dpi.inpe.br/prodesdigital/prodes.php* More information on quality assurance and control available at: Câmara et al. 2006. Methodology for the calculation of the annual rate of deforestation in the Legal Amazon

Data / Parameter	$APDPA_{icl,t}$
Data unit	Hectare (ha)
Description	Survey and mapping of areas of forest cover converted into non-forest cover areas due to the construction of forest management infrastructures
Source of data	Remote sensing images, technical maps, and field maps to monitor the construction of roads, trails, and yards for sustainable forest management activities
Description of measurement methods and procedures to be applied	The monitoring of forest cover areas in the area of sustainable forest management will be done by satellite imagery analysis, road construction maps, forest trails and yards, and field verification. The Forest Cover Benchmark Map will be updated by map algebra in case of planned deforestation. The verification processes will report the reduction in carbon stock in the Project area

Frequency of monitoring/recording	During the management year of each UPA
Value applied	N/D
Monitoring equipment	Post-exploratory reports, and geographic information system
QA/QC procedures to be applied	The mapping of deforestation areas planned for the implementation of Sustainable Forest Management infrastructures will be carried out through high resolution images and field check
Purpose of data	Calculation of project emissions
Calculation method	If unplanned deforestation areas are detected, the Forest Cover BenchMark Map will be updated by map algebra
Comments	-

Data / Parameter	ΔCabBSLLKt
Data unit	tCO2e
Description	Changes in total carbon stock in the leakage belt area
Source of data	Calculated
Description of measurement methods and procedures to be applied	Calculations will be made according to VM0015 and reported in Table 30.c of Methodology VM0015.
Frequency of monitoring/recording	To be determined depending on the activity
Value applied	Does not apply
Monitoring equipment	To be determined depending on the activity
QA/QC procedures to be applied	To be determined depending on the activity
Purpose of data	Calculation of *leakage*
Calculation method	To be determined depending on the activity
Comments	-

Data / Parameter	Frequency of surveillance and patrol operations
Data unit	Number of operations per year
Description	Record of the number of surveillance operations carried out in the design area and leakage belt during the monitoring period
Source of data	Patrimonial Surveillance Reports
Description of measurement methods and procedures to be applied	To be established
Frequency of monitoring/recording	To be established
Value applied	Does not apply
Monitoring equipment	Does not apply
QA/QC procedures to be applied	To be established
Calculation method	Does not apply
Comments	The Patrimonial Surveillance Reports will be implemented from the Project validation

3.3.3 Monitoring Plan

The WARG Project monitoring plan was developed according to VM0015 methodology. The Monitoring Plan will encompass key issues for the emission reduction by deforestation and degradation due to avoided unplanned deforestation demonstration, in accordance with the applied methodology VM0015, and changes in carbon stock throughout the project life cycle due to changes in land use within the Project Area and in the Leakage Belt.

Part 1 – Application of Methodology VM0015

TASK 1: Monitoring of Carbon Stock Changes and GHG Emissions for Periodical Verifications

1.1 Monitoring of actual carbon stock changes and GHG emissions within the Project Area

a) Technical description of the monitoring tasks

In the Project Area, the monitoring of carbon stock changes and GHG emissions will be carried out through analysis of avoided unplanned deforestation. CCC Brazil will develop actions to monitor REDD+ activities, which aim to avoid unplanned deforestation by verifying areas of forest cover by satellite images and field patrols in the Project Area, including the use of Unmanned Aerial vehicles (UAVs also known as drones).

b) Data to be collected

Table 37 Data to be collected for monitoring carbon stock changes and GHG emissions for periodic verification in the WARG Project

Data/Parameter	Description	Unit	Source	Frequency
$Ctot_{icl}$	Average carbon stock of all accounted carbon pools in forest class *icl*	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated according to allometric equations and data measured in the field	Collected in periods of up to 10 years
$APDPA_{icl,t}$	Areas of planned deforestation in forest class *icl* at year *t* in the Project Area	Hectare (ha)	Calculated through remote sensing images, technical maps and data, field information and post exploratory of management	Annual
$\Delta CPLdPA_t$	Total decrease in carbon stock due to planned logging activities at year t in the Project Area	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual
$ACPA_{icl,t}$	Annual area within the Project Area affected by catastrophic events in category *icl* in year *t*	Hectare (ha)	Calculated through remote sensing images	Whenever a catastrophic event occurs
$AUFPA_{icl,t}$	Areas affected by forest fires in class *icl* in which carbon stock recovery occurs in year *t*	Hectare (ha)	Calculated through remote sensing images	Whenever a forest fire event occurs
$\Delta CUFdPA_t$	Total decrease in carbon stock due to unplanned forest fires at year *t* in the Project Area	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Whenever a forest fire event occurs
$\Delta CUCdPA_t$	Total decrease in carbon stock due to catastrophic events in year *t* in the Project Area	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Whenever a catastrophic event occurs
$\Delta CUDdPA_t$	Total of current change in carbon stock due to deforestation planned and not avoided in year *t* in the Project Area	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual
$\Delta CPSPA_t$	Total project carbon stock change within the Project Area in year *t*	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual

c) Overview of data collection procedures

The Project plans to use the data processed by PRODES as a basis for deforestation monitoring, and the main activities developed for data collection and processing are:

- Selection of optical satellite images with less cloud cover and date of collection of images near the dry season in the Amazon and appropriate radiometric quality.

- Georeferencing of satellite imagery with scale 1: 100,000 topographic maps or NASA images in ortho-rectified MrSID format.
- Production of a spectral mixing model to estimate the percentage of vegetation, soil and shade components for each image pixel.
- Use of segmentation technique determining in the satellite image the spatially adjacent regions (segments) with similar spectral characteristics.
- Classification of the segments to identify forest classes, non-forest vegetation and deforestation.

Carbon stock changes will be monitored through forest inventory and the measurement of the Diameter at Breast Height (130 cm), for each tree with DBH equal to or greater than 10 cm in each inventory plot.

d) Quality control and quality assurance procedures

To validate the information obtained from PRODES, the deforestation occurrence will be checked against other data source. The checking process will be done using either high resolution satellite imagery, using the best available source at each event, or using the orthomosaic resulting from the UAV data. At each monitoring event we will sort random points and check PRODES with the selected high-resolution source and calculate a confusion matrix and an accuracy indicator by Kappa index. The minimum classification accuracy for use and ground cover is 80%.

e) Data archiving

CCC Brazil will be responsible for storing during the Project period the original digital data (raster) and processed (vectors) of satellite images, coordinates, technical maps, photos, and field archives, visit reports, and others. Maps with installed infrastructure, satellite images, annual deforestation reports, spreadsheets, forest inventory reports, and parcel monitoring reports will be made available to VVB at each verification event.

f) Organization and responsibilities of the parties involved in all the above

These activities are the responsibility of Carbon Credits Consulting Brazil.

1.1.1 Monitoring of Project Implementation

Implementation of REDD+ activities will be monitored through physical-financial timelines, performance and quality monitoring reports, forest cover maps, meeting reports, land invasion police reports and other actions to control illegal deforestation, and other relevant documents.

1.1.2 Monitoring of Land-Use and Land-Cover change within the Project Area

The planned and unplanned deforestation monitoring will be developed by mapping the forest coverage of the Project Area, data provided annually by PRODES, using satellite images with spatial resolution of 30 meters. Subsequently the mapping will be validated from the assessment of accuracy with

high resolution images. Aiming for greater flexibility in the deforestation mapping process, different techniques for classification and visual interpretation may be used during the Project progress, such as complementary mapping using alternative images and sensors and data collected in the field.

Data on deforestation events will be compared to the baseline scenario. The emission reduction values for the monitored period will be based on the comparison between the expected deforestation and the actual deforestation.

1.1.3 Monitoring of carbon stock changes and non-CO_2 emissions from forest fires

It is hoped that the ex ante estimate of carbon stock for forest class will not change during the baseline period. However, Methodology VM0015 requests monitoring of the carbon stock in the Project Area subject to the relevant decrease of the carbon stock in the Project scenario in accordance with the ex ante evaluation due to controlled deforestation and planned management activities, or areas subject to the unplanned and significant decrease of the carbon stock in the Project scenario. The total change in carbon stock due to unavoidable unplanned deforestation in the Project Area will be calculated and if there is a significant reduction in the carbon stock due to forestry activities, this reduction will be presented in the verification processes using Table 29 of the Approved Methodology VM0015 version 1.1.

1.1.4 Monitoring of impacts of natural disturbances and other catastrophic events

Reducing carbon stock and increasing GHG emissions caused by natural disturbances or catastrophic events will be controlled by monitoring the forest cover by satellite using the same methods applied for monitoring the forest cover in the Project Area.

The multiplication of the forest loss mapped area by forest carbon stock average will be used to estimate the emissions caused by natural disturbances or catastrophic events. If there is a significant decrease in the carbon stock due to natural disturbances or catastrophic events, this reduction will be reported in the verification processes using Tables 25e, 25f and 25g of the Approved Methodology VM0015 version 1.1.

1.2 Monitoring of Leakage

a) Technical description of the monitoring tasks

The WARG Project will include two monitoring activities for leakage sources:

i. Monitoring the reduction in carbon stocks and/or increase in GHG emissions correlated with leakage prevention measures if project proponents implement activities such as tree planting, agricultural intensification, fertilization, forage production and/or other measures of improvement in agricultural areas and pastures. In case these activities imply a reduction in carbon stocks and/or an increase in GHG emissions in the Leakage Management Areas, these carbon stock changes and/or GHG emissions will be calculated by CCC Brazil.

ii. Monitoring of forest cover in the Leakage Belt through satellite imagery will be conducted by CCC Brazil.

b) Data to be collected

Table 38. Data to be collected for leakage monitoring for the WARG Project

Data/Parameter	Description	Unit	Source	Frequency
$\Delta CLPMLK_t$	Reduction of carbon stock due to measures to prevent leakage	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual
$EgLK_t$	Emissions resulted from animals on pastures in Leakage Management Area in year *t*	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual
$ELPMLK_t$	Total annual increase of GHG emissions derived from measures to prevent leakage in year *t*	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual
$\Delta CabBSLLK_t$	Total change in carbon stock in the Leakage Belt area	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual

c) Overview of data collection procedures

Monitoring of carbon stock changes and GHG emissions associated to leakage prevention activities:

To validate the monitoring of carbon stock changes due to the activities implemented in the Leakage Management Areas, the main activities carried out by the Project for data collection and processing are:

- List of leakage prevention activities.
- Production of map showing the intervention areas and type of intervention.
- Recognition of areas where leakage prevention activities have an impact on the carbon stock.
- Non-forest classes existing in these areas in the baseline case will be identified.
- The carbon stocks in the identified classes will be measured or there will be use of a conservative estimation of literature.
- Carbon stock changes in the Leakage Management Areas under the project scenario will be reported using Table 30b of VM0015.
- Calculation of net changes in carbon stock caused by leakage prevention measures during the fixed period of the baseline and crediting period of the Project.
- The results of the calculations will be reported by Table 30c of approved Methodology VM0015.

Monitoring of carbon stock decrease and increase in GHG emissions due to activity displacement leakage:

Monitoring of carbon stock changes

The processes used to monitor deforestation in the Project Area will be the same for data collection (item 1.1 above).

Monitoring of increases in GHG emissions

Emissions due to forest fires are not computed at the baseline.

d) Quality control and quality assurance procedures

Monitoring of carbon stock changes and GHG emissions associated to leakage prevention activities:

To be determined according to the activity, if implemented.

Monitoring of carbon stock decrease and increase in GHG emissions due to activity displacement leakage:

The procedures for quality control and quality assurance will be carried out with the same methods used to monitor deforestation in the Project Area (section 1.1).

e) Data archiving

The original reports and field maps will be stored by CCC Brazil, as well as will keep all the original digital data (raster) and processed (vectors) of satellite images, coordinates, technical maps, photos, and field cards. Maps with installed infrastructure, satellite images and annual deforestation reports will be made available to the verification body at each verification event.

f) Organization and responsibilities of the parties involved in all the above

These activities are the responsibility of Carbon Credits Consulting Brazil.

1.2.1 Monitoring of carbon stock changes and GHG emissions associated to leakage prevention activities

It is not expected that there will be a decrease in the carbon stock due to the activities developed in Leakage Management Areas, since no agrarian improvement or management of pasture areas capable of altering the carbon stock and increasing GHG emissions when compared to the baseline scenario has plans to be implemented. However, should such activities prove necessary, the ex ante changes in carbon stock and GHG emissions associated with these activities will be estimated in accordance with step 8 of the Approved Methodology VM0015. If the results are relevant, they will be monitored and the data made available to the verifiers at each verification event using Tables 30b, 30c, 31, 32 and 33 of Methodology VM0015 version 1.1.

1.2.2 Monitoring of carbon stock decrease and increase in GHG emissions due to activity displacement leakage

Activity data for the Leakage Belt area will be produced using the same methods applied to monitoring deforestation in the Project Area (item 1.2 above). If there is a deforestation event larger than expected for the baseline scenario during the monitoring process and it is recognized in the Leakage Belt and deforestation is attributed to deforestation agents in the Project Area, the losses in the carbon stock will be accounted for and reported using Tables 22c and 21c of the Approved Methodology VM0015 version 1.1.

1.2.3 Total ex post estimated leakage

The results will be demonstrated to the verifiers at each verification event using Table 35 of the Approved Methodology VM0015 version 1.1.

1.3 Ex post net anthropogenic GHG emission reductions

a) Technical description of the monitoring tasks

In the verification procedures, the results will be depicted using Table 36 of approved Methodology VM0015 version 1.1 along with spatial data (deforestation maps, when available).

b) Data to be collected

Table 39. Data to be collected to monitor net ex post GHG reductions for the WARG Project

Data/Parameter	Description	Unit	Source	Frequency
$\Delta REDD_{,t}$	Liquid reduction anthropogenic emissions of GHG related to AUD activities of the Project in year *t*	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual
$VCU_{,t}$	Number of Verified Carbon Units (VCUs) to be available for commercialization in year *t*	Tons of carbon dioxide equivalent (tCO_{2-e})	Calculated	Annual

c) Brief description of data collection procedures

The calculation of the number of Verified Carbon Units (VCUs) to be produced by the WARG REDD+ Project activities in year t will be done using Equations 19 and 20 of Methodology VM0015 version 1.1.

d) Quality control and quality assurance procedures

All tasks and tools listed in part 2 of the Approved Methodology VM0015 will be used to ensure that the data are suitable for the verification process and the number of Verified Carbon Units is reliable.

e) Data archiving

CCC Brazil will keep all WARG Project data and reports stored in digital files throughout the Project's duration. All documents related to the WARG Project monitoring will be gathered in paper and/or digital files and made available to the verifiers at each verification event.

f) Organization and responsibilities of the parties involved in all the above

These activities are the responsibility of Carbon Credits Consulting Brazil.

TASK 2: Revisiting the Baseline Projections for the Future Fixed Baseline Period

2.1 Update information on agents, drivers, and underlying causes of deforestation

They will be updated and used in the revision of baseline projections after 6-year fixed period, statistical and spatial data, studies, and information on agents, drives and underlying causes of deforestation required by Item 3.2.7 of the VCS Standard Version 4.2.

2.2 Adjustment of the Land-Use and Land-Cover change component of the baseline

If, during the next fixed baseline period, any national or subnational baseline becomes available, it will be applied to the next period. If there is no national or subnational baseline available, Step 4 of Methodology VM0015 will be redone considering the 6-year period (2019-2024) required by the standard, and using updated variables on the agents, drivers, and underlying causes of deforestation in the Reference Region. The area of annual deforestation and the location of deforestation at the baseline are the two main components to be revisited.

The assumptions and hypotheses considered in the modeling of the dynamic component of future deforestation (population data), as well as the data used in the spatial projection (updating of highways, location, and distance of new deforestation) will be reviewed and updated.

2.3 Adjustment of the carbon component of the baseline

According to the results generated during the changes in the carbon stock monitoring processes throughout the Project, the spatial estimate of the carbon component can be reviewed in Methodology VM0015 version 1.1, Part 3, item 1.1.3. New techniques can be analyzed for estimating spatial biomass, such as LIDAR or interferometric SAR data.

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

All results will be publicly available on the internet. The aim is to develop summaries that will be available to communities and other stakeholders through appropriate means. In addition, all documents and information on monitoring and verification results will be published on the VCS and CCB standards platforms. The monitoring plan and results will be published in Portuguese and eventually in English.

3.4 Optional Criterion: Climate Change Adaptation Benefits

Not applicable. This project does not aim to be validated for Gold Level on this section.

3.4.1 Regional Climate Change Scenarios (GL1.1)

Not applicable.

3.4.2 Climate Change Impacts (GL1.2)

Not applicable.

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

Not applicable.

4 COMMUNITY

4.1 Without-Project Community Scenario

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

The Western Amazon REDD+ Grouped Project includes 22 properties, 20 of which are distributed in the central-eastern part of the State of Acre and two properties in municipalities on the border with the southern state of Amazonas. In Acre, the municipalities in which the properties are distributed are: Bujari, Capixaba, Porto Acre, Senador Guiomard, Sena Madureira, Xapuri and in the state of Amazonas the municipalities are Boca do Acre and Lábrea.

The properties were divided into 10 blocks, that can also be understood as groups, according to the municipalities to which they belong and their owners. Figure 7 (Item 2.1.7) shows the properties belonging to each block, its owners, and municipalities where they are located. The communities influenced by the project are composed mainly by the residents and workers of the properties. The communities are made up of people who work in the various types of roles of the properties, from cattle racks, agriculture, administration and infrastructure. Part of these people work and reside in the properties, and part of the workers live in nearby villages.

This is a list of land settlements and important nature conservation units near the Project Area:

Land Settlements: PAD Pedro Peixoto, PA General Moreno Maia, PA Caquetá, PA Porto Alonso, PA Santo Antônio do Peixoto, PAE Remanso, PAE Riozinho, PA Espinhara I and II, PA Tupã, PDS Floresta.

Conservation Units: Resex Chico Mendes, Flona Macauã.

The project properties have terrestrial access, mostly paved highways and/or dirt roads. The communities use these land access to make monthly purchases in nearby cities, or to get to schools and health posts. Some rivers are used near the Project Area for artisanal fishing and leisure. Waterway use was not observed. Most of properties has proper physical structures, reasonably well-preserved forest area and extensive pasture areas. The boundaries are surrounded by other productive areas, in which property maintenance is visible. The main economic activity is livestock farming.

A survey of the main community demands was carried out by a team of experts who applied participatory methodology. Strengths, opportunities, weaknesses and threats were identified. As a result, a community map was created with areas of preserved forests, roads, pastures, corral, buildings, slaughterhouse, tractor garage, river and residences.

Figure 16. Elaboration of the Map of The Santo Nictheroy Farm carried out by the workshop participants

The community reported plenty of water on the property, good access, good relationship with the boss, dental apparatus existence and health support, in addition to housing, easy access to school and existence of fire combat structure. However, the residents reported the need for more specialized courses related to animal and machinery, in addition to activities focused on women. It was also reported the need to build extensions in the divisions. Some of the threats mentioned were the presence of hunters (unauthorized persons) and the existence of accidental fires.

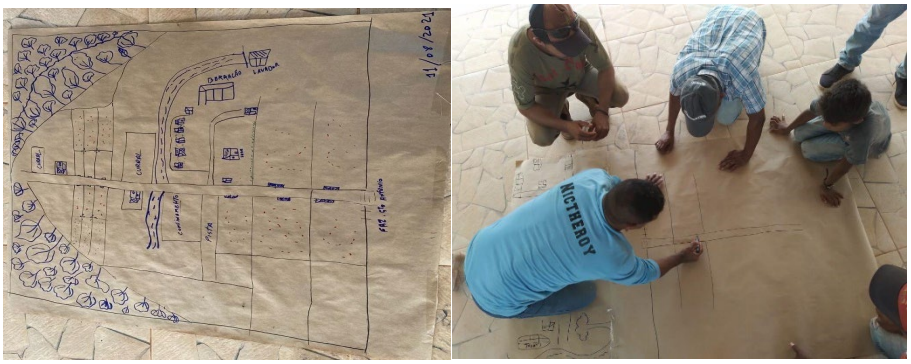


Figure 17. Elaboration of the Santo Antônio Farm Map carried out by the workshop participants

The people know about other possibilities of income generation in the forest, have good skills and show great concern with the surroundings and the forest preservation. Fruit plantations such as açaí and Brazil nut were identified in some of the properties. The people who live there enter the forest to collect their fruits, which are used for food and for small sales in the city.

The communities showed interest in addressing issues related to deforestation and climate change. Both the youngest as the oldest residents reported several significant changes that are occurring in relation to the climate, mainly due to deforestation increase each year in the region. They told in the past it was possible to plan everything according to the weather, now everything has changed, and the cyclical regimes of nature show differences in the region. The participants reported that the participatory methodology used to conduct the workshop contributed to a better understanding of carbon credit projects and the importance of the forest to their lives.

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

The interactions between the WARG Project's communities occur through the labor affinities between properties of the same owner. There are also interactions with community groups outside the properties, belonging to RESEX Chico Mendes, and some other groups within the Project Zone. These interactions will be further analyzed and monitored during the development of the project.

4.1.3 High Conservation Values (CM1.2)

Table 40. High Conservation Values for communities identified

High Conservation Value	The forest as a source of food
Qualifying Attribute	In the Project Area, a practice of harvesting foods such as Brazil nuts, açaí and essential oils from copaíba and andiroba trees was identified. Communities traditionally use the forest for small extractive activities that complement their food security. Nuts are widely used in the traditional Amazonian dishes. In addition, this non-timber forest product represents an income source to small producers and communities not involved with agriculture or during the offseason. It has importance to regional and national trade markets. The oils are extracted from the trees' trunks, and to collect it is necessary to pierce the trunk to the core, the inner part of the trunk is formed by dead cells in which no water is transported. This extractive is used for cosmetics, traditional medicine and herbal industry.
Focal Area	Communities inside and outside the WARG Project properties; RESEX Chico Mendes

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

The most likely without-project scenario is deforestation increase due to cattle-ranching and large-scale agriculture. This process in Amazon has been moving people from the region of the States of Rondônia, Mato Grosso, Pará and Acre to the south of Amazonas through the opening of new roads and logging followed by deforestation for the purpose of installing cattle farms. As a result of these migratory processes, many people from local communities (outside the properties like those of WARG Project) sell their land to new occupants and go way to cities, especially the young ones.

Within the Project Zone there is the occurrence of areas invaded by squatters, cattle raisers, miners, and land grabbers, causing great social disturbances and violence. The people from this communities fit into the timber and ranching model that promotes degradation and deforestation in the region, joining these practices, either as owners or workers. This mischaracterizes the way of life and land use of community model.

Therefore, the expected changes in welfare conditions and other characteristics of communities and community groups in the without-project land use scenario are negative. This project aims to encourage forest conservation with local people, within and outside the borders of WARG Project properties, with improvements in their living conditions. The project then sets out to combat climate change and protect the biodiversity in partnership with these people.

More information about this topic can be found in the Item 2.2 – Without-project Land Use Scenario and Additionality.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Community Group	Landowers
Impact(s)	• Aggregation of productive and environmental improvements with potential for financial increase on famrs.
Type of Benefit/Cost/Risk	• The impact is actual because part of the initiative to start a REDD project came from the landowners themselves. The signed contracts are the tangible instrument of this agreement. • The impact is predicted by the possibility of generating financial resources through the sale of credits, which will be converted into improvements in the farms. The impact is direct because the resources generated will be applied directly to the farms that own the project areas.The impact is beneficial because the inflow of financial resources can increase investments by landowners.
Change in Well-being	The WARG Project intends to bring about environmental improvements that can directly reflect on the production of farms and, consequently, bring more financial gains and productive investments aimed at low environmental impact, low carbon and optimization of the systems already implemented.

Community Group	Community
Impact(s)	• Improvement in the quality of work/employment • Access to information (Monthly reports and informational folders about REDD+ and the Project Area) • Resilience to adverse situations (better technical response to prevent and act in the event of forest fires)
Type of Benefit/Cost/Risk	• The impact is actual because most people in the communities are properties' employees. The improvements intended by the project will have a direct impact on their work activities. Having quality of work means greater income, well-being and engagement. The impact is direct because the communities will be directly involved in the activities' implementation. They will be active agents of the process. The impact is beneficial due to the potential to guarantee the permanence of people in the place. Changes in the relationship with the land and nature are also desired. • The impact is predicted because the project aims to share knowledge and build changes in thinking about nature over time. For this we will use folders, notes, notices and direct contact channels with communities. The impact is direct because information access strategies will not have intermediaries. They will be carried out by the proponent directly with the communities. The impact is beneficial because with information circulating locally, people can take ownership of the project, and can keep updated and may contribute to its continuity. • The impact is actual because fires annually threaten the Project Area, in addition to harming the health of local populations and biodiversity. The impact is direct because the communities will be directly involved with training. The impact is beneficial because it will build a culture of resilience in the face of adverse events such as fires.
Change in Well-being	The WARG Project intends to contribute to the establishment of a better relationship between landowner and employees; Changes and improvements in perception about the place of life and local nature can help a better land use; Gain of knowledge through the planned training courses can help mitigate negative internal impacts by the fire.

Community Group	Public or Private Agents

Impact(s)	• Establish the participation of local institutions in the objectives of conservation and protection of nature
Type of Benefit/Cost/Risk	• The impact is predicted because institutional partnerships are not yet formalized. The cooperation agreements will be made, especially with research institutions for the development of activities in the Project Area and surroundings aimed at data collection, monitoring and creation of scientific material on the project. The impact is indirect because institutions will not be involved in all project activities. The impact is beneficial due to the potential to generate knowledge and a scientific framework from a social and environmental point of view. Communities will also participate in the construction of this knowledge.
Change in Well-being	The possible funding of grants through the project; Infrastructure improvements of research and teaching institutions; Opportunity for local people to get involved with science; Improvements in local education in general on the communities.

Community Group	Partners (Managers and Project Representatives)
Impact(s)	• Improved decision-making capabilities on the Project Area • Benefits from nature conservation • Economic benefits through the commercialization of carbon credits
Type of Benefit/Cost/Risk	• The impact is actual because decision-making process based on the activities' dynamics is robust. It is based on the real needs of the properties. The fire brigade courses, the installation of signaling infrastructure, communication and training of communities will be important elements for the Project Area and surroundings management. The impact is direct because involves the communities directly on the process to generate data and information about the place. The impact is beneficial because the activities and people involved form the basis for good project management. They will be active agents at the cutting edge of decision-making process. • The impact is real because the investments and efforts to implement the project are fundamental for the forest protection and conservation of the. The impact is direct because the proponents will be directly impacted by the project's implementation. It is beneficial because the existence of the project and the involvement of local communities help the partners to improve the area management, considering the reduction of GHG emissions as part of their socioeconomic investment. • The impact is real because the project's implementation has as its main objective the generation of carbon credits. The impact is direct because the proponents and direct partners will benefit directly from this credits' sale. The impact is beneficial because the resources generated will have to be reinvested in improving the local quality of life of the WARG Project and in protecting biodiversity.
Change in Well-being	Improvement in the proponent's know-how in relation to the management to WARG Project area and future projects; Maintenance of local quality of life and guarantee of protection of biodiversity; Circulation of financial resources that can bring improvements to partners and locals.

4.2.2 Negative Community Impact Mitigation (CM2.2)

The mitigation of possible negative impacts will mainly be in relation to the people who use the Project Area for subsistence. Although most people in the community area salaried, they still use forest resources for cultural reasons. There are small wood harvests for small constructions, and hunting for food. Some of these practices will not be able to continue happening and this could generate minors' negative impacts on their way of life. As a mitigation measure, it is proposed to involve these people more actively in activities aimed at environmental education.

In this way, the necessary and designed measures to mitigate any negative impacts on the well-being of community groups and to maintain or improve HCV attributes related to community well-being will be taken in consultation with the community. These measures will be consistent with the precautionary

principle and will prioritize the neediest, most vulnerable communities and members with emergency demands.

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

All groups in the community will have net positive benefits from the with-project scenario. Improvements in education, job training and well-being will increase their life standards, which would not happen in the project's absence. The Western Amazon Grouped REDD+ Project plans to support various community activities to improve life standards through institutional partnership.

4.2.4 High Conservation Values Protected (CM2.4)

The HCV previously identified will not be negatively affected by the project.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

Potential positive impacts of the Western Amazon Grouped REDD+ Project to other stakeholders include, but are not limited to, the following impacts:

- Forest extension and low carbon agriculture training will also be offered to other stakeholders, promoting permanent crops with native species (fruit growing), such as açai, nuts, cocoa, guarana, etc.
- Knowledge and experience of the project will be discussed and disseminated during open workshops. There will also be a cultural exchange and with other stakeholders besides those identified in this project, considering their best practices, lessons learned, etc.
- The results of research and other project initiatives will be widely disseminated through digital media and social media with the whole society, in Portuguese and English.

Project proponents have identified the following potential negative impacts on other stakeholders as a result of the project:

- Generation of conflict in the surrounding areas not directly benefited by the project, whether due to envy or other causes, hurting external interests to the beneficiaries.
- Increased land cost in the region due to project implementation.
- Decrease in land value in case of impediment to road construction and access to markets on adjacent properties.
- Migration of people from outside the communities out of the Project Zone causing pressure on protected forest outside the project in its influence zone or vice versa.

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

There are several measures that can be taken to mitigate the potential negative impacts of the project on other stakeholders. There is a good relationship between the communities in the WARG Project properties and throughout the region. Any conflicts that may exist must be resolved through diplomatic and legal channels. Project proponents will closely monitor community benefits across their catchment area.

Young people and children from surrounding communities and from other locations will be able to attend the project's educational and training activities. Work opportunities will also be offered to people outside the project's zone, when necessary and justified.

Regarding the increase in the cost of the land, it is believed that the project will have less impact than the construction of other works and roads in the region that will certainly increase its value. The project will encourage conservation practices and guide landowners not to deforest or degrade the forest, but to use already open and degraded areas.

On the other hand, the project may have impacts on the depreciation of land values on neighboring properties due to limited access to markets and other facilities. The project is not intended to build roads that can pass through the property as this poses a risk to the integrity of the project. However, Project Proponents will engage adjacent landowners to promote other forest conservation projects that expand beyond the project boundaries. Maintaining forest cover, at the expense of building roads or establishing other large-scale cattle ranches, has positive benefits for the climate, community and biodiversity.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

The Western Amazon Grouped REDD+ Project is not expected to result in net negative impacts on other stakeholders. These stakeholders will also be identified, consulted, and allowed to participate in the project with the consent of the beneficiary communities and other direct project collaborators. Other communities will be able to participate in the project activities, as well as other actions to be developed related to climate and biodiversity monitoring.

4.4 Community Impact Monitoring

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

The monitoring for the first verified period will be developed by Harmonia Consultoria Socioambiental jointly with Carbon Credits Consulting Brazil. Future monitoring will be conducted by Carbon Credits Consulting Brazil together with other entities involved that are relevant to the field data collection procedure. The data generated in this current monitoring will be stored by Carbon Credits Consulting Brazil, while Harmonia Consultoria Socioambiental will be responsible for the collection and processing of field data for community and biodiversity monitoring of the WARG Project. Carbon Credits Consulting Brazil will be responsible for the collection and processing of weather data for the currently monitored period, necessary for VCS verification (item 3.3).

Data quality verification process and control of generated information will be carried out. Any non-conformities or failures found during the internal audit will be documented, communicated, and resolved within the time stipulated by the auditor.

Below are some processes that are part of the first monitoring report procedure:

1) Storage: Harmonia Consultoria Socioambiental is responsible for the first monitoring report, together with Carbon Credits Consulting Brazil, which will be responsible for future monitoring, and will also develop the forms for field data collection. The forms will be printed for data collections, then they will be scanned and photographed, ensuring multiple storage procedure. After scanning, they will be uploaded to the project database, which currently uses a Microsoft Onedrive account, where it will be stored online in cloud. All proponents have secure restricted access to this basis.

2) Data Management: Harmonia Consultoria Socioambiental will be responsible for managing field data collection operations, with guidance, impressions, distribution and digitization of the collected information. If people from the community are involved, training will be guaranteed for adequate collection of biodiversity data. The organization chart will be set later.

3) Procedures: Operational procedures will be created for field data collection. People involved in monitoring will be trained according to these procedures. Future monitoring is expected to follow the standards drawn in the current report to ensure comparable measures over the Project's lifetime.

4) Monitored communities: Communities within project properties, Project partners, government institutions involved.

5) Community Monitoring Plan: This monitoring plan is being developed based on the WARG Project's characteristics. The Project is a private initiative and executed in private areas where communities are part of the properties' employees list. These people have access to forest based on the rules of the landowners, considering that they are protected areas by law (legal reserve). Landowners are aware of the importance of these people's participation in forest conservation and reducing the deforestation risk. This reason justifies the involvement of property communities in monitoring. The local workshops already carried out helped in the characterization of this group of people (Socioeconomic Diagnosis), and they will be properly informed about the monitoring stage of the project.

Any other relevant stakeholders who have been identified in the local stakeholder consultation will be invited to participate in community monitoring to provide relevant data and information when necessary.

Regular monitoring of the project's impacts on communities will be carried out to identify the positives and negatives that the project may be bringing. Direct effects will be measured from information reported by the proponent Carbon Credits Consulting. Indirect effects will be evaluated through interviews with stakeholders and the community.

A basic questionnaire will be created to collect information that will be applied to the direct beneficiaries of the WARG project. This stage includes people who have been employed by the project, participants in local workshops, courses and people who support any other activities. It is intended that this monitoring be carried out over a 2-year interval. Community monitoring aims to identify some points:

- What changes as communities observed after the project begins?
- What changes they believe were brought by the project?
- What changes made by the project were positive or negative for them?
- Do they believe that the changes brought about by the project will continue for longer?

Monitored direct impacts: Below is a list of some variables that will be monitored, types of measurements, sampling, and frequency:

Table 41. Variables of direct impact to be monitored

Project Activity	Indicator	Unit	Method	Frequency
Communication	Installed internet towers / people with internet access	Number of installed towers and people accessing the internet	Visit to installation sites / Photographic record / Questionnaire with people	Once a year
Fire prevention	Perception of the increase or reduction of fires in the communities / Official data	Number of people who noticed improvement of worsening in air quality and fire outbreaks / Number of	Questionnaire application / Data analysis with GIS	Once a year

	on the reduction or increase of fires	fire outbreaks collected by remote sensing		
Land tenure regularization	Lands participating in the project under some land tenure process / Parts of land that were assigned or had a use agreement established between owner and community	Number of properties and hectares that were regularized or had land transfers / Number of people who received land or signed use agreements with the owner	Application of questionnaires and interviews / Consultation with the bases of the official land institution	During each verification event
Mitigation of human-wildlife conflict	Animals and/or communities that have been affected by the presence of wild animals in the vicinity	Number of wild animals observed by the community / Number of livestock or other animals that were affected	Application of questionnaires / Visits to protection improvements / Collection of data on cattle that were affected	Every six months
Patrol and Surveillance	People involved in patrols (including female audience)	Number of people involved in the patrol teams directly	Collection of data and information about people and contractual documents	Once a year
Signalization	Information boards about the project / Suggestion boxes	Number of boards and boxes installed	Visit to installation sites and counting	During each verification event
Training and Qualification	Community courses and training	Number of courses and people involved	Gathering data about the courses and people	Every six months

6) Monitored indirect impacts: Indirect impacts will be monitored through interviews with the community and other stakeholders involved in the project. The interviewees answered a semi-structured questionnaire to collect perceptions, feedbacks and suggestions. This step will be performed at each project verification event. The following items will be evaluated as indirect impacts:

Table 42. Indirect impacts to be monitored

Indirect impact	Unit
Involvement with the Project	Overall number of people involved
Gender of people	Female / Male / Other
Age group	Age
Education	What is the highest level of education
Children in the family	Number of children and age
Workers	What kind of work and how many people work
Family Monthly income	Amount of family income per month
Access to basic services	Quantity and what basic services the family has

4.4.2 Monitoring Plan Dissemination (CM4.3)

The community monitoring plan will be made available and disseminated to the community member and other stakeholders through the project´s internet website and by means of Verra platform. Annual summaries of the community monitoring and results will also be disseminated through biennial workshops of the management staff (including the community representatives) and open events and public consultation process. Digital files of the community monitoring will be transparently made available to community members, institutions, and authorities. Printed version of the monitoring plan will made available under request. Other communication ways, such as radio programs, social networks, etc. will be used for this purpose.

4.5 Optional Criterion: Exceptional Community Benefits

This project is not seeking the generate a gold level for exceptional community benefits.

4.5.1 Exceptional Community Criteria (GL2.1)

This project is not seeking the generate a gold level for exceptional community benefits.

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

This project is not seeking the generate a gold level for exceptional community benefits.

4.5.3 Community Participation Risks (GL2.3)

This project is not seeking the generate a gold level for exceptional community benefits.

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

This project is not seeking the generate a gold level for exceptional community benefits.

4.5.5 Net Impacts on Women (GL2.5)

This project is not seeking the generate a gold level for exceptional community benefits.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

This project is not seeking the generate a gold level for exceptional community benefits.

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

This project is not seeking the generate a gold level for exceptional community benefits.

4.5.8 Governance and Implementation Structures (GL2.8)

This project is not seeking the generate a gold level for exceptional community benefits.

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

This project is not seeking the generate a gold level for exceptional community benefits.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The Western Amazon REDD+ Grouped Project is a conservation initiative proposed by Carbon Credits Consulting and partners to reduce greenhouse gas emissions from unplanned deforestation, in a set of 22 private rural properties located in the states of Acre and Amazonas, distributed in 9 municipalities. The properties included in the project are in the eastern region of Acre State and southern of Amazonas State. They are easily accessible from the capital Rio Branco and close to highways and roads. The total area covered by tropical forest in this group of properties is 59,959 hectares.

The State of Acre and Southern Amazonas were chosen to propose this project because of high deforestation rates observed by several studies. Deforestation drivers, mainly cattle-ranching, have been acting very intensively in this region, which fuels deforestation rates in near future and bring about biodiversity impacts. Although still preserving most of its forested area, especially the state-owned forests,

intense fragmentation of the original landscape is observed in private lands, especially along the roadsides. Logging is also an important drive to deforestation and forest degradation in those areas.

The project aims to contribute to the reduction of deforestation and forest degradation in the region by developing activities to protect the forest against logging and cattle-ranching. Such activities are proposed to mitigate the impacts of human activity on biodiversity while ensuring well-being of local communities through the REDD+ mechanism (Reducing Emissions from Deforestation and Degradation, plus Sustainable Management of Forests and the Conservation and Enhancement of Forest Carbon Stocks). This project is a private business and carbon credits to be generated will provide funding to the landowners invest in forest protection and preserve biodiversity.

Thus, the main challenge is the implementation of a project in private areas, aiming at the integration of extensive farming activities with the commercialization of carbon credits for environmental services. It is also worth considering that the development of other practices aimed at transitioning from the traditional production mode to low-carbon production technologies, such as the possible implementation of integrated farming, livestock, and forestry, may also be incorporated throughout the project.

Acre and Amazonas States have a welcoming environment for developing REDD+ projects, as they have been advancing in the construction of a low-carbon development model, which encompasses the jurisdictional REDD+ program and other legal framework (e.g., Law nº 308/2010 that creates the SISA). Acre has established deforestation reduction targets by 80% based on the average annual rate of 602 km²/year for the 1996-2005 period (Acre 2010 PPCD/AC, Brazil 2010 Decree 7390 PNMC), as well as it presents specific norms to regulate REDD+ mechanisms.

This project's Reference Region has 5.408.270 hectares of total area, of which 804.277 ha are federal and state legally protected areas. Yet, 126.668 ha of indigenous lands besides being home to traditional populations, also contribute to the protection of biological diversity in a regional scale. In these protected lands, biodiversity is well conserved, given the low degree of human intervention so far. There is a great number of threatened/endangered and endemic species (and their habitats) sheltered by this network of public areas designed to protect the region's environmental and sociocultural attributes.

While there is a large area protected by law, there is an even larger area of private land that permeates and borders the protected areas. In these lands, the owners' focus is on developing livestock and agricultural production activities to make their properties economically feasible once no public resources are readily available to promote conservation on private forestland.

The most practiced activities are logging and cattle-ranching. Both processes can lead to complete forest clearing (deforestation for pasture opening) or forest degradation (timber extraction). It is allowed by law to deforest up to 20% of the property area and to practice selective logging on the remaining 80% of the forest. It is very common to use fire in these activities to reduce woody debris and facilitate mechanized operations in pasture or crop. Fire is also used to renew the pasture when grass-fields loose productivity along the years.

In addition to these legal activities, there are many illegal ones that escape from state control and private owners' surveillance. Both legal and especially the illegal activities lead to a picture of great impact on local and regional biodiversity.

Several rare and centuries-old tree species are simply felled down, generally without applying any forestry technics, removed from the land, and sold out to some sawmill provider (called toreiros in the region). Some woody debris may remain on the deforested land. Roots may or not be removed, depending

on the owner's financial conditions. Almost all flora biodiversity is quickly lost, and fauna is driven away to adjacent areas not yet degraded or deforested.

The impacts on biodiversity are severe once all the local fauna and flora are immediately replaced by exotic grasses, usually *Brachiaria* spp., and cattle. Intensive livestock producers supply beef to local slaughterhouses that process the product and sell it to the domestic and external markets. Brazil is one of the world's largest beef exporters.

Fauna Biodiversity

An inventory carried out in the region demonstrated that the study region has a very diverse fauna. The study compiled 329 animal species occurring in the study area, of which: 66 mammals, 163 birds, 28 reptiles, 27 amphibians and 45 fishes.

In Acre state, the Economic-Ecological Zoning revealed that there are many areas that have not yet been investigated and that most information on fauna comes from studies carried out in Conservation Units and Indigenous Lands (Acre, 2007). Despite this, mammals were recognized as the group for which more information is available (Acre, 2007) and that almost half of the mammal species in Brazil, about 40%, are found in the region. When compared on a global scale, it reaches 5% of total mammal species in the world (ICMBIO/MMA, 2007)

In a more conservative species richness assessment of the Humaitá National Forest (FLONA), that combined solid secondary data obtained from two studies in adjacent study areas, one in the Marmelos River region (Melo, 2005) and another in the National Park of Campos Amazônicos (Abade et al., 2009), it was listed 49 species of medium and large mammals in the FLONA, which is an important public forest protection reserve.

In an analysis carried out by the Médio Purus Extractive Reserve Management Plan, for mammals it was listed 41 species of medium and large mammals in the region, which includes areas of two interfluves domain (Purus-Madeira and Purus-Juruá), which allows a particularly high potential richness of medium and large mammals in the reserve. The highlighted species were the following: a. Giant otter (*Pteronura brasiliensis)*: top predator and indicator of high quality of aquatic ecosystems and excellent fish stock base; b. Jaguar and Puma (*Panthera onca* and *Puma concolor*), for being top predators in terrestrial ecosystems, with large areas of use, whose presence indicates the existence of a prey base. Although the area is under strong human pressure, this presence indicates that the disturbances may only be local and that initiatives for the natural resources sustainable use can reverse possible situations of faunal rarefaction, caused, for example, by subsistence hunting.

In other protected areas in Acre, the mammal surveys provided the following results: 39 species of terrestrial mammals and two aquatic species (cetaceans) in the Chandless State Park (Acre, 2010); 43 species at Rio Acre Ecological Station; and 45 species in the Serra do Divisor National Park (SOS Amazônia/IBAMA/TNC, 1998) (ICMBIO/MMA, 2010).

The medium and large mammal species of the Mapinguari National Park were mainly associated with upland forests, composing varied terrestrial and arboreal assemblages. The savannah enclaves contributed to an open area's exclusive species occurrence, the Pampas Deer (*Ozotoceros bezoarticus*). No other species characterized the grasslands during the cruising. Although primates were not noticed the fields themselves, they occur in the forests interspersed with the savannas, a fact that contributed to the richness found in lands dominated by the fields. The area's large size and the mosaic of habitats make the Mapinguari National Park one of the most diverse Conservation Unit among all those sampled in the Purus-Madeira Interfluve Region (ICMBIO/MMA, 2018).

The fauna of the investigated fields to the UC's north may be suffering the influence of the BR-230 (Humaitá – Lábrea) road, which materializes in the form of a branch that enters the Mapinguari PN, representing a direct route for hunters and vehicle movement.

It was observed that 12 of the species surveyed in the Macuã and São Francisco FLONAs region appear on the endangered specimens list (IBAMA, 2008), among them the Giant Anteater (*Myrmecophaga tridactyla*); Giant Armadillo (*Priodontes maximus*); Bush Dog (*Speothos venaticus*), Giant Otter (*Pteronura brasiliensis*), Goeldi's Monkey (*Callimico goeldi*), Margay (*Leopardus wiedii*); Puma (*Puma concolor*); Jaguar (*Panthera onca*); Amazon River Dolphin (*Inia geoffrensis*); Tucuxi Dolphin (*Sotalia fluviatilis*) (ICMBIO/MMA, 2016).

Birds constitute one of the best-known faunal groups in the tropics (*e.g.,* Stotz et al. 1996) and present a very high diversity in the Amazon region (SICK, 1997), with about 1,000 species catalogued (Oren 2001 apud Antunes, 2010). Furthermore, they provide a notable exception to most vertebrates, as they meet strict multiple criteria to act as effective biological indicators (Bibby 1999; Carignan & Villard 2002). In this way, they become an excellent focus group for studies on environmental changes.

Regarding avifauna, in the UC there was a record of 99 species, however, there is a potential of 323 species in total. Three threatened species were recorded during the surveys: Red-billed Toucan (*Ramphastos tucanus*), considered vulnerable by the IUCN list but not by the Brazilian list, Channel-billed Toucan (*Ramphastos vitellinus*), considered vulnerable by the IUCN list but not by the Brazilian list, and Madeira Parakeet (*Pyrrhura snethlageae*), considered vulnerable by the IUCN list but not by the Brazilian list (ICMBio/MMA, 2020).

Amphibians and reptiles are the most threatened group of terrestrial vertebrates (Stuart et al., 2008) due to their sensitivity to environmental disturbances. In addition to being important indicators, they play a fundamental role in controlling populations of various invertebrates.

Despite the current deforestation rate (Laurance and Williamson, 2001) and the high endemism of the Amazon Forest Domain (Ab'Saber, 1970), this ecosystem is still poorly represented in faunal surveys. According to Azevedo-Ramos et al. (2011, apud Antunes 2010), the Amazon has 163 anuran amphibian species and 550 reptile species (Vogt et al., 2001 apud Antunes 2010).

Regarding herpetofauna, 63 species of amphibians and 36 of reptiles were recorded, where the taxa of greatest interest for conservation now are the Wall-Gecko (*Hemidactylus mabouia*), because it is synanthropic and introduced and the species real effect is not known. As to natural environments' species, the remarkable ones for conservation are: Spectacled Caiman (*Caiman crocodilus*), Black Caiman (*Melanosuchus niger*), South American River Turtle (*Podocnemis expansa*), Six-tubercled Amazon River Turtle (*Podocnemis sextuberculata*), Yellow-spotted River Turtle (*Podocnemis unifilis*), for being hunted and consumed by humans and, these last three, for being almost threatened of extinction (see MMA, 2015a and IUCN, 2015). Also, the newly discovered frog *Pristimantis reichlei* is classified as DD "insufficient data" in the list of threatened species in Brazil (MMA, 2015b).

Of all the vertebrates in the Amazon, fish form the most diverse group, with estimates of more than 3,000 species, about 75% of all freshwater species in South America (Barthem and Goulding, 2007 apud Antunes, 2010; Santos et al., 2008 apud Antunes, 2010). Fish are also the most economically important group, whether for the subsistence of riverside communities, as they are the main protein source, and one of the most important sources of income. It is important to note that in the Amazon, per capita fish consumption is one of the highest in the world, around 400 to 600 g per day (Santos et al., 2008 apud ANTUNES, 2010). However, only 20 species are responsible for 80% of all fisheries production in the

Amazon, which is estimated at 217 thousand tons per year (Santos et al. 2008 apud Antunes, 2010). Among these species are jaraqui, pacu, curimatã, matrinxã, arowana, tambaqui, pirarucu, sardine, surubim, etc.

In the Humaitá Flona, collections were carried out in Natural Landscape Units 3 and 11. The seven fish collection sections sampled the Maici Mirim rivers and two tributaries sub-basins (Igarapé Escondido and Igarapé Azul) and Madeira River in the Salomão hole. The fish inventory resulted from the gathering of all records of fish species obtained for the area together with the results obtained in the field. The activities were carried out in 58 stretches of the 11 UCs of the Purus-Madeira Interfluve, comprising 57 stretches of collection and records of fish in the rivers Açuã, Coti, Endimari, Iquiri, Ipixuna, Mucuim, Veloso, Jacinto, Muriri, Maici Mirim, Ituxi, Punicici, Purus, Madeira, Hat Complex Lakes, Capanã Lake. A total of 415 individuals belonging to 5 orders, 23 families, 59 genera and 72 species were collected. Representatives of the Characiformes Order make up 52% of the richness and 44% of the abundance and of the Siluriformes Order, 45% of the richness and 38% of the abundance of the recorded fish. (ICMBIO/MMA, 2018)

For the Mapinguari National Park fish group, the UPNs sampled were 3, 12, 13 and 14, the latter UPN was only sampled in this UC area. The area corresponding to the park's UPN corresponds to 55.73% of representation for the Purus-Madeira Interfluve region. Fish were collected in 12 stretches, in three support bases and in the hydrographic sub-basins of the Coti, Mucuim, Au rivers. In all, 2,417 specimens of fish were collected, belonging to 6 (six) orders, 24 families, 62 genera and 95 species, 48% of which are Characiformes, 24% Siluriformes, 10% Perciformes and 18% belong to the Beloniformes, Cyprinodontiformes and Gymnotiformes orders, following the pattern observed for the Amazon region and the results obtained by Arrolho & Rosa (2010) in a survey carried out in 38 water bodies of the Purus-Madeira Interfluve. Of the Mapinguari National Park total species number, 63 have a wide distribution within the Amazon region, 26 are classified as endemic and one species - needlefish *Potamorrhaphis guianensis* indicator of areas with good environmental quality (ICMBIO/MMA, 2018).

According to the CITES list (2010), which considers the species' international conservation status, the Yellow-spotted River Turtle (*Podocnemis unifilis*), the South American River Turtle (*Podocnemis expansa*), the Spectacled and Black caimans (*Caiman crocodilus* and *Melanosuchus niger*) and the Red-tailed Boa (*Boa constrictor*). The genus Eunectes comprises four species of anacondas, of which three occur in Brazil (TIGR, 2009) and are also on the CITES list (2010). The Orinoco Goose (*Neochen jubata*) is cited as a widely distributed species, but with a rare and localized occurrence. Nine recorded species of birds are among the list of Amazonian species of restricted distribution: Speckled Chachalaca (*Ortalis guttata*), White-winged Trumpeter (*Psophia leucoptera*), Dusky-headed Parakeet (*Aratinga weddellii*), Cobalt-winged Parakeet (*Brotogeris cyanoptera*), Tui Parakeet (*Brotogeris sanctithomae*), Southern Festive Amazon (*Amazona festiva*), Purus Jacamar (*Galbalcyrhynchus purusianus*), Semicollared Puffbird (*Malacoptila semicincta*) and Lemon-throated Barbet (*Eubucco richardsoni*) (Oren, 2001).

The presence of endangered species of aquatic mammals and reptiles and of overexploited fish corroborates the fauna studies shown in a scientific event held in Macapá, in which the Purus River region was considered extremely important for mammals and of very high importance for the aquatic biota. It is noted that, although the richness of local species has been underestimated, the region has a diverse fauna of evident biological relevance. Therefore, it is expected that with the deepening of studies and the realization of new biological inventories, the Reserves importance in the region for the protection of biodiversity will be proven. A great faunal potential is observed in the study area, both due to the species number and the existence of substantial populations, even of heavily hunted species, such as Lowland Tapir and White-lipped Peccary. This fact indicates the region's importance for the maintenance of human populations that use natural resources with traditional and low-impact practices (ICMBio/MMA, 2010).

Umbrella species are those that have a wide range of life, that is, their habitats are areas that cover a larger region and consequently protect other species that also co-inhabit that habitat. For this, they are considered bio-indicators when there is a need for planning and monitoring fauna for conservation. In addition, there are also flagship species that, in turn, are chosen to become symbols of conservation campaigns. Studies also point to the choice of fauna symbol species, those that have a closer relationship with the population, such as those that are part of the usual menu or have some involvement in the local economy. And finally, those that are, to some degree, threatened of extinction.

An enormous biodiversity can be observed in the project region, so three species were selected as symbol fauna to represent the project. The Jaguar (*Panthera onca*) represents its conservation value for the terrestrial fauna, the Yellow-spotted River Turtle (*Podocnemis unifilis*) for the aquatic fauna and the Harpy Eagle (*Harpia harpyja*) for the bird fauna, as indicated in the images below:

Jaguar (Panthera onca) Photo: WWF/AFP

Yellow-spotted River Turtle (Podecnemis unifilis) Photo: ICMBio/Rafael Balestra

Harpy Eagle (Harpia harpyia) Photo: Nicoli Chepe

Figure 18. Key fauna species in the WARG Project's areas

Flora Biodiversity

There are different ways to obtain data on plant diversity in the Amazon: through inventories, flora checklists, samples in herbariums and taxonomic literature. However, its use is limited by different factors that range from the variety of methodologies applied in data collection, mainly in relation to plots' size and shape and the sampling criteria for specimens' inclusion (Nelson and Oliveira 2001), as well as the low herbaria species representation (Martins-da-Silva and Ferreira 1998; Santos et al. 2000; Yoshida et al. 2001).

According to the ZEE-Acre itself, even considering the great botanical collection effort carried out between 1999 and 2006, which formed a database with approximately 24 thousand collections, it would still take 50 more years of research to obtain the Density Index of Collection (IDC) of 16 collections for/100 km². Contrary to the time that science needs to obtain accurate answers, there is an advance in deforestation and degradation of tropical forests, which represent up to 20% of greenhouse gas emissions annually.

Thus, one of the most relevant and practical ways to assess the pressures on the main forest species that are threatened in the project region is to assess their commercial flow through the local timber industry. Among the best ways to understand the main forest species endangered by economic vectors and their strategic importance in REDD+ actions development, is to analyze the DOF system database of the Brazilian Government. The entire DOF database and reports until 2017 are made available on the

IBAMA portal for consultations and analyses, and after this period only general data regarding the Forest Management Plans-PMFS and Annual Operational Plans-POA's licensed are available in the states.

The WARG Project's territory relevance is highlighted once it aims to protect a great number of wood species traded as timber. According to official data, from the total 274 timber forest species traded between 2015 and 2017, 173 (63%) were sold within the project's territory. Added the number of 35,110 DOFs issued, what in practical terms means more than 35,000 truckload trips between forest areas and the industry, demonstrates the data robustness to evaluate the list of Flora species with greater relevance in the project region.

Native species timber enterprises have the greatest capacity to manage and commercialize the Amazon's biodiversity, as the species declared in the DOF system diversity for the territory prove. Of this universe of species commercialized in the project territory, only 23 corresponded to approximately 75% of the total volume commercialized in the territory and more than 23 thousand DOF's issued, being this the main list of Flora species that deserve special attention in the project region.

By adding another 10% of the total volume, we obtain 37 Flora species with a high economic share in the territory, and which also deserve attention. The rest of the 137 economic species of Flora commercialized contribute with only 25% of the volumetric movement in the territory.

Analyzing the set of the 37 main species that suffer from exploitation pressures, we note that 16 of those (43%) are classified as high value woods in the timber market, as they are considered noble or red and represent 49% of the volume sold within the territory.

According to DOF records, three wood species represented more than 30% of the region's exploited volume, being therefore chosen as priorities for this project, namely: *Dipteyx odorata* (cumaru-ferro), *Ceiba pentandra* (samaúma), and *Apuleia leiocarpa* (garapeira). These species will be the key flora species to be researched and protected by the project Figure 19.

A relevant and worrying fact for the Flora component in the territory is the long-term sustainability of these resources. It is well known that currently the most sustainable way to obtain Amazonian native flora species is through the elaboration of Sustainable Forest Management Plans (PMFS). Analyzing the PMFS licensed in Acre and cutting to the project's region, as shown in the table below, we observe that the territory corresponds to only 19% of the state's PMFS supply, while it represents more than 38% of the state's raw material. This data is a very relevant indicator that points out that such supply is coming from the conversion of land use, which generates an alarm for the conservation of Flora in the project region.

Cumaru-ferra (Dipteryx odorata) Photo: Timbermu

Sumaúma (Ceiba pentandra) Photo: Portal Amazônia

Garapeira (Apuleia leiocarpa) Photo: Martin Molz

Figure 19. Key flora species in the WARG Project's areas.

Threats to Biodiversity

The increase in deforested areas in Acre and southern Amazonas States to cattle-ranching (and to a lesser extent to seasonal crops) takes place mainly along larger roads and on riverbanks. The growing anthropic perturbation of nature resulting from the agricultural frontier's expansion leads to a landscape of forest fragmentation and the formation of extensive areas of secondary forests with low diversity and dominated by opportunistic species. The picture is even more drastic when fire is used, which favors ruderal species that hinder the natural regeneration of more ecological advanced species in the succession. The forest resilience to the impacts is diminished when the regional forested matrix (which is the source of propagules) is also lost and fire or chemical products (pesticides) are used to pasture management, preventing natural regeneration.

Baseline Scenario

Thus, in summary, in the current baseline scenario, irreparable losses to biodiversity are noticed as a result of the following processes:

1) Biodiversity reduction by converting the forest with hundreds of species of tropical fauna and flora to an agroecosystem composed essentially of pasture and cattle.
2) Indiscriminate use of fire that destroys unique plant species and scares away fauna, also promoting losses in soil biota.
3) Edge effect due to increasing forest fragmentation, harming gene flow, migration, and species reproduction.
4) Genetic erosion caused by intense noble wood species extraction, which generally take centuries to become able to log. Therefore, there is an irreparable biodiversity loss at the genetic level.
5) The conversion of undisturbed primary forests into secondary forests with a high concentration of opportunistic and ruderal colonizing species affects the regeneration of climatic plant species and reduces the supply of food and shelter to fauna, severely affecting the food chain. Fauna reproduction is also severely affected, which leads to population reduction, especially at the top of the food chain.
6) The conversion of forests to pastures and secondary vegetation also promotes the unwanted dispersion of invasive species, some of which are exotic to the ecosystem. This causes biological contamination that also has negative impacts on native biodiversity.
7) The application of pesticides to control invasive plants in pastures and agricultural areas contaminates water sources and the soil, impacting ichthyofauna, herpetofauna, and aquatic mammals.
8) Combined with logging and agricultural activities, predatory animal capture, hunting and fishing on these properties and their surroundings, significantly reduce populations of various elements of fauna.
9) The opening of roads and accesses for logging activities and pastures establishment encourage other legal and illegal activities spread in the region, e.g., mining (gold and other minerals). Mining has a high impact on the soil, contaminates water bodies with mercury, and chases fauna away.

10) In addition to damaging the biodiversity, deforestation and forest degradation activities on properties cause damage to protected areas, whether by their invasion, illegal logging, uncontrolled spread of fire, etc.

The WARG Project proposes to change these existing conditions by promoting forest conservation and avoiding conversion of the natural ecosystem to pasture and crop (deforestation) and other degrading and carbon-intensive land uses.

5.1.2 High Conservation Values (B1.2)

In the WARG Project's Area and its Reference Region, High Conservation Values (HCV) in relation to biodiversity can be recognized. High Conservation Values are those which are biological, ecological, social, or cultural values considered outstandingly significant at regional, national, or global level.

The Brazilian Ministry of Environment published the priority areas to conservation (PAC) map to each biome (MMA, 2018). The WARG Project is officially situated in the Amazonia Biome, whose PAC can be seen in Figure 20. The map demonstrates the existence of extraordinarily important areas in terms of biological relevance and, consequently, classified as very high to extremely high priority for conservation actions. These can be considered HCV for this project.

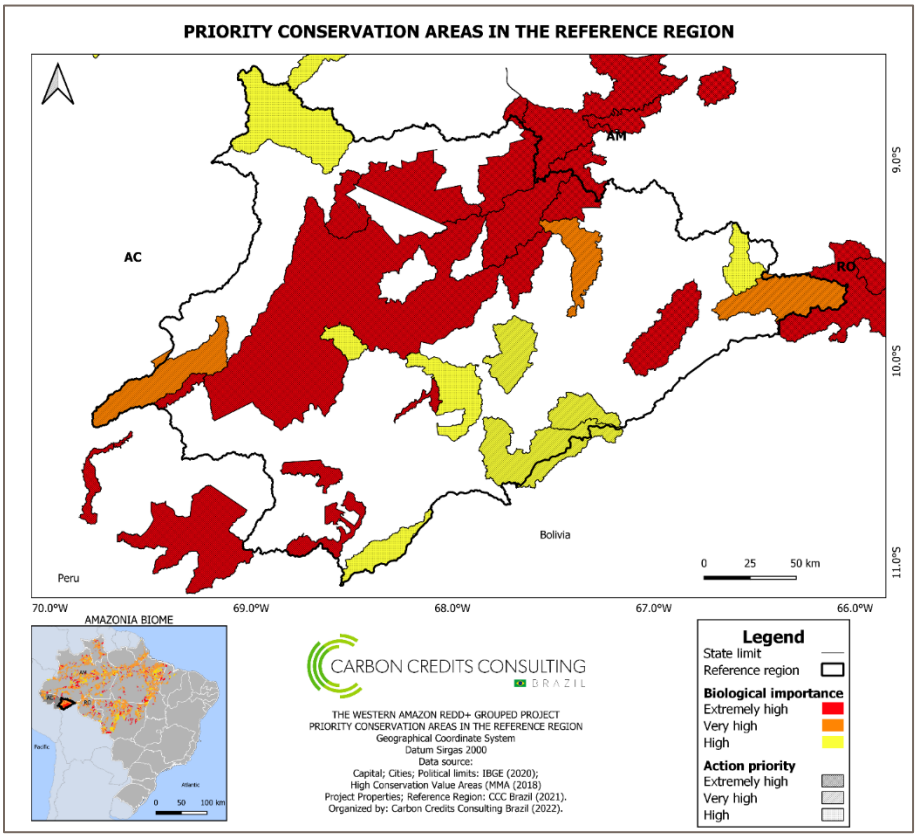


Figure 20. Priority Conservation Areas of the Amazonia Biome

In addition, seven UCs located in the region can also be considered as HCV of the WARG Project, as seen in Figure 20.

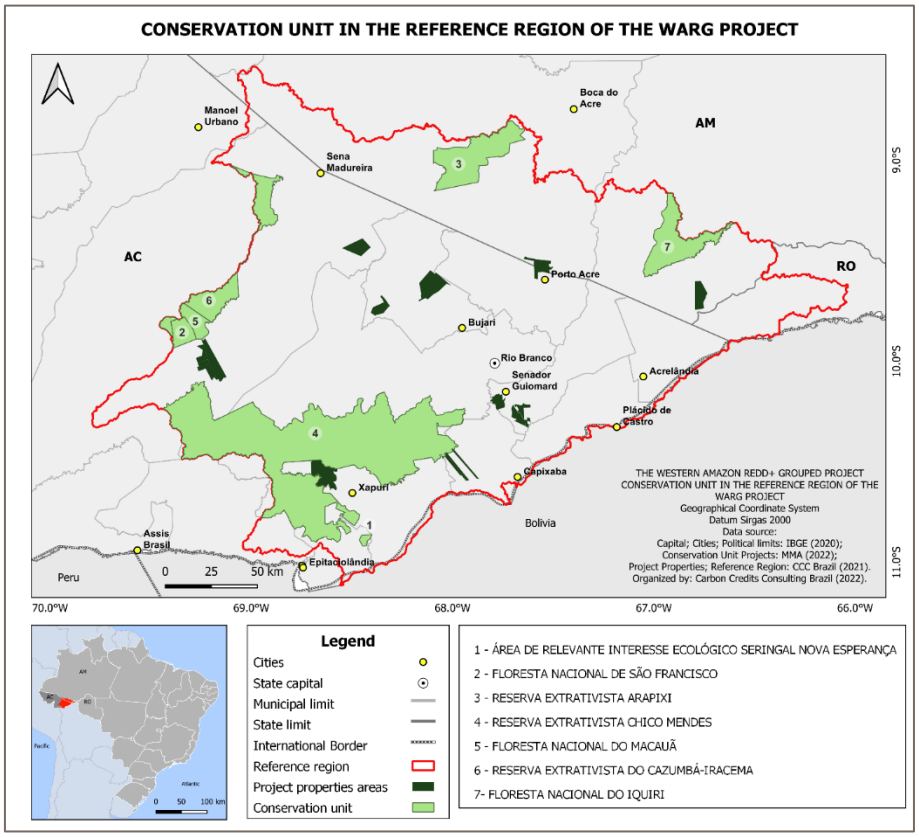


Figure 21. HVC identified in the Reference Region of the WARG Project
Notes: Self-elaborated map using official cartographic sources cited in References.

In this section, some specific HCV related to WARG Project's biodiversity will be cited, with special emphasis on protected areas, endangered, rare, and endemic species, as well as large landscape-level areas where species populations occur in natural patterns of distribution and abundance. Table 43 provides a list of various HCVs previously identified in the Project Areas and their influence zone.

Table 43. Biodiversity HCV associated to the WARG Project

1) High Conservation Value Category	Officially Protected Areas (Conservation Units) and connecting forest fragments linking the Project Area units to them.
Qualifying Attribute	The WARG Project aims to contribute effectively to the maintenance of a large-sized tract of undisturbed primary forests in Acre and Southern Amazonas States. The area is on private properties surrounded by a mosaic of state conservation units (UCs). The Project Area is located on a region considered of very high to extreme priority to forest conservation by the Brazilian Federal Government. The WARG Project adds 62,447 hectares of well conserved forests connecting these large tracts of undisturbed forests represented by the UCs. The purpose of this HCV is to provide a better genic flux, favorable conditions to fauna migration, and other ecological benefits to biodiversity.
Focal Area	Borders and forest fragments connecting the Project Areas and the UCs.

2) High Conservation Value Category	Flora Threatened / Endangered / Endemic Species

Qualifying Attribute	Various flora species occurring in the project's region listed by the International Union for Conservation of Nature (IUCN) are potentially threatened / endangered, with some of them being endemic. The WARG Project will identify and propose measures to protect them. Some trees species heavily logged and used as sawn timber in the region will be focused: *Dipteryx odorata* (cumaru-ferro), *Ceiba pentandra* (samaúma) and *Apuleia leiocarpa*.
Focal Area	Throughout the Project Area, particularly where significant populations of those species occur.

3) High Conservation Value Category	Fauna Endangered Species
Qualifying Attribute	Many fauna species occurring in the project's region listed by the International Union for Conservation of Nature (IUCN) are potentially threatened/endangered, with some of them being endemic. The WARG Project will identify and propose measures to protect them. Three animal species will be focused, once they are good ecological indicators as they are on the top food chain: the Jaguar (*Panthera onca*) represents its conservation value for the terrestrial fauna, the Yellow-spotted River Turtle (*Podocnemis unifilis*) for the aquatic fauna and the Harpy Eagle (*Harpia harpyja*) for bird fauna.
Focal Area	Throughout the Project Area, particularly where significant populations of those species occur, along the riverbanks and water streams.

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

The most likely without-project scenario is the conversion of the biodiverse tropical forest ecosystem in pasture for extensive cattle-ranching in which only a few exotic grasses (usually *Brachiaria* genus) replace hundreds of indigenous species. Besides this drastic land cover and land use change, all associated fauna and other life-forms are driven away to remaining adjacent forest areas. Fire is often used to clean the land after valuable timber species logging and others clearcut. Therefore, what happens is a complete replacement of the rich natural ecosystem biological diversity to a poor grassland. The WARG Project has been designed to change this status quo and protect biodiversity while reducing emissions from deforestation and forest degradation.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

The WARG Project will avoid conversion of the biodiverse tropical forest to anthropogenic vegetation in equilibrium (such as pasture, agriculture, and others). The forest will be protected, and deforestation will not take place in the Project Area, contributing to reduce deforestation and forest degradation in the Reference Region as well, which are the aims of a REDD+ activity.

The main expected biodiversity changes and the corresponding justification are listed in Table 44, as follows:

Table 44. Expected biodiversity changes of the WARG Project

Biodiversity Element	Biodiversity in general and environmental education.
Estimated Change	The WARG Project will promote environmental education to the community. Environmental education contributes to reduce deforestation, forest degradation and biodiversity conservation. Researchers and other professionals will be invited to give lessons on biodiversity conservation to children, youth, and the community leadership, and dialogue with them on how to better protect biodiversity. The idea is to demonstrate that biodiversity is important to forest survival and to human being and avoid deforestation and forest degradation.

Justification of Change	A drive of deforestation and forest degradation is the lack of environmental education and understanding of biodiversity benefits. The project aims to bring people from the local community closer to the forest and its biodiversity. The establishment of partnerships with local research centers will promote environmental education to local people. The idea is to demonstrate that biodiversity is important to forest survival and to human being.

Biodiversity Element	Fauna hunted for food: mammals, birds, and fishes.
Estimated Change	The WARG Project foresees to carry out some important measures to reduce threat to animal biodiversity due to unsustainable hunting and fishing. These measures include environmental education, training, and access to other protein/food sources.
Justification of Change	Hunting and unsustainable fishing may cause decrease of mammals, birds, and fish populations with remarkable impacts on biodiversity. The WARG Project will adopt measures to improve food security by the local community and reduce pressure on traditionally hunted and fished fauna. Some of examples of commonly hunted and overfished species are: 1) the Brazilian tapir (anta, *Tapirus terrestris*), 2) paca (*Cuniculus paca*), 3) capybara (capivara, *Hydrochoerus hydrochaeris*); 4) Mutum (*Crax spp.* or *Mutu spp.*), 5) Giant Amazonian fish (pirarucu, *Arapaima gigas*), 6) Tracajá turtle (*Podocnemis unifilis*), among others. These species are very important to biodiversity and trophic chain and should be protected by the WARG Project.

Biodiversity Element	Flora: large-sized climax highly valuable timber trees
Estimated Change	Avoiding genetic erosion. Avoiding reduced pollination agents, collapse, and dieback.
Justification of Change	Some highly valuable timber trees are logged over in the region, causing genetic erosion because the best specimens are felled down to sawmills. Various species also occur in a low density within forest (rare) and depend on specific pollination agents to reproduce. Deforestation and forest degradation may reduce the population and the pollination agents (insects and bats), reducing population. Severe reduction of populations may lead to collapse and dieback. The project aims to protect a large forest tract to maintain populations in equilibrium.

Biodiversity Element	Flora: natural regeneration of trees and shrubs
Estimated Change	Avoiding climate change impacts on natural regeneration of those life forms.
Justification of Change	Climatic extreme events (reduced precipitation and humidity; savannization - change of tropical rainforest to savanna) may prevent tree/shrub natural regeneration. The project aims to protect a large forest tract to maintain the continuous regeneration of such species.

Biodiversity Element	Flora: important plants as food (fruits, nuts, herbs, oil, etc.) to human being and fauna
Estimated Change	The WARG Project will produce technical and practical information to be shared to local community regarding useful plants in terms of food security. This will widen the diversity of food to local community, improving their nutrition status and, therefore, depending less on the intensive extraction of forest non-timber products from the forest.
Justification of Change	Climate change may alter ecological processes related to flowering, fruiting and seed dispersal of many useful fruits and herbs to community, such as Brazilian nut (*Bertolletia excelsa*), açaí (*Euterpe oleraceae*), cupuaçu (Theobroma grandiflorum), among others. Changes in temperature and precipitation patterns may reduce the availability of those plants to local people and fauna. The WARG Project proposes to protect a large forest tract to maintain the population of those species.

Biodiversity Element	Fauna: key pollination insects and bats
Estimated Change	Conservation of habitat for bees and bats, very important to pollination of tree species by avoiding deforestation and forest degradation in a large forest tract.

Justification of Change	Deforestation and forest degradation are driven forces to bee dieback. Bats' biology may also be affected by climate changes. The WARG Project proposes to protect a large forest tract to maintain the population of those species under natural conditions.

Biodiversity Element	Fauna: Birdlife
Estimated Change	Conservation of habitat for birds, with emphasis on some threated and endemic species. Environmental education to local community to avoid illegal capture and trafficking wildlife in the region, particularly birds. Opening of a reporting channel against illegal activities in the Project Area regarding the capture and trafficking of birds.
Justification of Change	Deforestation and forest degradation destroy avian habitats and trophic chain. The WARG Project proposes to protect a large forest tract to maintain the population of birdlife under natural conditions.

Biodiversity Element	Fauna: mammals
Estimated Change	Conservation of habitat for mammals, with emphasis on some threated and endemic species. Environmental education to local community to avoid illegal capture and trafficking wildlife in the region, particularly mammals.
Justification of Change	Deforestation and forest degradation destroy the habitats and cause discontinuity and risks in trophic chain of mammals. Some endemic and threated taxa are particularly vulnerable. The WARG Project proposes to protect a large forest tract to maintain the population of fauna under natural conditions.

Biodiversity Element	Fauna: reptiles and amphibians
Estimated Change	Conservation of habitat for herpetofauna communities, with emphasis on some threated and endemic species under risk of extinction by climate change and deforestation/degradation. Environmental education to local community to avoid illegal capture and trafficking wildlife in the region, particularly mammals.
Justification of Change	Climate change may promote changes in environmental conditions needed to survival and reproduction of reptiles and amphibians. Deforestation and forest degradation destroy the habitats and cause discontinuity and risks in trophic chain of reptiles and amphibians. Some endemic and threated taxa are particularly vulnerable. The WARG Project proposes to protect a large forest tract to maintain the population of reptiles and amphibians under natural conditions.

5.2.2 Mitigation Measures (B2.3)

Appropriate mitigation measures shall be undertaken to maintain those 3 HCV attributes previously described and threatened flora and fauna taxa under the precautionary principle. In Table 44 were identified various changes to be promoted by WARG Project in terms of benefit to biodiversity, but other mitigation actions will also be done to protect biodiversity against human perturbation.

Mitigation measures undertaken by WARG Project regarding biodiversity will be the following:

1) Establishment patrol units in charge of identifying potential invasion risks into the Project Area, as well as avoiding illegal practices against the fauna and flora.

2) Attempt the establishment of communication channel with State and local environmental authorities to report activities harmful to biodiversity.

3) Attempt the establishment of partnership with Federal and State agencies (IBAMA, ICMBio, IPAAM, IMAC, and others) linked to environmental protection at the national level, forming

a task force against potential damage to biodiversity, particularly on the borders with public protected areas.

4) Environmental education and training on the importance of protecting biodiversity, environmental legislation, and ecosystem services, with special reference to the previously identified HCV protection and other vulnerable natural attributes.

5) Partnership with research organizations to promote conservation strategies and actions in the region focused on the HCVs.

6) Promote sustainable use of biodiversity, avoiding illegal access to the threatened HCVs.

7) Empowering women and youth to promote biodiversity services.

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

The project's anticipated net impacts on biodiversity in the Project Zone will be positive compared with conditions under the without-project land use scenario. This is demonstrated by the following framework (Table 45):

Table 45. Net positive biodiversity impacts

With-project	Without-project	Golden Level
Intensification of patrolling the Project Area against invasions, deforestation, and forest degradation	Normal occasional patrolling the Project Area against invasions, deforestation, and forest degradation	
Frequent and detailed monitoring of forest cover, deforestation, and forest degradation by advanced satellite imagery tools	Conventional monitoring forest cover by INPE	Changes in forest ecosystems due to climate change detected
Flora biodiversity continuously inventoried and better known	Flora biodiversity scarcely known	Flora behavior under climate change known
Fauna biodiversity continuously inventoried and better known	Fauna biodiversity poorly known	Fauna behavior under climate change known
Infrastructure to environmental education and training established adequately in the Project Area	No environmental education and training infrastructure established	
Community highly engaged in biodiversity conservation and motivated to contribute to the project's objectives	Community not engaged and motivated	
Infrastructure to research established adequately in the Project Area	No research infrastructure	Long-term research projects on adaptation of biodiversity to climate change conducted
In-situ seedlings of key species preserved	No seedling preserved	Seedlings of various species preserved can adapt biodiversity to climate change
Supply of important plants and animals to the community well-known and guaranteed	Superficial knowledge on the important plants and animal to community and risks associated to food safety	Community involved with biodiversity adaptation to climate change
Conservation of many species and better knowledge on them	Loss of many species without any previous study	
Low risk of species threat and extinction	High risk of species threat and extinction	
Low risk of unsustainable use of biodiversity by the local communities	High risk of unsustainable use of biodiversity by the local communities	
Biodiversity vulnerability to climate change detected	No detection of the effects of climate change on the local/regional biodiversity	Measures to protect vulnerable sites regarding biodiversity undertaken

5.2.4 High Conservation Values Protected (B2.4)

The WARG Project will not negatively affect the HCVs related to biodiversity. On contrary, it will increase the already established network of federal and state protected areas in 59,959 hectares.

5.2.5 Species Used (B2.5)

Only native species will be used by the WARG Project. Introduced species will be not used for the REDD+ project purposes. This excludes the exotic species used by the community, but invasive species will be controlled if necessary.

5.2.6 Invasive Species (B2.5)

No invasive species will be used for purposed of this REDD+ project. Environmental education of the community will be carried out in order to avoid introduction of potentially invasive species.

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

Not applicable, because non-native species will not be used in the WARG Project.

5.2.8 GMO Exclusion (B2.7)

The WARG Project aims to protect the tropical forest biodiversity and guarantees that no GMOs will not be used for its purpose to generate carbon credits.

5.2.9 Inputs Justification (B2.8)

No fertilizers, chemical pesticides, biological control agents and other harmful inputs will be used by the WARG Project, since it is aimed at promoting biodiversity conservation under complete natural conditions.

5.2.10 Waste Products (B2.9)

No solid waste is expected to be generated by the implementation of project activities in the Project Area. The project activities do not involve the use of fertilizers, pesticides, or any other chemicals whose containers can become waste. Also, waste from food is not expected to be present in the Project Area. The local community members will be encouraged to reduce, reuse, and recycle all their waste. The composting of organic waste will be encouraged.

5.3 Offsite Biodiversity Impacts

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

Table 46 lists the negative offsite biodiversity impacts and the mitigation measures.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

Table 46. Potential biodiversity impacts on the Project Area and offsite, as corresponding mitigation measures.

Impacts	Potential impacts on biodiversity in the Project Area	Potential impacts on biodiversity outside the Project Zone	Mitigation measures
Negative	Risk of forest fires an illegal logging and deforestation/degradation coming from adjacent areas. Risk of overhunting and/or overfishing of species with low abundance for community subsistence.	Risk of forest fires an illegal logging and deforestation/degradation on adjacent areas. Increasing hunting and fishing pressure in areas adjacent to RESEX (leakage of activities).	Patrolling and partnership with environmental offices (IBAMA, IPAAM, ICMBio) and Environmental Police. Environmental education and partnership with local communities.
Positive	Greater knowledge of the status of biodiversity in the region. Maintenance of the levels of biodiversity and conservation status of flora and fauna. Decrease of illegal hunting and fishing by non-residents who exert strong pressure from hunting and fishing.	Increased connectivity with other protected areas and forest areas. HCV on the borders and adjacent to the Project Area protected Better understanding on the regional biodiversity Food supply to resident communities.	

5.4 Biodiversity Impact Monitoring

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

A Monitoring Plan for Impacts to Biodiversity is presented below and it focuses on the monitoring of activities aimed at assessing the project's impacts on biodiversity in protected areas, endangered fauna and flora as well as relevant species monitoring. Table 47 shows data and parameters to be monitored by the WARG Project regarding biodiversity.

Table 47. Data and parameters to be monitored regarding biodiversity

Variable to be Monitored	Explanation	Unit	Frequency	Procedure
Number of tree species identified and measured	Data from continuous forest inventories will provide information on changes in tree diversity within the project lifetime besides recruitment, growth, and mortality rates	Number per hectare and total	Every 3 years	Forest Inventory
Number of non-tree plant species identified	Data from continuous forest inventories will provide information on changes in tree diversity within the project lifetime besides recruitment, growth, and mortality rates	Number per hectare and total	Every 3 years	Forest Inventory
Occurrences of fauna by species	Continuous fauna cruising will provide species recorded in the Project Area and surroundings and estimates on population size and ecological behavior	Number	Every 3 years	Fauna cruising
Number of matrix trees selected to *in-situ* conservation	Specific field work will provide information to plan and execute the *in-situ* conservation effort following the scientific protocol	Number	Year 1 and 10	Specific field work
Number of women trained and involved with biodiversity issues	Women will be trained and involved with biodiversity goals of the project	Number	Annual	List of participants signed
Number of young people trained and involved with biodiversity issues	Women will be trained and involved with biodiversity goals of the project	Number	Annual	List of participants signed
Number of dead trees due to drought and other climatic events	Climate change, natural and human disturbances may lead to increased	Number	Every 3 years	Forest Inventory

	mortality rates of tree species within the Project Area			
Deforested x protected area	Deforestation and forest degradation and their impacts on biodiversity will be assessed through satellite imagery analysis	ha	Annually	Satellite imagery analysis
Number of visitors in the Project Area	Stakeholders and external people will be visiting the Project Area. So, the number of visitors will be recorded	Number	Continuously	List of participants signed
Number of researchers in the Project Area	Various researchers will carry out specific studies in the Project Area. So, the number visits will be recorded	Number	Continuously	List of participants signed
Number of seedlings planted to enrichment purposes	Forest enrichment may be necessary to supply food to fauna and local community	Number	Annually	Field cruising
Number of recorded hunted/dead animals	Impacts of hunting on biodiversity will be monitored	Number	Annually	Field cruising
Illegal entry in the Project Area	Illegal activities and their impacts on biodiversity will be monitored	Number	Annually	Field cruising
Number of fire spots recorded	Fires are responsible to destruction of biodiversity in the Project Area and its borders	Number	Annually	Satellite imagery analysis and field cruising
Number of km patrolled	Patrolling is an essential activity to protect biodiversity within the project limits and borders	km	Annually	From the vehicles
Number of accesses on the project's website	Stakeholders will be interested and may contribute to its objectives	Number	Annually	Digital automatic counting

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Biodiversity monitoring plan will be made available through the project's site on internet as well as by the Verra platform. Digital versions of annual summary reports will be made available to the community, partners, and other stakeholders. Printed copies will be available on demand. During public consultation meetings the monitoring results will be presented to all participants and discussed with them to improve the monitoring process/plan. Local authorities and the organized society will be also invited to contribute to formulate revised versions of the biodiversity monitoring plan.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

This project seeks to be validated to the Gold Level for exceptional biodiversity benefits.

The exceptional benefits to biodiversity of the Western Amazon REDD+ Grouped Project are the following:

1) Conservation of 59,959 hectares of dense tropical rainforest considered mostly of extremely high priority in the Amazon Biome according to Brazilian Government.
2) In-situ conservation efforts for the most important tree species of the Project Area.
3) Research projects on extremely important fauna and flora taxa: *Dipteryx odorata, Ceiba pentandra, Apuleia leiocarpa, Panthera onca, Podocnemis unifilis* and *Harpia harpyja*.
4) Adaptation measures to protect biodiversity against climate change.

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

The International Union for Conservation of Nature (IUCN) has identified several species as Endangered, and Critically Endangered in the States of Amazonas and Acre. The complete list was obtained under request to IUCN website. Moreover, including threatened flora and fauna Red Lists of Brazil, published by ICMBio (2013, 2018) which used the IUCN methodology, and IBAMA timber species database (2014), six target species (three trees and three animals) to focused research on this project are highlighted in Table 48.

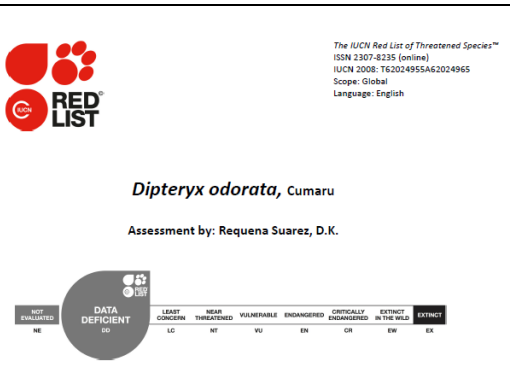
Table 48. Six target species (to be triggered) for special biodiversity conservation by the WARG Project

Scientific name	Common name	Group	Relevance	Population trend
Dipteryx odorata	Cumaru-ferro	Tree	Biodiversity, timber of commercial use.	Data deficient nowadays, but population may me declining if no action was done to reduce logging, once it is one the main species for timber milling in the region.
Ceiba pentandra	Samaúma	Tree	Biodiversity, timber of commercial use. One of the largest tree species in Amazon.	Least concern nowadays, but population may me declining if no action was done to reduce logging.
Apuleia leiocarpa	Garapeira	Tree	Biodiversity, timber of commercial use	Least concern nowadays, but the population may me declining if no action was done to reduce logging, once it is one the main species for timber milling in the region
Panthera onca	Jaguar	Mammal	Biodiversity, hunted	Near threatened, population decreasing
Harpia harpyja	Harpy Eagle	Bird	Biodiversity	Vulnerable, population decreasing
Podocnemis unifilis	Yellow-spotted River Turtle	Tortoise	Biodiversity, hunted	Data deficient, population decreasing

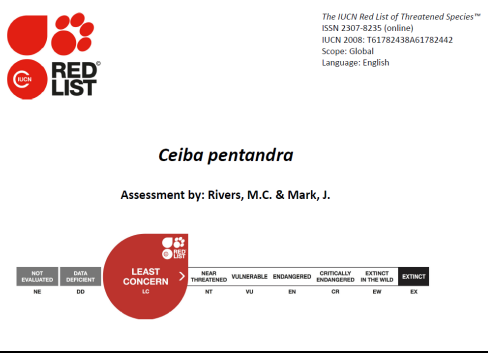
5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

Table 49 provides a list of trigger species population trends of the WARG Project.

Table 49. Trigger species population trends

Trigger Species 1	*Dipteryx odorata*, tree
Features	 
Population Trend at Start of Project	Unspecified population trend, continuing decline in area, extent and/or quality of habitat, according to IUCN.
With-project Scenario	Selective logging of *Dipteryx odorata* is a major threat, mainly because of the rapid increase in exporting quantities for the Chinese flooring

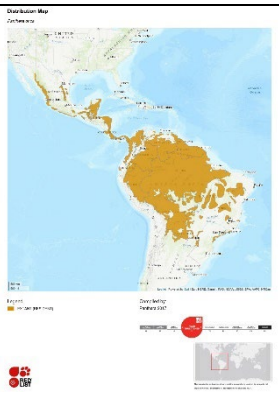
	market (Hewitt, 2007; Putzel et al., 2008). Also, given the slow growth of this species, current regulations do not guarantee the sustainable logging of *D. odorata* in Brazil (Vinson et al. 2014). The habitats in which *D. odorata* exist are subject to land degradation and deforestation (Leisher et al., 2013; Barber et al., 2014), and upon review several locations of herbarium specimens of *D. odorata* fell within areas subject to human-induced land cover change (CIAT-Terra-I, 2016). This habitat reduction and fragmentation may result in loss of genetic diversity, leading to *D. odorata* population decline as has happened with populations of *Dipteryx alata* in the Brazilian cerrado (Collevatti et al., 2013). The WARG Project aims to trigger this key threatened tree species by continuous forest inventories and promoting a special research project on its auto-ecology and synecology. WARG Project also will select matrix trees from significant populations, forming an *in-situ* conservation effort to guarantee the species survival.
References, as given by IUCN:	CIAT-Terra-i. 2016. Terra-i. Available at: http://www.terra-i.org/terra-i.html. (Accessed: 20-01-2017). Collevatti, R.G., Telles, M.P.C., Nabout, J.C., Chaves, L.J. and Soares, T.N. 2013. Demographic history and the low genetic diversity in Dipteryx alata (Fabaceae) from Brazilian Neotropical savannas. Heredity 111(2013): 97-105. Hewitt, J. 2007. An assessment of tree species which warrant listing in CITES. Milieudefensie (Friends of the Earth, Netherlands), Netherlands. Leisher, C., Touval, J., Hess, M.S., Boucher, T.M. and Reymondin L. 2013. Land and Forest Degradation inside Protected Areas in Latin America. Diversity 2013(5): 779-795. Putzel, L., Padoch, C. and Pinedo-Vasquez, M. 2008. The Chinese timber trade and the logging of Peruvian Amazonia. Conservation Biology 22(6): 1659-1661. Vinson, C.C., Kanashiro, M., Sebbenn, A.M., Williams, T.CR., Harris, S.A., Boshier, D.H. 2015. Long-term impacts of selective logging on two Amazonian tree species with contrasting ecological and reproductive characteristics: inferences from Eco-gene model simulations. Heredity 115(2): 130-139.

Trigger Species 2	*Ceiba pentandra*, tree	
Features	*MAP NOT AVAILABLE*	

Population Trend at Start of Project	Unknown, according to IUCN.
With-project Scenario	The main threat to this widespread species is the intensification of wild populations use for the timber market. These trends need to be monitored, as in the long-term natural regeneration may be insufficient to sustain increased use as a timber source, while minimal efforts have been undertaken to develop plantations in tropical Africa (Duvall, 2011). There are also reports that large, relict *Ceiba pentandra* trees are now being rapidly cut down for pallets production (http://www.ceiba.org/ceiba.htm, accessed 03/03/2017). The WARG Project aims to trigger this key threatened tree species by continuous forest inventories and promoting a special research project on its auto-ecology and synecology. WARG Project also will select matrix trees from significant populations, forming an *in-situ* conservation effort to guarantee the species survival.
References, as given by IUCN:	Duvall, C.S. 2011. Ceiba pentandra (L.) Gaertn. In: Brink, M. & Achigan-Dako, E.G. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. Available at: http://uses.plantnet-project.org/en/Ceiba_pentandra_(PROTA). (Accessed: Accessed 24 February 2017).

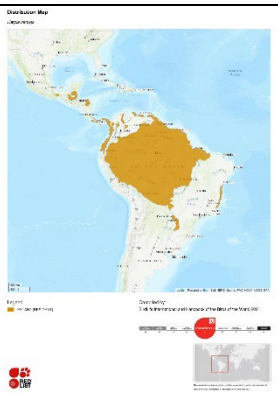
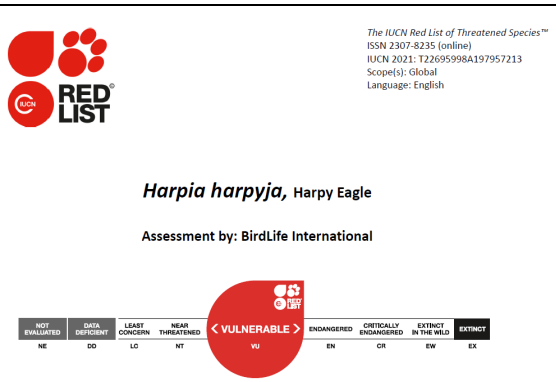
Trigger Species 3	*Apuleia leiocarpa*, tree
Features	 
Population Trend at Start of Project	Decreasing, according to IUCN. The overall population size of this species is unknown due to lack of available information. However, it is known from nearly 1,000 georeferenced specimens available on GBIF.org (2020) and it has been described as abundant (Atahuachi and Guillén, 2020). Nevertheless, it is suspected that the population has been declining, based on habitat loss and intentional harvesting. A reduction of at least 30% in the last 100 years has been reported for Brazil (CNCFlora, 2012), but there is not enough information to calculate global reduction rates.
With-project Scenario	The main threat to this species is logging, as it is extensively used in construction (Carvalho, 2003; Nahuz et al., 2013; Bonnet and Curcio,

	2016). Without the project, this species will suffer a strong genetic erosion due to logging. The WARG Project aims to trigger this key threatened tree species by continuous forest inventories and promoting a special research project on its auto-ecology and synecology. WARG Project also will select matrix trees from significant populations, forming an *in-situ* conservation effort to guarantee the species survival.
References, as given by IUCN:	Atahuachi, M. and Guillén, R. 2020. *Apuleia leiocarpa* (Vogel) J.F. Macbr. In: S. Arrázola, G. Navarro, M. Mercado and M. Atahuachi (eds), *Libro Rojo de Plantas Amenazadas de las Tierras Bajas de Bolivia*, pp. 61-62. Editorial FAN, Santa Cruz. Bonnet, A. and Curcio, G.R. 2016. Uso de espécies arbóreas nativas para a propriedade rural e mercado regional na Região de Marabá, PA. *Comunicado Técnico Embrapa* 390: 1-17. Carvalho, P.E.R. 2003. *Grápia*. Embrapa, Circular Técnica. CNCFlora. 2012. *Apuleia leiocarpa* in Lista Vermelha da flora brasileira versão 2012.2. Available at: http://cncflora.jbrj.gov.br/portal/pt-br/profile/Apuleia. GBIF.org. 2020. GBIF Home Page. Available at: hhttp://www.gbif.org. (Accessed: 2020). Nahuz, M.A.R., Miranda, M.J.A.C., Ielo, P.K.Y., Pigozzo, R.J.B. and Yojo, T. 2013. *Catálogo de madeiras brasileiras para a construção civil*. IPT - Instituto de Pesquisas Tecnológicas do Estado de São Paulo, São Paulo.

Trigger Species 4	*Panthera onca*, mammal/cat	
Features		
Population Trend at Start of Project	Decreasing, according to IUCN. Historic assessment of Jaguar viability: High chance of survival: Sanderson et al. (2002) estimated that populations in 70% of the Jaguar range (over 6 million km²) had a high probability for survival. Most of that area consists of the Amazon Basin rainforest, and adjoining Pantanal and Gran Chaco areas (Torres et al., 2007). Other areas considered to have a high probability for long-term Jaguar persistence included tropical moist lowland forest in Mesoamerica (the Selva Maya of Guatemala, Mexico, and Belize) and	

	a narrow strip of the Choco-Darien of Panama and Colombia to northern Honduras. Medium chance of survival: Sanderson et al. (2002) estimated that Jaguar populations in 18% of the Jaguar range (1.6 million km²) had a medium probability of long-term survival. These areas are generally adjacent to high probability of survival areas and include a large portion of the northern Cerrado, most of the Venezuelan and Colombian llanos, and the northern part of Colombia on the Caribbean coast. In Central America and Mexico, they include the highlands of Costa Rica and Panama, southern Mexico, and the two eastern mountain ranges of Mexico, Sierra de Taumalipas and the Sierra Madre Oriental. Low chance of survival: Sanderson et al. (2002) classified the remainder of Jaguar range (12%) as having a low probability for Jaguar survival, and of most urgent conservation concern. These areas include the Atlantic Rainforest and Cerrado of Brazil; parts of the Chaco in northern Argentina; the Gran Sabana of northern Brazil, Venezuela, and Guyana; parts of the coastal dry forest in Venezuela; and the remaining range in Central America and Mexico. Jaguar density in the Bolivian Amazon is estimated at 2.8/100 km² (Madidi National Park - Silver et al., 2004), and in the Colombian Amazon, at 4.5/100 km² and 2.5/100 km² (Amacayacu National Park and unprotected areas respectively - Payan, 2008).
With-project Scenario	Jaguar populations are threatened by habitat loss and fragmentation (Medellín et al., 2016), killing for trophies/illegal trade in body parts, pro-active or retaliatory killings associated with livestock depredation (Zimmermann et al., 2005), and competition for wild meat with human hunters (Foster et al., 2016). Deforestation rates in Latin America are the highest in the world together with tropical Africa (D'Annunzio et al., 2015). Fragmentation and displacement frequently lead to lowering of Jaguars density and its prey in leftover forest patches due to easier access and Jaguars feeding on the replaced livestock. Jaguar-livestock conflict is a serious threat to Jaguar survival and reported throughout their range (Hoogesteijn and Hoogesteijn, 2011). There are documented population declines and habitat loss for most of the range countries. Connectivity among Jaguar populations is being lost at local and regional scales. Isolated populations have fewer individuals and are more prone to local extinctions (Ceballos et al., in press). Many Jaguar populations require connectivity between core sites to survive in the long term and these connectivity corridors are most of the time outside protected areas, and therefore vulnerable to human impacts (Bernal-Escobar et al., 2015). The WARG Project aims to trigger this key threated cat species by continuous monitoring and supporting a special research project on its biology and habit. The Project will select the use of proper monitoring methods to trigger the Jaguar populations in the Project Area and in the Reference Region, establishing strategies to its conservation. Environmental training will be provided to disseminate among the community members the project's purpose and the aims of protecting biodiversity with special focus in this large-sized wild cat.

References, as given by IUCN:	Bernal-Escobar, A., Payán, E. and Cordovez, J.M. 2015. Sex dependent spatially explicit stochastic dispersal modeling as a framework for the study of Jaguar conservation and management in South America. Ecol. Model. 299: 40-50. Ceballos, G., González-Maya, J.F., Zarza, H. and Chávez, C. In press. Ecology and conservation of Jaguars in Mexico: state of knowledge and future challenges. In: A. Aguirre and R. Sukumar (eds), Tropical Conservation: a view from the south on local and global priorities, Oxford University Press, UK (in press). D'Annunzio, R., Lindquist, E.J. and MacDicken, K.G. 2015. Global forest land-use change from 1990-2010: an update to a global remote sensing survey of forests. Foster, R.J., Harmsen, B.J., Macdonald, D.W., Collins, J., Urbina, Y., Garcia, R. and Doncaster, C.P. 2016. Wild meat: a shared resource amongst people and predators. Oryx 5(1): 63-75. Hoogesteijn, R. and Hoogesteijn, A. 2011. Estrategias anti-depredación para fincas ganaderas en Latinoamérica: una guía. Campo Grande: Panthera. Medellín, R.A., de la Torre, J.A., Chávez, C., Zarza, H. and Ceballos, G. 2016. El Jaguar en el Siglo XXI: La Perspectica Continental. Fondo de Cultura Económica, Universidad Nacional Autónoma de México, Ciudad de México. Payan, E. 2008. Jaguars, ocelots and prey ecology across sites with different hunting pressure in Colombian Amazonia. Ph.D. Thesis, University College London and Institue of Zoology, Zoological Society of London. Sanderson, E.W., Redford, K.H., Chetkiewicz, C.B., Medellin, R.A., Rabinowitz, A.R., Robinson, J.G. and Taber, A.B. 2002. Planning to save a species: the jaguar as a model. Conservation Biology 16(1): 58. Silver, S.C., Ostro, L.E.T., Marsh, L.K., Maffei, L., Noss, A.J., Kelly, M.J., Wallace, R.B., Gomez, H. and Ayala, G. 2004. The use of camera traps for estimating jaguar Panthera onca abundance and density using capture/recapture analysis. Oryx 38: 148-154. Zimmermann, A., Walpole, M. and Leader-Williams, N. 2005. Cattle ranchers' attitudes to conflicts with Jaguars in the Pantanal of Brazil. Oryx 39: 1-7.

Trigger Species 5	*Harpia harpyja*, bird/eagle
Features	 
Population Trend at Start of Project	Decreasing, according to IUCN. The species is generally rare throughout its range. It has a very large territory and is patchily distributed (Thiollay, 1989). In Brazil, it is most common in Amazonia, and rare in the Atlantic Rainforest (Banhos et al., 2018). It is now very scarce in Mexico (Monroy-Ojeda in litt., 2021) and in Costa Rica. Records for the area occupied by one breeding pair include 45-79 km^2 in Venezuela, 10-20 km^2 in Panama (Alvarez-Cordero, 1996), 43 km^2 in Peru (Piana, 2007), 47.8 km^2 and 19.6 (+/- 5.7) km^2 in Ecuador (Muñiz-López, 2016), and 14-16 km^2 in Panama (Vargas González and Vargas, 2011). In the deforestation arc in Mato Grosso, Brazil, the species was recorded at a nest density of 1.97–4.84 nests/100 km^2 of forest habitat, or 0.79–3.07 nests/100 km^2 where deforested areas were included in the calculation (Miranda et al., 2021). The global population size is estimated to fall within the range 118,000-225,000 mature individuals. Hunting and selective logging are likely to have depleted population densities across large parts of the species' range, so the true population size may be lower; to account for uncertainty, the population size is here placed in the band 100,000-250,000 mature individuals. Trend Justification: From 2001 to 2020, approximately 8% of tree cover with at least 50% canopy cover was lost from within the species' range (Global Forest Watch, 2021). If the annual forest loss area remains constant and extrapolating forwards, approximately 27% is projected to be lost over three generations (60 years) from 2020. Although the Harpy Eagle appears to be fairly tolerant of degraded forest and human-modified landscapes (Bowler et al., 2020), it is unable to tolerate landscapes with less than 50% forest cover remaining (Miranda et al., 2021) and does not usually cross forest gaps of more than c.500 m (Aguiar-Silva, 2016). Furthermore, the species' preference for very large trees as nest sites potentially makes it susceptible to selective logging (Miranda et al., 2020). The species' population size therefore can be assumed to be declining as its forest habitat is lost.
With-project Scenario	The main threats to the species are forest loss and degradation, and hunting, poaching and persecution. Collision with powerlines is an additional source of mortality (Gusmão et al., 2020).

	Forest continues to be lost and degraded across much of the species' range, and particularly in southeast Amazonia and in Central America (Global Forest Watch, 2021). Loss of canopy cover may lead to a reduction in the abundance of prey species, thereby decreasing the habitat quality for the Harpy Eagle (Miranda et al., 2021), although a study in Peru found that the Harpy Eagle is able to survive in secondary forest by feeding on prey species that are tolerant to disturbance (Bowler et al., 2020). The WARG Project aims to trigger this key threated large-sized Amazonian eagle species by continuous monitoring and supporting a special research & development project devoted to understanding its biology, habit, growth, and reproduction. Research institutions of the region will be contacted and invited to develop research activities in the Project Area with focus on this eagle. The WARG Project also will develop actions to change the without-project scenario by carry out environmental education actions with the community to avoid species' population decrease and guarantee its survival.
References, as given by IUCN:	Aguiar-Silva, F. H. 2016. Uso e seleção de recursos por Harpia em múltiplas escalas espaciais: persistência e vulnerabilidade. INPA. Álvarez-Cordero, E. 1996. Biology and Conservation of the Harpy Eagle in Venezuela and Panama. PhD. thesis. University of Florida. Banhos, A., Sanaiotti, T. M., Aguiar-Silva, F. H., Martins, F. D., da Luz, B. B., Carvalho, A. S., & Ruiz, C. M, 2018. *Harpia harpyja* (Linnaeus, 1758). In: Instituto Chico Mendes de Conservação da Biodiversidade (ed.), *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção: Volume III - Aves*, pp. 124-128. ICMBio, Brasília. Bowler, M., Couceiro, D., Martinez, R., Orihuela, G., Shoobridge, J. D., Nycander, E., de Miranda, E. B., & Tobler, M. W. 2020. Harpy eagles (*Harpia harpyja*) nesting at Refugio Amazonas, Tambopata, Peru feed on abundant disturbance-tolerant species. *Food Webs* 24: e00154. Global Forest Watch. 2021. Interactive Forest Change Mapping Tool. Available at: http://www.globalforestwatch.org/. Gusmão, A. C., Degra, D., Silva, O. D. D., Souza, L. S. D., Frota, A. V. B. D., Tuyama, C. A., Tuyama, M. C., Costa, T. M. D., Dalbem, A. P., Barnett, A. A., & Aguiar-Silva, F. H. 2020. Power lines as a threat to a canopy predator: electrocuted Harpy Eagle in southwestern Brazilian Amazon. *Journal of Threatened Taxa* 12(13): 16904-16908. Miranda, E. B., Peres, C. A., Carvalho-Rocha, V., Miguel, B. V., Lormand, N., Huizinga, N., Munn, C. A., Semedo, T. B., Ferreira, T. V., Pinho, J. B., & Piacentini, V. Q. 2021. Tropical deforestation induces thresholds of reproductive viability and habitat suitability in Earth's largest eagles. *Scientific Reports* 11(1): 1-17. Miranda, E. B., Peres, C. A., Marini, M. Â., & Downs, C. T. 2020. Harpy Eagle (*Harpia harpyja*) nest tree selection: Selective logging in Amazon forest threatens Earth's largest eagle. *Biological Conservation* 250: 108754. Monroy-Ojeda, A., Gibert, S., López. S., & León, R. 2016. Neotropical Raptor Monitoring Program in the Selva Lacandona, Mexico. *Spizaetus* 22: 22-23. Muñiz-López R. 2016. Biología y conservación del águila harpía (*Harpia harpyja*) en Ecuador. Tesis doctoral. Universidad de Alicante.

	Piana, R. P. 2007. Nesting and diet of Harpia harpyja Linnaeus in the native community of Infierno, Madre de Dios, Peru. *Revista Peruana de Biologıa* 14: 135-138. Thiollay, J. M. 1989. Area requirements for the conservation of rain forest raptors and game birds in French Guiana. *Conservation Biology*: 128-137. Vargas González, J.J. & Vargas, H. 2011. Nesting density of Harpy eagles in Darien with population size estimates for Panama. *J. Raptor Res.* 45(3): 199-210.

Trigger Species 6	*Podocnemis unifilis*, reptile (turtle/tortoise)	
Features		
Population Trend at Start of Project	No data available at IUCN website. Data from ICMBio was used.	
With-project Scenario	The WARG Project aims to trigger this key threatened reptile (turtle) species by continuous monitoring and promoting a special research & development project devoted to understanding its biology, habit, growth, and reproduction. This species is trapped/hunted and used as food by the local people, hence its population being decreasing. The WARG Project also will develop actions to change the without-project scenario that is trapping/hunting and population decrease by developing environmental education actions with the community to guarantee the species survival. *Podocnemis unifilis* occurs in Brazil, Venezuela, Colombia, Ecuador, Peru, Bolivia, Guyana, French Guiana and Suriname. It is eligible for the regional assessment. In Brazil, it occurs in all North Region states and in the states of Goiás and Mato Grosso, in Center-West region. The species lives in a wide variety of habitats, such as: large rivers, lakes, meandering lakes, swamps, and lagoons, and in white, clear, and black water rivers. Its occurrence extent calculated in Brazil is 4,231,371.09 km². It is suspected that, in Brazil, in the last 90 years there has been close to 30% population decline, mainly due to the collection of eggs and breeding females, threats that persist (A2). The species is easily found in its distribution area, and in some locations, when protected from human predation, it is abundant. The installation of hydroelectric plants in the hydrographic basins where the species occurs (Amazonian and Tocantins-Araguaia rivers) may lead to future population decline. It is a species dependent on protection actions (inspection and management), mainly in breeding areas. For these reasons, *Podocnemis unifilis* was evaluated as Near Threatened (NT), approaching the A2d criterion. Therefore, the WARG Project will support projects to protect this turtle.	

References provided by ICMBio website:	Ataídes, A.G. 2009. Parâmetros populacionais, aspectos reprodutivos e importância socioeconômica de P. unifilis (Troschel, 1848) (Testudines, Podocnemididae), no entorno do Parque Nacional do Araguaia, Tocantins. Dissertação de Mestrado em Ciências do Ambiente, Universidade Federal do Tocantins, Palmas – TO, 154 p. Balestra, R.A.M.; Oliveira, M.D.F.; Sampaio, A.A.; Lustosa, A.P.G.; Alencar, J.R.M.; Freitas, F.O.; Paiva, S.R. & Masini, D.V.C. 2010. Ecologia reprodutiva e manejo conservacionista do Tracajá Podocnemis unifilis Troschel, 1848 (Testudines, Podocnemididae), no Parque Indígena do Xingu- MT, Brasil. Dados não publicados. Cites (Convenção Sobre o Comércio Internacional de Espécies Ameaçadas da Fauna e Flora Silvestres). http://www.cites.org. (Acesso em:16/08/2012). Emysystem. 2010. World Turtle Database, 1999. <http://emys.geo.orst.edu/>. (Acesso em: 10/06/2010). Ernst, C. H. & Barbour, R. Turtles of the World. Smithsonian Institution Press. USA, 1989, 313p. Escalona, T.; Engstrom, T.N.; Hernandez, O.E.; Bock, B.C.; Vogt, R.C. & Valenzuela, N. 2009. Population genetics of the endangered South American freshwater turtle, Podocnemis unifilis, inferred from microsatellite DNA data. Conservation Genetics, 10: 1683–1696, 2009. Fachín-Terán, A. 2005. Participação comunitária na preservação de praias para reprodução de quelônios na reserva de desenvolvimento sustentável Mamirauá, Amazonas, Brasil. UAKARI,1(1): 9-18. Haller, E.C.P. 2002. Aspectos da biología reprodutiva de Podocnemis sextuberculata Cornalia, 1849 e Podocnemis unifilis Troschel, 1848 (Testudinata: pelomedusidae) na região do Rio Trombetas, Pará. Dissertação (Mestrado em Zoologia). Universidade de São Paulo, São Paulo.

APPENDICES

Appendix 1: Stakeholder Identification Table

This appendix provides two table, the first list the stakeholders and the second the partners of the project.

Table 50. Stakeholders of the WARG Project.

Stakeholder	Role	Interest	Overall Relevance to the Project
Communities	Beneficiaries of social activities and participants in the distribution of project benefits.	Socioeconomic development of the population	Essential components of social activities, to control deforestation and to develop a model of sustainable practices with the environment.
Landowners	Owners can help contain deforestation and ensure environmental improvement in the region.	Conservation of biodiversity and sustainable use of natural resources	Essential components of social activities, to control deforestation and to develop a model of sustainable practices with the environment.
ICMBio – Chico Mendes National Institute on Biodiversity Conservation	Federal institution responsible to maintain the integrity of the national-level protected areas system	Conservation of biodiversity and sustainable use of natural resources	Since his project is situated in a zone comprised of various protected areas, ICMBio is a key partner to carry out conjunct conservation strategies
IBAMA – Brazilian Institute for the Environment and Renewable Natural Resources	Federal institution responsible for the environmental licensing, environmental quality control, authorization to use natural resources and environmental inspection, monitoring and control in the national level	Conservation of biodiversity and sustainable use of natural resources	IBAMA is a key partner because it is in charge of inspection, monitoring and control activities, very important for the environmental integrity of the project
IPAAM – Amazonas State Environmental Protection Institute	It is responsible for Environmental Control in the State of Amazonas, through the actions of Licensing, Inspection and Environmental Monitoring of activities potentially and effectively polluting and degrading the environment, as well as those related to Environmental Education	Conservation of biodiversity and sustainable use of natural resources	IPAAM is a very important partner of the project because it is in charge of inspection, monitoring and control activities in the State of Amazonas
IMAC – Acre Environmental Institute	It is responsible for Environmental Control in the State of Acre, through the actions of Licensing, Inspection and Environmental Monitoring of activities potentially and effectively polluting and degrading the environment, as well as those related to Environmental Education	Conservation of biodiversity and sustainable use of natural resources	IMAC is a very important partner of the project because it is in charge of inspection, monitoring and control activities in the State of Acre
Military Fire Department of Acre	The agency will be responsible for training and empowering residents to extinguish forest fires.	Socioeconomic development of the population and conservation of biodiversity and sustainable use of natural resources	Boost residents' independence so that they are the main actors in the maintenance, protection and monitoring of the natural resources of their properties.
Portonet Telecom Communication Company	Communication infrastructure improvement	Socioeconomic development of the population	Minimize isolation-related vulnerability, both physical and communication-related.

IMC – Institute of Climate Change and Environmental Services Regulation	Support analyzes and studies based on the climate dynamics of the region and the possible future impacts caused by climate change.	Develop research related to climate benefits and flora biodiversity	Generate a basis for decision making regarding to climate change

Table 51. Institutions identified as potential partners of the WARG Project

Partner	Form of partnership	Interest	Overall Relevance to the Project
UFAC – Federal University of Acre	Possible partnership to carry out research projects related to community welfare and biodiversity	Develop research related to community welfare and biodiversity	Contribute to the validation of the biodiversity and community benefits of the WARG Project
UFAM – Federal University of Amazonas	Possible partnership to carry out research projects related to community welfare and biodiversity	Develop research related to community welfare and biodiversity	Contribute to the validation of the biodiversity and community benefits of the WARG Project
INPA – National Institute of Amazon Research	Possible partnership to carry out research projects related to carbon stock inventory and biodiversity	Develop research related to climate benefits and flora biodiversity	Contribute to validate the climate benefits of the WARG Project through specific research projects addressing carbon monitoring and biodiversity benefits of the project in relation to fauna and flora key species, particularly the latter
Municipal Prefecture (Town Hall) – Capixaba, Lábrea, Porto Acre, Sena Madureira, Senador Guiomard, Boca do Acre, Bujari.	Municipal Executive Power Headquarters	Socioeconomic development of the population	Key partners for the implementation of future activities that may involve municipal structures and/or logistics