IACO REDD+ PROJECT

Document Prepared By WayCarbon Soluções Ambientais e Projetos de Carbono S.A

Project Title	*IACO REDD+ PROJECT*
Version	*1.1*
Date of Issue	*31 March 2023*
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1 PROJECT DETAILS

1.1. Summary Description of the Project

In the last three years (2018-2021), 111.6 hectares were deforested per hour in the Brazilian Amazon biome, which equates to about 18 trees per second[1]. Agriculture and livestock were responsible for almost all of the country's deforestation, being the cause of more than 97%[1] of the cases. The IACO REDD+ Project seeks to address the issue of deforestation in the Amazon biome on a local level in the state of Acre, Brazil. The IACO REDD+ Project is an AFOLU project and therefore is classified within scope 14. More specifically, the project falls under the Avoided Planned and Unplanned Deforestation categories.

Sena Madureira, the municipality where the project is located, has the second largest area of accumulated deforestation in the Acre state for the period between 1988 and 2020, summing up to 212,917.6 hectares[2]. In 2020, the municipality also had the second largest deforested area in the state, 7,322.2 hectares, which represents 11.8% of the deforested area in Acre[2]. Also, the project area is surrounded by conservation units (UCs) that had the highest deforestation rates in the state in recent years (ZEEIII). Much of this deforestation is driven by the expansion of livestock and soy cultivation, logging, growing infrastructure, and colonization by subsistence farmers. Particularly in the IACO REDD+ Project region, areas of native forest have been cleared mainly for livestock and subsistence colonization. With the increasing pressure for deforestation, the original Amazon rainforest present in the IACO REDD+ Project is threatened and the lack of economic return from the property is the major barrier to the implementation of activities that prevent the conversion of forest to other land uses. If this REDD+ Project is implemented, 60,805 hectares of Amazon rainforest will be conserved over the first 30 years, avoiding the emission of 26,040,427 tons of CO_2 into the atmosphere. A significant part of these reduced emissions will be achieved through the abandonment of the planned deforestation that would occur in 20% of the property's area.

Through carbon revenue, IACO's REDD+ Project proponents intend to abandon legally permitted planned deforestation, install signboards to inform the presence of the conservation project, hire and train forest patrols, build the project's base camp, provide courses and training for fire prevention and fighting and provide means for community awareness around the project on climate change, biodiversity, ecosystem services, and sustainable management of forests, agricultural land and grasslands. In addition, high-resolution satellite images will be acquired to monitor forest cover and biodiversity conservation. With these activities, the project will, directly and indirectly, contribute to the mitigation of global climate change and the reduction of occurrences and risks associated with extreme weather events.

Under the social and biodiversity spheres, the project also brings benefits to the region. The IACO REDD+ project proponents recognize the essential role of the participation of project area residents and neighbors in the success of this project. The improvement of the quality of life and environmental conscience will be worked on throughout the duration of the project and is expected to prevail after its crediting period. Activities focused on the improvement and diversification of the local economy, education, and local health are planned and described in section 1.11.

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[1] Relatório Anual de Desmatamento 2021 - São Paulo, Brasil. MapBiomas, 2022 - 126 páginas. http://alerta.mapbiomas.org

[2] Dinâmica do desmatamento no Estado do Acre – PRODES ano florestal 2019/2020. GOVERNO DO ESTADO DO ACRE, 2021

1.2. Sectoral Scope and Project Type

The sectoral scope applied to the IACO REDD+ Project is scope 14 - Afforestation, Forestation and Other Land Use (AFOLU), specifically under the Reducing Emissions from Deforestation and Degradation (REDD) through Avoided Unplanned Deforestation (AUD) and Avoided Planned Deforestation (APD). This is not a grouped project.

1.3. Project Eligibility

The IACO REDD+ Project meets all the eligibility criteria and requirements set by the VCS Program Version 4.3 for the AFOLU sectorial scope.

- The IACO REDD+ Project applies a methodology eligible under the VCS Program, VM0007.
- The project is located in the state of Acre, which intends to incorporate incentives and projects related to the reduction of emissions from deforestation and forest degradation – REDD+ program zones. So far, as further described under section 1.11 and 1.14, the Acre REDD+ Jurisdictional Program is a document without force of law and was not formally validated under the VCS, or any other standard of REDD+ in Brazil or worldwide. Currently, this program is just a guidance document for the public administration, which is applicable to the State's action in reducing GHG emissions from deforestation.
- The implementation of the IACO REDD+ Project activities do not lead to the violation of any applicable law. Only conservation and sustainable development are objectives of the proposed activities;
- The IACO REDD+ Project does not convert native ecosystems to generate GHG. In fact, the project aims to avoid the native ecosystem conversion. Nevertheless, there has not been a change in land use in the project activity area within the last 10 years before the project start date. Images below show the project activity area 10 years before the project start date and in 2021.

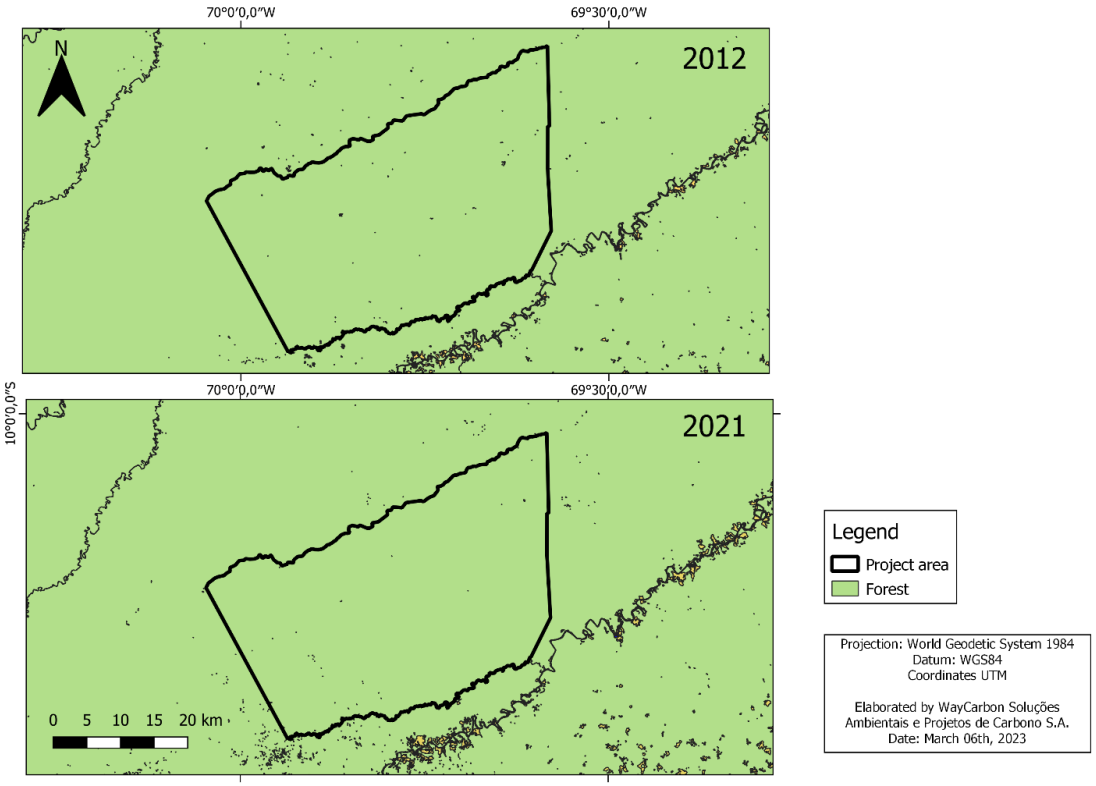

Figure 1 – Forest cover of IACO REDD+ Project area in 2012 and 2021. Source: MapBiomas Collection 7.0[3]

- The IACO REDD+ Project does not occur on wetlands and does not drain native ecosystems or degrade hydrological functions; In addition, the Permanent Preservation Areas (APP), including the areas covered by native vegetation that border the rivers and are part of the project area, are preserved.
- The Non-permanence risk was analyzed by the VCS Program document AFOLU Non-Permanence Risk Tool version 4.0.

1.4. Project Design

The IACO REDD+ Project has been designed as an Avoided Planned and Unplanned Deforestation applying VM0007 methodology, Version 1.6, 08 September 2020, in a single location (see **Figure 2).**

Eligibility Criteria

Not applicable. This is not a grouped project.

[3] MapBiomas Project, https://mapbiomas.org/produtos

1.5. Project Proponent

Organization name	IACO AMBIENTAL LTDA.
Contact person	Diego Hoebel Munhoz
Title	CEO
Address	Espírito Santo street, 890, 8th floor, Londrina city, Paraná, Brazil.
Telephone	+55 (43) 9603-0079
Email	diego@iacoambiental.com.br

1.6. Other Entities Involved in the Project

Organization name	WayCarbon Soluções Ambientais e Projetos de Carbono LTDA
Role in the project	Responsible for compiling and adapting information provided by the proponent and other entities involved, regional context description, and estimation of GHG emissions reductions for the IACO REDD+ Project.
Contact person	Filipe Bittencourt
Title	CEO
Address	Paraíba street, 1000, 7th floor, Belo Horizonte, Minas Gerais, Brazil
Telephone	+55 31 36560501
Email	fbittencourt@waycarbon.com / https://waycarbon.com

Organization name	Catraia Soluções Ambientais LTDA
Role in the project	Responsible for developing the initial community relationship and forest inventory
Contact person	Rair Verde and Rodrigo de Souza
Title	Directors of Catraia Soluções Ambientais LTDA
Address	Avenue General Vieira de Melo, 588. ZIP-Code: 69915-178, Rio Branco – Acre, Brazil
Telephone	+55 (68) 99240-5603 / +55 (68) 99907-4200

Email	administrativo@catraiasolucoes.com.br

Organization name	Roma Participações S/S LTDA
Role in the project	Partner of IACO AMBIENTAL
Contact person	Rodrigo Gomes de Oliveira
Title	Director of Roma Participações LTDA
Address	Jurutes street. ZIP-CODE: 86055-750, Londrina, Paraná, Brazil.
Telephone	+55 (43) 9119-5555
Email	rodrigo@iacoambiental.com.br

Organization name	Guanabara Ambiental LTDA.
Role in the project	Partner of IACO AMBIENTAL
Contact person	Fernanda Hoebel Munhoz and Iana Hoebel Munhoz
Title	Director of Guanabara Ambiental LTDA
Address	Espírito Santo street, 890, 8th floor, Londrina city, Paraná, Brazil.
Telephone	+55 (43) 9603-0079
Email	diego@iacoambiental.com.br

1.7. Ownership

The project is conducted within a private property, named “Fazenda Guanabara/Petrópolis”, which has 148,541.15 hectares and is located in the municipally of Sena Madureira, in the state of Acre, Brazil. This property is composed of 69 parcels (designated by “Local ID” on

Table *1*) with CAR registrations that were leased by the IACO Ambiental Ltda.

The information of the parcels that compose the project area is in the table below. Property deeds and their CAR registry numbers[4] are listed for each respective local ID (i.e. local name of parcel), presents the delimitation and arrangement within the project area, and CCIR number[5].

Table 1 – Farm name, Property deeds, Local ID, CAR-Code

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
Guanabara	Lote 1	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 30–N; Page.073	438 Book 2RG	AC-1200500-3B8DE590124C4AFCB86D407144E6CF82
Guanabara	Lote 2	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 29-N; Page.095	446 Book 2RG	AC-1200500-FC24D2FD589041C285ED92A36257A47E
Guanabara	Lote 3	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 29–N; Page.097	445 Book 2RG	AC-1200500-A92A0DCBD6584AC982A9395CBF465BB5
Guanabara	Lote 4	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of	436 Book 2RG	AC-1200500-3AD551D8ABA949CB9B1CC898E27B567D

[4] Cadastro Ambiental Rural (CAR), https://www.car.gov.br/#/

[5] Certificado de Cadastro do Imóvel Rural (CCIR), https://sncr.serpro.gov.br/ccir/emissao?windowId=d82

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		Faxinal, state of Paraná; book number 158; Page.068		
Guanabara	Lote 5	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 30–N; Page.074	437 Book 2RG	AC-1200500-E0C9D24C45484E13916726F9EB06687E
Guanabara	Lote 6	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 29–N; Page.104	444 Book 2RG	AC-1200500-8D1B1D0A2CF64E3680FFA66BB7C27005
Guanabara	Lote 7	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 60–N; Page.049	443 Book 2RG	AC-1200500-894912D07E6E49E6BEA4E56B3CC3658D
Guanabara	Lote 8	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 29–N; Page.103	448 Book 2RG	AC-1200500-33EE63B7F91E4D8DBFD7C5C19AD5E195
Guanabara	Lote 9	PUBLIC WRITING OF PURCHASE AND SALE,	449 Book 2RG	AC-1200500-2DC9.21C8.28F2

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 29–N; Page.096		.441B.ACEA.C108 .ECB1.1C06
Guanabara	Lote 10	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 149; Page.184	330 Book 2	AC-1200500-75F30 AC0D32746F0AB 4C9E33167B33C 9
Guanabara	Lote 11	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 135; Pages. 29 and 30	331 Book 2RG	AC-1200500-CCE71955CC7E4 095 ACDCF1F4D8D65 CF0
Guanabara	Lote 12	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 166; Page.126	364 Book 2RG	AC-1200500-374BA7C200D54 45788E8652157 55B7E9
Guanabara	Lote 13	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number	363 Book 2RG	AC-1200500-C2ADDB8319204 E139AED53540C AAF9C6

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		129; Page.155 and 156		
Guanabara	Lote 14	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 60–N; Page.043	450 Book 2RG	AC-1200500-F97D79A2F5004F048522228BB1A5FBF6
Guanabara	Lote 15	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Rio Branco Registry, from the municipality of Rio Branco, state of Acre; book number 2–A; Page.273	451 Book 2G	AC-1200500-507E36B44B1349B3A18AAF5526BA7805
Guanabara	Lote 16	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 113; Page.182	332 Book 2RG	AC-1200500-2CD876EB495E44CDB87E30E68451CF22
Guanabara	Lote 17	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cândido de Abreu Registry, from the municipality of Cândido de Abreu, state of Paraná; book number 047; Pages. 017 to 019.	333 Book 2RG	AC-1200500-DAD78316048A4500B064DEE0C1A8F2D7

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
Guanabara	Lote 18	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.141	320 Book 2RG	AC-1200500-5C6F29D1F4E44B689B8DD75DC4F364DF
Guanabara	Lote 19	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.139	307 Book 2RG	AC-1200500-01059E84CA084A9FA45D7FF164BDDD24
Guanabara	Lote 20	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.140	325 Book 2RG	AC-1200500-AB441DDA11BA41D7865C1899EA4DE6A7
Guanabara	Lote 21	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.142	334 Book 2RG	AC-1200500-2DECDF6F1934433E91AB89268372B43D
Guanabara	Lote 22	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of	326 Book 2RG	AC-1200500-C225FAD69EA148CDBD932F601AD99D4A

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		Paraná; book number 167; Page.143		
Guanabara	Lote 23	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.144	327 Book 2RG	AC-1200500-D5F9A448B88D47A3BCD2B4E9EC37C759
Guanabara	Lote 24	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.134	328 Book 2RG	AC-1200500-BF7F3EDE2EA048EDB2B8F41932FC5A1D
Guanabara	Lote 25	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.135	321 Book 2RG	AC-1200500-0162310082EA4DF187C545D41A8A229C
Guanabara	Lote 26	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.137	322 Book 2RG	AC-1200500-EA33A111BF07408989A9CF86B2868EC1
Guanabara	Lote 27	PUBLIC WRITING OF PURCHASE AND SALE, registered in the	323 Book 2RG	AC-1200500-CF7963844F364

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 167; Page.136		308BF8CCC2398A88A6B
Guanabara	Lote 30	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 60–N; Page.041	313 Book 2RG	AC-1200500-72C4094579844D87A3E0F8F15CD6EDC1
Guanabara	Lote 31	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 29–N; Page.098	441 Book 2RG	AC-1200500-E0FF ACA05257439BB2DB868C02CF1AAD
Guanabara	Lote 32	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 120; Pages.125 and 126	556 Book 2RG	AC-1200500-BDDEED483F974A95AB3E2D880B45 ACE1
Guanabara	Lote 33	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 153; Page.093	319 Book 2RG	AC-1200500-45FA30CB13114E669140DC7768A0F0E4

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
Guanabara	Lote 34	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 153; Page.092	329 Book 2RG	AC-1200500-F052643AB36E465AA817A30403A15986
Guanabara	Lote 35	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 163; Page.002	324 Book 2RG	AC-1200500-68B9EC8D7DBA41DC9BF1D7387961E1EE
Guanabara	Lote 36	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Londrina Registry, from the municipality of Londrina, state of Paraná; book number 60-N; Page.047	447 Book 2RG	AC-1200500-5BE51166825D471E99BDF2D06F0595CF
Guanabara	Lote 37	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 60–N; Page.050	442 Book 2RG	AC-1200500-5CFF1002338B4F3EB0EFC2562C9E4D48
Guanabara	Lote 39	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of	471 Book 2A	AC-1200500-F4D1 AC43F76D4B579E21DEFB7D5D1FD5

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		Paraná; book number 60–N; Page.044		
Guanabara	Lote 28-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Tangará da Serra Registry, from the municipality of Tangará da Serra, state of Mato Grosso; book number 038; Page.109	299 Book 2RG	AC-1200500-52286F5EF2D64DFA9EB91EC81612B25B
Guanabara	Lote 28-B	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Sena Madureira Registry, from the municipality of Sena Madureira, state of Acre; book number 001; Page.149	246 Book 2RG	AC-1200500-0883FF943A7542669247EF12D6F3FA04
Guanabara	Lote 29	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Warta Registry, from the municipality of Londrina, state of Paraná; book number 29-N; Page.098	440 Book 2RG	AC-1200500-1011B294D2E44603A49CF16A1062C919
Guanabara	Lote 32-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of	555 Book 2RG	AC-1200500-21E4B9F172D740E5A39C16BE1CEC70CA

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		Paraná; book number 60–N; Page.042		
Guanabara	Lote 35-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Cesário Registry, from the municipality of Londrina, state of Paraná; book number 60–N; Page.045	495 Book 2RG	AC-1200500-2EE242818C294CE9A5BD3EC23493C340
Petrópolis	Lote 6	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 435–N; Page.097	1934 Book 2RG	AC-1200500-C7E80B9429404591BBAD37D1569EDE42
Petrópolis	Lote 8	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Rio Branco Registry, from the municipality of Rio Branco, state of Acre; book number 007; Pages.075 and 077	266 Book 2RG	AC-1200500-8FB034E4886B46B58BD966AC3E28B20F
Petrópolis	Lote 9	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.105	1933 Book 2RG	AC-1200500-AB1BEBF2BB564DCFB6F73312AA94B93B

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
Petrópolis	Lote 11	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number ; Page.	2088 Book 2RG	AC-1200500-0EF9557381D8485E8F133E58AF836743
Petrópolis	Lote 12	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Faxinal Registry, from the municipality of Faxinal, state of Paraná; book number 171; Pages.177 to 179	153 Book 2RG	AC-1200500-C476B49E60554C0F847394136922ABFB
Petrópolis	Lote 13	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 446-N; Page.107	1979 Book 2RG	AC-1200500-482108FD13AF4D1AAF5A225FA80BC376
Petrópolis	Lote 14	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 446-N; Page.046	1978 Book 2G	AC-1200500-E37521DBE49647F6BAF4A45616385EBF

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
Petrópolis	Lote 16	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.117	17 Book 2RG	AC-1200500-164BB70D333348BCBABB95A7920BB627
Petrópolis	Lote 13-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 447-N; Page.046	1977 Book 2G	AC-1200500-1BAFEF4D860047CBBB833B6689995B31
Petrópolis	Lote 15-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.123	1935 Book 2F	AC-1200500-57D994DD239D4319B01383D68A1B6BDE
Petrópolis	Lote 15-B	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.107	1940 Book 2F	AC-1200500-8066B865C95F455E8BF3C781AF310197

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
Petrópolis	Lote 15-C	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.111	1941 Book 2RG	AC-1200500-BE94E1D9FA924DDFB72C4411421D153A
Petrópolis	Lote 16-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.115	1936 Book 2RG	AC-1200500-F439AABB775F4193A17C2E7589419690
Petrópolis	Lote 17-18	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.113	1942 Book 2RG	AC-1200500-1A3345F6D6DD4B11AD5C52BE358167DE
Petrópolis	Lote 1-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Liana Claudia Registry, from the municipality of Maringá, state of Paraná; book number 434-N; Page.121	1943 Book 2	AC-1200500-756F1AE90A5F4496AD62CCF3519A59EE
Petrópolis	Lote 4-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the	1976 Book 2RG	AC-1200500-538B818CADD64

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 496-N; Page.051		9778A39A4580DB67EF7
Petrópolis	Lote 4-B	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 451-N; Page.023	2084 Book 2RG	AC-1200500-93AE98A4EF5046FAB36161812B4AD06B
Petrópolis	Lote 5	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 446-N; Page.061	1980 Book 2RG	AC-1200500-4810F4A40DE04F80AE886196D047FBD3
Petrópolis	Lote 6-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 435-N; Page.099	1938 Book 2RG	AC-1200500-64CBDA65B29C4812BE8FFF73920EB67A
Petrópolis	Lote 7-10	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the	1937 Book 2RG	AC-1200500-9B9871DF9E6E4C73822E9B9EDB2CCE13

Farm name	Local ID	Property deeds	Property Registry Office Number	CAR registry number
		municipality of Maringá, state of Paraná; book number 434-N; Page.109		
Petrópolis	Lote 9-A	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Diogenes Pinto Registry, from the municipality of Maringá, state of Paraná; book number 486-N; Page.176	1916 Book 2RG	AC-1200500-557EE07948104C63B8636B30116B6A75

1.8. Project Start Date

According to the VCS Standard Version 4.3, the project start date for AFOLU projects is the date on which activities that lead to the generation of GHG emission reductions or removals are implemented.

Therefore, the project start date for both AUD and APD components of the IACO REDD+ Project is defined as 16 December 2021, the date of the legal registration of the Business Partnership Agreement ("Contrato de Parceria Empresarial", in Portuguese), which has the documented objective of implementing the REDD+ Project at Fazenda Guanabara/Petrópolis. Also, on 16 December 2021 a "Rural Lease Agreement for Environmental Management and Reforestation Purposes" ("Contrato De Arrendamento Rural Para Fins De Gestão Ambiental E Reflorestamento", in Portuguese) was signed between the landowners and the partners of IACO Ambiental for the purpose of environmental management, forest maintenance, reforestation and commercial exploitation of the respective carbon credits.

1.9. Project Crediting Period

The Project Crediting Period will be 30 years, renewable for another 30 years. The first crediting period will be from 16 December 2021 until 15 December 2051, both days included. The maintenance of project activities throughout the proposed crediting period is ensured by a lease agreement of all parcels of the Fazenda Guanabara/Petrópolis located in the IACO REDD+ Project area to IACO Ambiental Ltda. This contract is defined as "Rural Lease Agreement for Environmental Management and Reforestation Purposes" (or in Portuguese "Contrato de Arrendamento Rural para Fins de Gestão Ambiental e Reflorestamento") and will be in force for a period of 60 (sixty) years, starting on December 16, 2021, with final term on December 15, 2081.

1st baseline period: 16/12/2021 to 15/12/2027;

2nd baseline period: 16/12/2027 to 15/12/2033;

3rd baseline period: 16/12/2033 to 15/12/2039.

4th baseline period: 16/12/2039 to 15/12/2045;

5th baseline period: 16/12/2045 to 15/12/2051;

1.10. Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	X

Estimates of GHG emissions reductions were made on a preliminary basis, assuming a deforestation rate of 1.237% for avoided unplanned deforestation activity, estimated by the deforestation rate of reference region (RRD) in the period from 2012 to 2021. For avoided planned deforestation activity, the GHG emissions reduction estimates take place on the first 7-year deforestation cycle and covered 4,194.57 hectares per year in the first 6 years, and 2,208.71 hectares in the last year.

Year	Estimated GHG emission reductions or removals (tCO_2e)
2022	1,672,870.82
2023	1,704,294.88
2024	1,735,676.18
2025	1,767,015.25
2026	1,798,312.61
2027	1,929,772.74
2028	1,558,322.35
2029	649,602.88
2030	652,771.33

2031	655,900.58
2032	626,097.57
2033	596,354.12
2034	566,669.49
2035	537,042.95
2036	507,556.97
2037	476,178.69
2038	453,318.03
2039	448,904.94
2040	444,546.44
2041	440,241.86
2042	432,069.08
2043	423,960.54
2044	415,915.45
2045	408,016.27
2046	400,012.56
2047	391,930.73
2048	384,918.03
2049	380,157.63
2050	375,456.11
2051	370,812.74
Total estimated ERs	23,204,699
Total number of crediting years	30

Average annual ERs	773,489

1.11. Description of the Project Activity

The main purpose of the IACO REDD+ Project is the conservation of the Amazon rainforest area in a property situated in the municipality of Sena Madureira, center of the Brazilian state of Acre, from planned and unplanned deforestation. This will be possible through income generation of carbon credits, and its posterior commercialization, for project proponents.

This project will be implemented to curb planned and unplanned deforestation on private property. Since 2013, the landowners of the Fazenda Guanabara/Petrópolis parcels have plans for planned deforestation as permitted by national law 12,651 (more details on section 3.4). In 2015, a request for forest cover suppression was filed with IMAC, Instituto do Meio Ambiente do Acre (Acre Environmental Institute, in English) to obtain permission to suppress native vegetation in 20% of the property's area. The purpose of this suppress was the timber exploration and the creation of pastures, a much-needed income and commonly seen activity at the region where the project is located. Between 2015 and 2019, the project proponents consulted different service providers in order to ask for proposals for infrastructure and labor for the implementation of the aforementioned activities. In 2019, the landowners received a proposal for a commercial partnership with a logging company and returned to the idea of planned deforestation by requesting an environmental service for suppression for the purpose of logging and analysis of pasture production in 2019 and 2021. In the absence of the project, 20% of Fazenda Guanabara/Petrópolis would have been deforested.

The other 80% of the property would be under high pressure from unplanned deforestation due to the insufficient presence of activities at the project site and the lack of a surveillance budget, which facilitates encroachment by subsistence farmers and ranchers. As shown **Figure 2** in part of the property was illegally deforested by these same agents in the last 6 years.

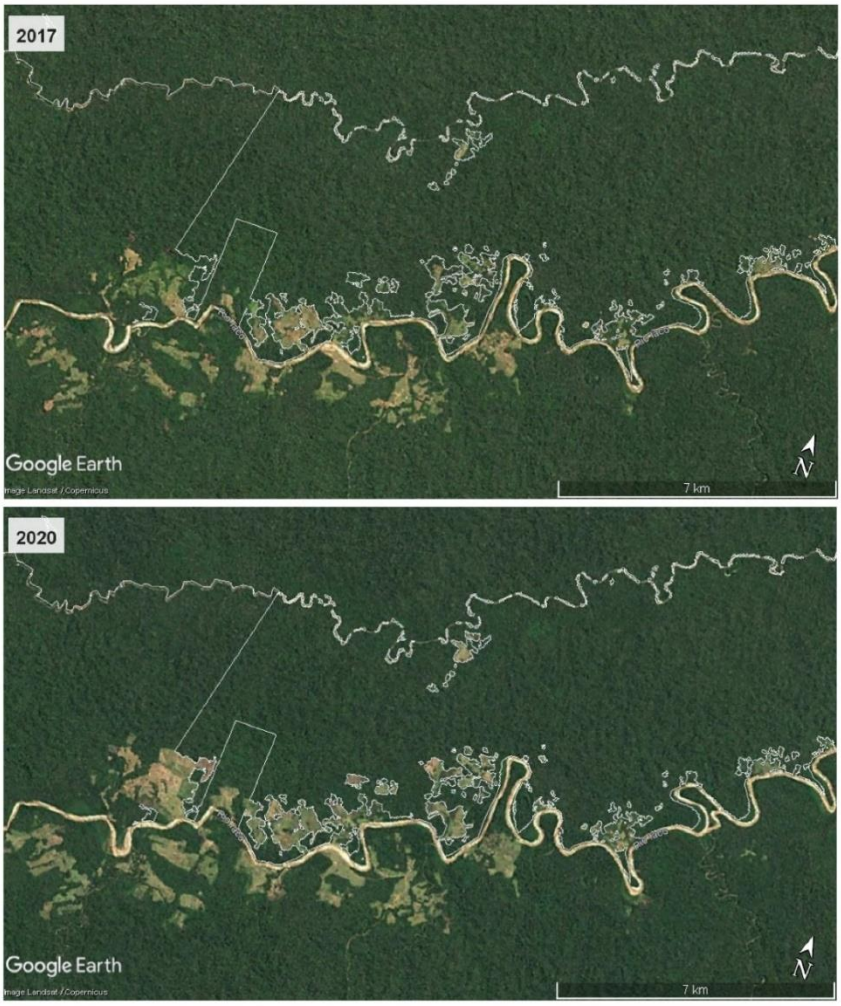

Figure 2 - Deforestation events occurred in 2017 and 2020 in the project area surroundings.

To mitigate these factors and achieve the reduction of emissions from deforestation, the IACO REDD+ Project has planned the following strategies in different spheres:

Climate sphere:

Installation of signboards to inform the presence of the REDD+ Project. As the project area boundary is not sufficiently recognized by community and immigrants, these signboards are intended to protect the project area against invasion and illegal deforestation and will contain information about the project and contact with the project proponents. These signboards will be allocated along the banks of the river since the main vector of deforestation comes from the Iaco and Macuanã Rivers.

Forest patrols. These patrols will have the objective of enforcing environmental laws, preventing the action of illegal agents of deforestation and/or degradation, as well as the maintenance of vegetation cover and conservation of biodiversity. It can also improve the relationship of trust between project proponents and local communities by involving residents in this activity. Such patrols will take place in the project area and in the leakage belt and the project proponent are facilitating mobility and reducing travel time in the field to ensure safety in the project and adjacent areas. A 4x4 car (**Figure 4**), was purchased to ensure safety in the development and surroundings and reduce travel time in the field. This

car will be stickered with the logo and contacts of the project representatives. In addition, some equipment have already been made available to facilitate the community's mobility along the rivers and creeks that are present in and around the project area. During the dry season, the risk of fire spreading in the project area and its leakage belt increases due to fires to open new areas. Therefore, the patrol frequency and team would be intensified as necessary at these times. If any evidence of encroachment, illegal logging or exploitation or fire outbreaks is found, the situation should be shared with the patrol team personnel, and immediately reported to the project management team for action to be taken and dully informed as per the definition of loss events.

Figure 3 - Car to be used by the patrol crew.

In addition, the "High resolution satellite imagery for monitoring forest cover and biodiversity conservation" activity will help physical patrol operations, since, with the definition of areas of greater pressure and understanding of the context of deforestation and degradation through images of high resolution, physical patrolling becomes more assertive and accurate.

Basecamp construction. This basecamp will be open to residents surrounding the project area, providing a safe place for consultation and to exchange opinions. In addition, this basecamp will have facilities such as a kitchen, bathroom and bedroom that can be used by visitors and project employees. Safety and communication equipment used by patrols such as leggings, radio and GPS, as well as fire extinguishing equipment (bombs, extension hoses, fire boots, etc.) will also be available there.

Fire Prevention and Extinguishing. In the IACO REDD+ Project region, forest fires are associated with human activity and occur with greater frequency, intensity, and severity in the driest periods and in areas with certain levels of occupation and/or degradation. Fire brigade training will be given to all people who show interest and vocation and who live close to the project area; Instruments to combat fires will also be made available in the project basecamp. Training related to awareness of fire ecology and good practices in preparing areas for cultivation, with a focus on preventing the spread of fire in forests will also be a project activity and will be open to anyone who wants to participate.

High resolution satellite imagery for monitoring forest cover and biodiversity conservation. There are no roads within the project area and access is limited to boats via rivers and waterways (Figure **4**). Therefore, the area that can be monitored by forest patrol is limited to the banks of the Iaco and Macauã Rivers, using satellite images for monitoring and observation of other areas.

Also, as described in the "Forest patrols" activity, the monitoring of forest cover using high-resolution images will support physical patrol operations, helping to understand the context of deforestation and areas of greater pressure.

Social sphere:

Regulation of land in areas occupied by the population. The objective is to provide the demarcation of areas destined for the traditional community that reside on project proponents lotes. Currently the best ways to carry it out are being studied and will be informed at the complete PD for registration and VVB assessment.

Training courses. Training will be offered on different topics, but especially on environmental awareness and climate change, biodiversity and ecosystem services and sustainable management of forests, agricultural lands, and grasslands. These trainings will be open to anyone who is interested and will be disseminated to the entire local community and neighbors to the project area.

Employment: People residing around the IACO REDD+ Project area will be contracted for some of the project activities, such as forest patrol, base construction, forestry guides and communication. These contracts will be made on a daily paid basis for the elaboration of a specific service. According to local interviews, this is the preferred way for most people residing in the area.

Education and health: Conversations and interviews with stakeholders are ongoing to define the activities that best serve the community. So far, the IACO REDD+ Project will support the improvement of education in the municipality of Assis Brasil. It is important to clarify that although the project is located at the municipality of Sena Madureira, Assis Brasil has the closest settlements to the project. Regarding health, the population living nearby the project area already has access to a health post (4 km from the community), the project aims to establish telemedicine at the health post in the municipality of Assis Brasil. Together with telemedicine, the IACO REDD+ Project will provide regular training to nurses and improve access to the local internet so that telemedicine consultations work well and meet community needs. Furthermore, the project aims to contact at and make contracts with doctors from the cities nearby so it will be possible to the communities to have face to face consultations and treatments.

Improvement and diversification of the local economy. the IACO REDD+ Project will provide technical assistance to support existing agricultural activities and promoting local culture by encouraging handicrafts for women residents in project region. Project proponents are committed to complete transparency and will not benefit financially from sales.

Transparency: The project proponents are committed to share information regarding project objectives and results achieved through booklets and visits by project employees.

Regenerative Agriculture. The goal of this activity is to strengthen the development of the local socio-economy by producing more food, increasing the income of farmers and improving the quality of life of the population. At the environmental level, regenerative agriculture increases biodiversity and regenerates vulnerable lands, besides creating more resilient landscapes for a more sustainable production. In this sense, the Project will provide technical support and brand development, branding and commercialization of the products produced.

Biodiversity sphere:

Monitoring of flora and fauna. The photographic record, for instance, can document, record, verbalize and trigger nature conservation, wildlife protection and environmental action. By hiring a photographer with extensive experience in recording fauna and flora, the IACO REDD+ Project intends, in addition to

registering local biodiversity, to be closer to threatened species, capture changes in the environment and promote nature conservation.

Partnerships with universities and research institutions. the project area will be offered to be used to the study of forest dynamics, biodiversity, conservation, and other themes related to the area. The Project will provide the infrastructure necessary so that researchers can stay in the area such as forest guides to accompany them.

Long-term data sets of acoustic activity. For the purpose of monitoring biodiversity and illegal activities in the IACO area, the proponents propose to acquire a Rainforest Connection project using RFCx Technology that relies on acoustic sensors (RFCx Guardians) that will monitor the ecosystem soundscape at selected location 365 days a year. In this sense, the activity can help in understanding the impacts of large drivers of changes, such as climate change on the fauna, thus it is possible to have more efficient long-term biodiversity management and illegal activity forecasting.

Jurisdictional and Nested REDD (JNR)

The REDD+ IACO Project is located in the state of Acre, which has a State System of Incentives for Environmental Services focused on promoting the reduction of GHG emissions, in accordance with the voluntary target of the State of Acre, the SISA-Carbon of 2010. However, there are no obligations for private REDD projects in adhesion to this jurisdictional program of the State of Acre and there is no risk of double-counting since the Government of Acre does not have a jurisdictional program validated by a carbon market standard. To date, the Acre SISA-Carbon is a public administration document that serves as a guide, which allows others to voluntarily join the Program if they choose. More details on compliance of IACO REDD+ Project and SISA-Carbon area available in section 1.14.

1.12. Project Location

The IACO REDD+ Project is situated in Sena Madureira, center of the Brazilian state of Acre. The municipality's area is 25,278 km², representing 16.5% of the State area. The project area is located between the Iaco and Macauã rivers within a private property, named "Fazenda Guanabara/Petrópolis", which has 148,541.15 hectares.

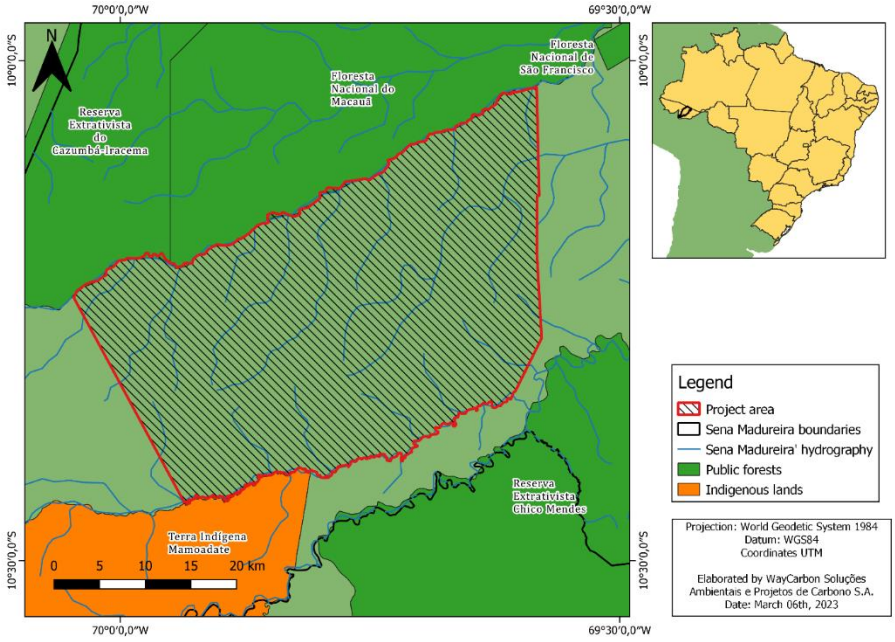

Figure 4 – IACO REDD+ Project location. The conservation units and indigenous lands that surround the area are highlighted. Source: FUNAI[6], IBGE[7] (2022) and ANA[8] (2018).

Access to the project area is difficult depending on the season and weather conditions. To access the project area, considering the dry season (drought), it is necessary to travel to the municipality of Assis Brasil, Acre. The city is about 345 km from Rio Branco, the state capital, being the municipality of Assis Brasil, accessed through the BR-317, with a displacement that accounts for approximately five hours of travel, including the use of a car.

Upon arriving in the municipality of Assis Brasil, it is necessary to access the Icuriã branch and travel approximately 80 kilometers, which will result in arriving at the banks of the Iaco River, which, in turn, limits and bathes the project area. In the Amazonian winter period, the project area can also be accessed via the Iaco River, with shipment taking place in the municipality of Sena Madureira, Acre (about 130 kilometers away from the capital Rio Branco) in the upstream direction of the river.

The project area is surrounded by conservation units. On the north, the project area borders the Flona Macauã (approximately 176,349.02 hectares) and the Reserva Extrativista Cazumbá-Iracema (approximately 754,987.10 hectares). On the south, the Mamoadate Indigenous Lands (approximately 312,584.49 hectares) and the Reserva Extrativista Chico Mendes (approximately 916,917.93) are neighboring the project.

A KML file is attached separately to better indicate the coordinates of the project.

1.13. Conditions Prior to Project Initiation

[6] Fundação Nacional do Índio (FUNAI), https://www.gov.br/funai/pt-br

[7] Instituto Chico Mendes da Conservação da Biodiversidade (ICMBio), https://www.gov.br/icmbio/pt-br/servicos/geoprocessamento/mapa-tematico-e-dados-geoestatisticos-das-unidades-de-conservacao-federais

[8] Agência Nacional de Águas, https://metadados.snirh.gov.br/geonetwork/srv/api/records/0f57c8a0-6a0f-4283-8ce3-114ba904b9fe

General characteristics of the project area and reference region

The land within the Project Area has original forest cover from the amazon rainforest, which has been intact, at the least, for over 10 years (Figure 1). However, the project region is experiencing increasing deforestation pressure driven primarily by extensive, small scale beef cattle farming and subsistence colonization farms (see Figure 2).

Although the project area is surrounding to different conservation units (UCs) and indigenous lands, according to the main sources of future deforestation projections[10], the project area is near to an area considered a hot spot for sporadic deforestation. Also, the same data shows that the dominant driver of tree cover loss in the IACO REDD+ Project region is the temporary loss or permanent deforestation due to small- and medium-scale agriculture. In addition, until 2021, 72,362 hectares were deforested within the Chico Mendes Extractive Reserve and 12,032.5 hectares within the Cazumbá –Iracema Extractive Reserve, both neighboring the IACO REDD+ Project area[2]. In 2020 the Chico Mendes Extractive Reserve and the Cazumbá –Iracema Extractive Reserve were among the three UCs with the largest deforested areas, with 5,922.5 and 878.1 ha deforested respectively2. Finally, the data analyzed in the Indigenous Lands included in the ZEE – Phase III**Erro! Indicador não definido.**, show the accumulated deforestation until the year 2020 with a total of 31,335 hectares and the Mamoadate Indigenous Land, neighboring the IACO REDD+ Project area, with 128.9 hectares in 2019 and 85 hectares in 2020[2].

Furthermore, there is currently a project to build a logging branch on the Petrópolis farm, in an area that borders the project area and which has been occupied for a long time by traditional populations[9]. This branch will have a great environmental impact, reducing the recreational and subsistence space of traditional communities[9].

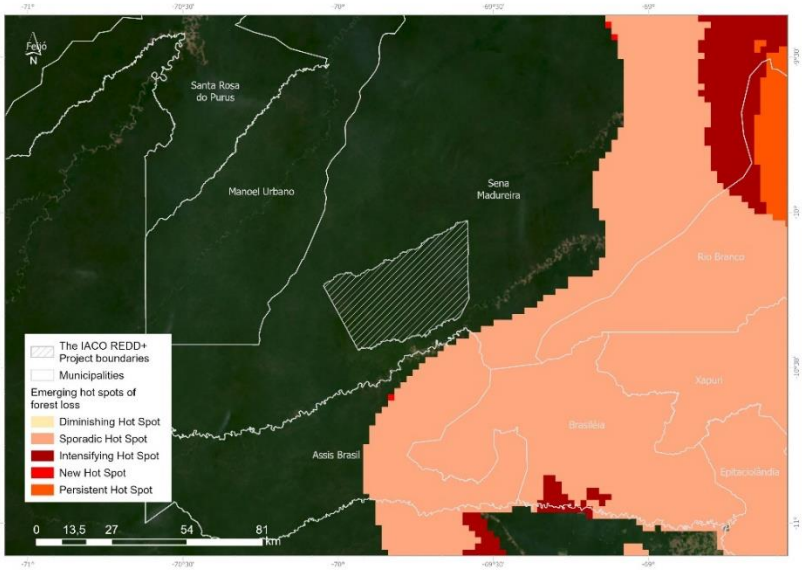

Figure 5 : Map of Emerging hot spots of forest loss by Global Forest Watch[10]

[9] Plano de Gestão Territorial e Ambiental Jaminawa e Manchineri para a Terra Indígena Mamoadate, 2016. Available at: < https://www.gov.br/funai/pt-br/arquivos/conteudo/cggam/pdf/2017/pgta-ti-mamoadate.pdf >.

[10] Global Forest Watch : Link here. Emerging hot spots of forest loss

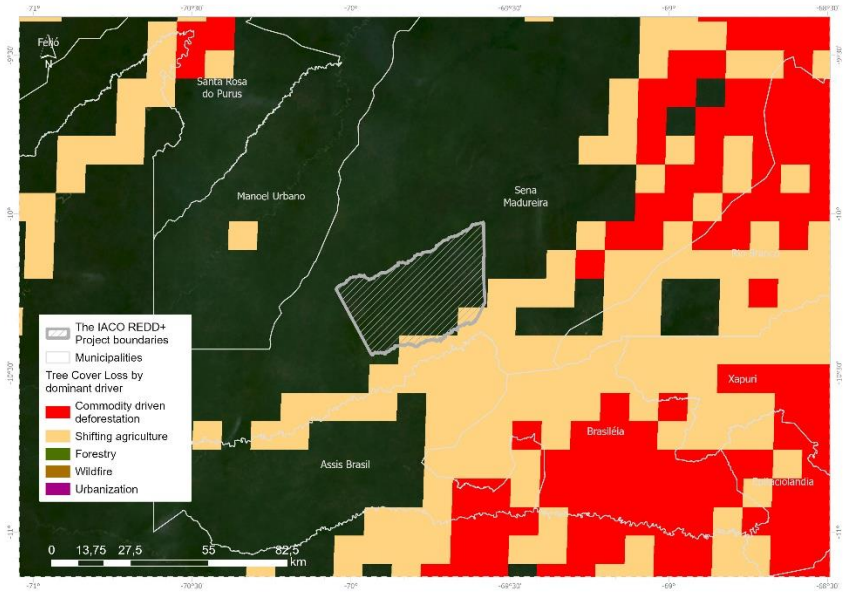

Figure 6: Map of Tree Cover Loss by Dominant Driver. Global Forest Watch [11]

Geology and Geomorphology

The main geotectonic unit is the Acre Basin, delimited by the Arc of Iquitos and the Andean belt. The basin is predominantly formed by poorly consolidated sedimentary material of the Cenozoic age[12]. The local landscape presents marked geology influences, tectonic activity, and physicochemical activities in its formation and evolution[13]. The area is constituted by shallow valleys, and the soil is predominantly sedimentary with high sediment cycling. Soils presents elevated contests of high activity clay and silt. It is therefore a pedologically recent region[14].

[11] Global Forest Watch: Link here .

[12] RESENDE, M.; MACHADO, R. P. Cotas fluviométricas do rio Acre, suas causas e implicações na política de colonização. Acta Amazonica [online]. 1988, v. 18, n. 3-4 [Acessado 20 Outubro 2022] , pp. 85-92. Available at: <https://doi.org/10.1590/1809-43921988183092>. ISSN 1809-4392. https://doi.org/10.1590/1809-43921988183092.

[13] KRONBERG, B. I. et al. Geochemical variations in Solimões formation sediments (Acre basin, Western Amazonia). Acta Amazonica [online]. 1989, v. 19 [Accessed 20 October 2022] , pp. 319-333. Available at: <https://doi.org/10.1590/1809-43921989191333>. ISSN 1809-4392. https://doi.org/10.1590/1809-43921989191333

[14] KRONBERG, B. I.; BENCHIMOL, R. E. Geochemistry and geochronology of surficial acre basin sediments (western amazonia): key information for climate reconstruction. Acta Amazonica [online]. 1992, v. 22, n. 1 [Accessed 20 October 2022] , pp. 51-69. Available from: <https://doi.org/10.1590/1809-43921992221069>. ISSN 1809-4392.

Topography and Soil

Gentle relief is predominant in area (100%)[15]. In the interfluves the predominant relief is also smooth wavy. However, they are interspersed by valleys with a minimum slope of 15%. At lower altitudes, flat relief predominates. In general, the region has a gentle topography[16].

The National Spatial Data Infrastructure (INDE) provides a Brazilian environmental database. This infrastructure has a variety of information obtained by government agencies; this information can be disposed of spatially by clicking on the desired area. From IBGE data, at a scale of 1:250.000, we found that the project area soils are predominantly composed of Haplic Luvisol (63,85%), followed by Red Yellow Argisoil (30,57%), Haplic Gleisol (5,57%) and Chromic Luvisol (0,001%).

As described above, the soils that occur within the project boundary are not inserted in the category of organic soils, being eligible for project activity in accordance with the applied methodologies in this PD.

Climate and Hydrography

The typical climate in the state of Acre is the humid equatorial climate (Af category in Koppen Climate Scale)[17] which is predominantly low thermal amplitude with high temperatures, average temperature around 25°C; and high precipitation levels, usually around 2000mm (Bardales, 2005)[18]. Usually, the rainy season extends from November to April and the dry season from June to September. Rivers and streams show high seasonality occasioned by the low relatively depth of regional soil, which occurs due to presence of high activity clays in the soil. Although there are high levels of precipitation, the water has difficulty to infiltrate in the soil (Resende & Pereira, 1988)[19].

The Project is located at the west bank of Iaco River, an affluent of the Purus River, which in turn is an affluent of the Solimoes River. The Iaco River has an extension of approximately 650 km and two main affluent rivers, Macauã and Caeté Rivers (Pereira & Morais, 2015)[20].

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[15] Brazilian Institute of Geography and Statistics (IBGE), https://www.ibge.gov.br/geociencias/todos-os-produtos-geociencias.html

[16] BARDALES, N. G. Envioromental stratification, classification, mineralogy and use of the groud of Micro-basin of the Narrow River Xiburema, Sena Madureira, Acre. 2009. 242 f. Tese (Doutorado em Fertilidade do solo e nutrição de plantas; Gênese, Morfologia e Classificação, Mineralogia, Química,) - Universidade Federal de Viçosa, Viçosa, 2009.< Available at: <https://www.locus.ufv.br/handle/123456789/1598>

[17] ALVARES, C. A.; et al. Köppen's climate classification map for Brazil. Meteorologische Zeitschrift, v. 22, n. 6, p. 711-728, 2013.

[18] BARDALES, N. G. Gênese, morfologia e classificação de solos do Baixo Vale do rio Iaco, Acre, Brasil. 2005. 132 f. Dissertação (Mestrado em Solos e Nutrição de Plantas) - Universidade Federal de Viçosa, Viçosa. 2005. Available at: < https://locus.ufv.br//handle/123456789/10964 >

[19] RESENDE, M.; MACHADO, R. P. Cotas fluviométricas do rio Acre, suas causas e implicações na política de colonização. Acta Amazonica [online]. 1988, v. 18, n. 3-4 [Acessado 20 Outubro 2022] , pp. 85-92. Disponível em: <https://doi.org/10.1590/1809-43921988183092>. ISSN 1809-4392. https://doi.org/10.1590/1809-43921988183092.

[20] PEREIRA, T. K. K.; DE MORAIS, J. F. Técnicas de geoprocessamento aplicadas aos problemas ambientais que afetam o rio Iaco dentro do limite do município de Sena Madureira-AC. Revista Eletrônica em Gestão, Educação e Tecnologia Ambiental, p. 11-20, 2015. Available at:< https://periodicos.ufsm.br/reget/article/view/13867/pdf >.

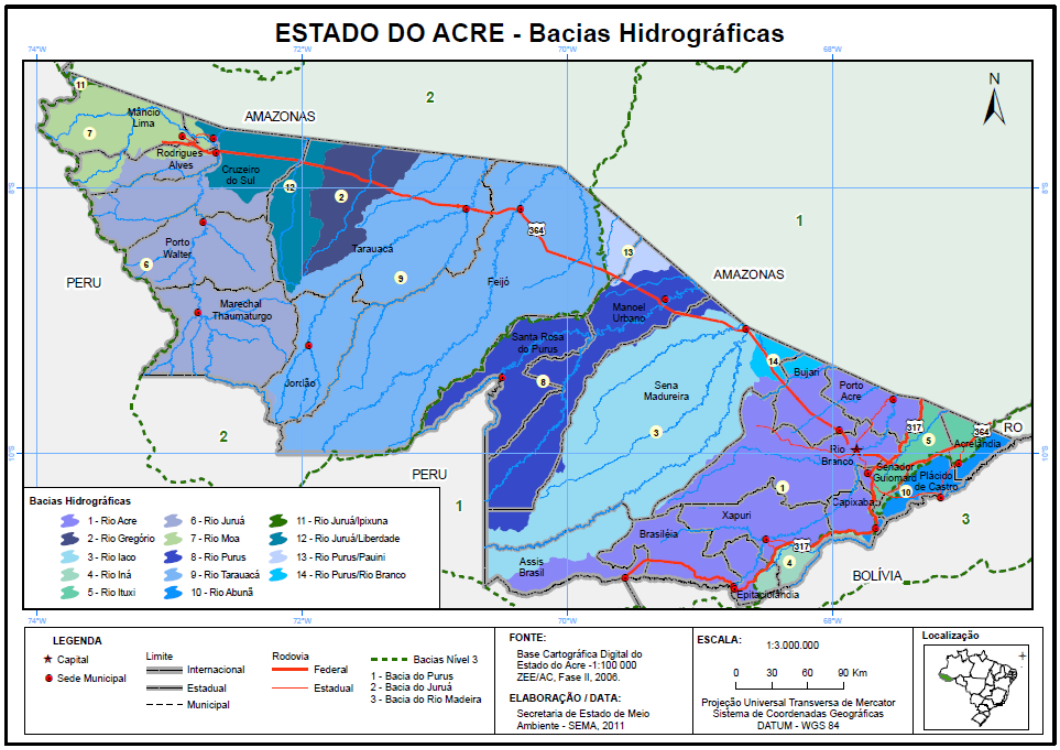


Figure 7 - Hidrography in Acre State, Source: ZEE III, 2022[42]

Socio-economic conditions

The Project is in the municipal area of Sena Madureira, in the state of Acre. The municipality of Sena Madureira has an estimated population of 47,168 people[21] (2020), of which 5,1% was occupied under a registered employment regimen, for which the average monthly salary was of 1,5 minimum salaries. Nevertheless, 46,3% of the domiciles counted with only half of a minimum salary (IBGE, 2020).

In the state of Acre, the main economic sectors are agriculture and livestock. The last one is Sena Madureira main activity. Other relevant sectors in the state are the industry and other services (ZEE, 2021)[22]. Analyzing the evolution of GDP per capita in Acre, between 2015 and 2018, there was a stagnation of GDP per capita that varied between -0.7% and 0.3%. Sena Madureira, presented in 2018 a GDP per capita of R$ 11,475.00, approximately 42% lower than the average GDP of the state[42].

[21] Brazilian Institute of Geography and Statistics (IBGE), 2021. Sena Madureira. Available at: < https://cidades.ibge.gov.br/brasil/ac/sena-madureira/panorama >.

[22] Acre, 2021. Ecological and economic zoning, Acre. Available at: < https://ipam.org.br/bibliotecas/fase-iii-do-zoneamento-ecologico-economico-do-estado-do-acre/>

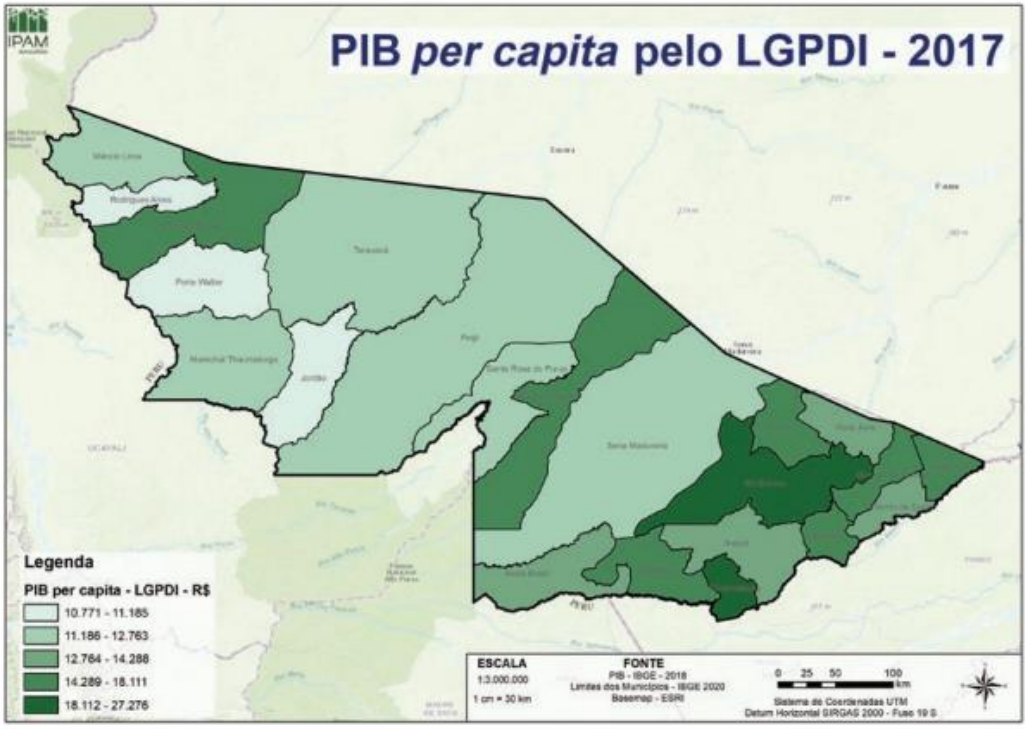


Figure 8 - GDP of Acre State in 2018. Source: ZEE III, 2022[42]

One of the national educational indices in Brazil is called Basic Educational Development Index (Ideb). By this index, the educational system of each state is evaluated according to the students' permanence in school, obtained from the School Census, and from the performance averages in the Basic Education Assessment System (Saeb)[23]. This index generates numerical evaluations between 0 and 10, with 10 being the best possible scenario. According to the Ecological and Economic Zoning (ZEE, 2021), in 2019, the state of Acre was evaluated with rates of 4,9 for public elementary school and average of 3,9 for high school. This rates, although low, were the highest in Brazil's north region. As for analphabetism rates, although the state is reducing the population inability to read and write, their number still high, and the official information and evaluating index are outdated. Still, in 2012 almost 14% of the population with more than 15 years old were illiterate, and according to ZEE, this data remained alarming in 2021.

In terms of public health, in the state of Acre, the child mortality is in decay for the last two decades. However, in 2016 the average value was of 17 deaths per 1000 births, higher than the national average of 13 deaths. In terms of sanitation, in 2019 only 55,2% of the state domiciles had access to the supply network of treated water, 40,6% had sewage treatment, and just 68,7% had any form of residue collection [24].

Vegetation and Biodiversity

[23]National Institute of Educational Studies and Research Anísio Teixeira (Inep). Índice de Desenvolvimento da Educação Básica (Ideb). Available at:< https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/ideb>

[24] ACRE, Governo do Estado Zoneamento ecológico-econômico do Acre: fase III: escala 1:250.000: documento-síntese / Secretária de Estado do Meio Ambiente. – Rio Branco: Semapi, 2021. Available at: < http://semapi.acre.gov.br/wp-content/uploads/sites/20/2021/12/COMPLETO-Resumo-Executivo-do-ZEE-Acre-Fase-III_V16_WEB.pdf>

The Acre State is one of the least deforested states in the Brazilian Amazon, with around 87% of the state's territory occupied by forests and around 80% of them untouched. Despite representing only 1.7% of Brazil's land surface, it is of great ecological importance, as it is in a transition zone between the Amazonian plain and the Andes, with biodiversity from both regions.

About 45%[42] of Acre's forests are classified as "Floresta Aberta com palmeiras" (Open Forest with palms, in English). It is usually found in areas close to the alluvial plains of rivers with high flow during the flood season. It is characterized by an open canopy forest with the presence of palm trees, and areas with lianas can also be found. About 36%[42], are classified as "Floresta Aberta com Bambu" (Open Forest with bamboo). This type of forest presents a mixture of physiognomies among which can be found: the open forest with a large concentration of bamboo; and Open Forest with palm trees, as well as small patches of dense forest. The presence of lianas can be observed in areas close to streams. There is also a large concentration of bamboos, and this species often reaches the canopy, dominating the vegetation. There may also be patches of open forest with a lower concentration of bamboos and a greater number of tree individuals. 5,5%[42] of Acre's land are classified as "Florestas densas" (Dense Forest) and "Campinaranas". The first, is a forest with emerging trees of approximately 50 meters high. It presents a lot of tree regeneration in the different topographical situations. In the lower areas, subject to flooding, there is a greater number of shrub and palm species. The Capinarana vegetation develops on extremely poor sandy soils and, in most cases, soils subject to flooding and rich in humic acid. It presents a low and irregularly open understory, high density of small and thin trees.

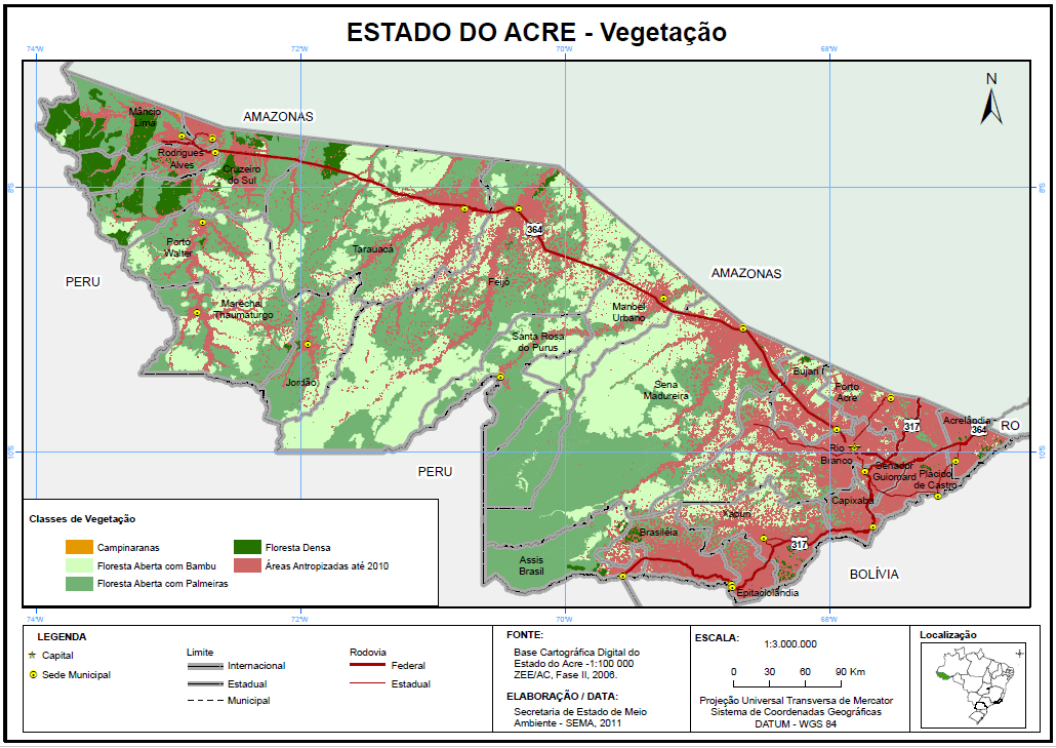


Figure 9 - Land cover in Acre State, Source: ZEE III, 2022[42]

The IACO REDD+ Project is covered by Lowland Open Forest (94,52%) and Alluvial Open Forest (5,48%)[25] and it is considered a very sensitive area due to fauna and flora conservation targets[26] present in these vegetation types.

The state of Acre is one of the regions with the highest richness of the world's species[27], harboring approximately 40% of the Brazil 's mammals and 4.5% of the world[28].

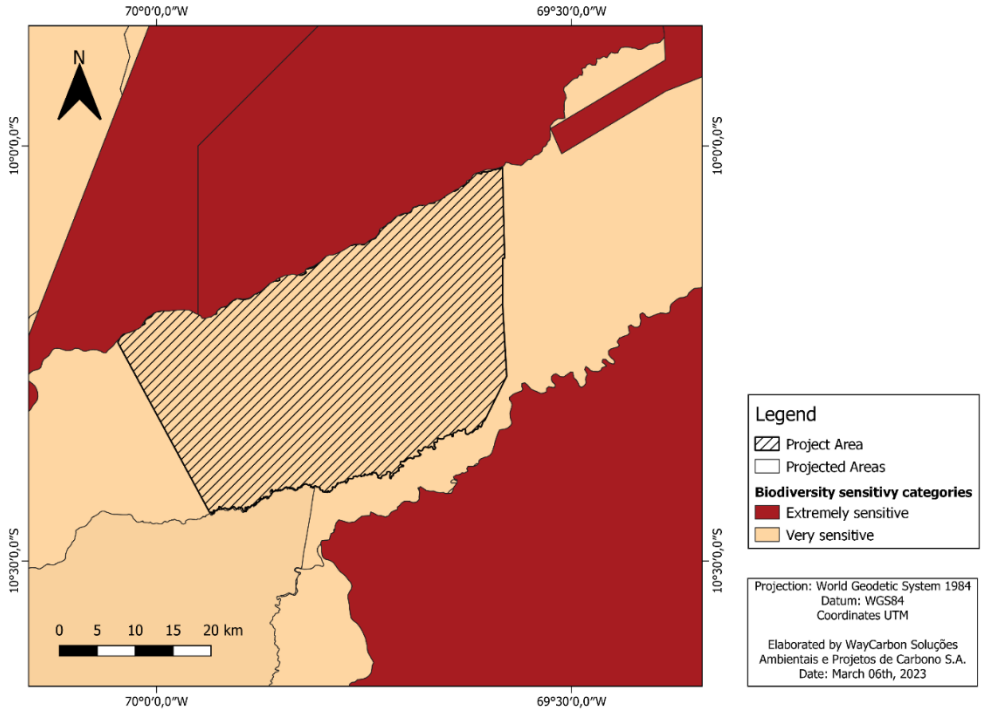


Figure 10 - The IACO REDD+ Project is located in zones classified as Very Sensitive, according to Plan for Reducing the Impact of Land Road Infrastructures on Biodiversity developed by ICMBio.

According to PRIM (Plan for Reducing the Impact of Land Road Infrastructures on Biodiversity) developed by ICMBio (Instituto Chico Mendes de Conservação da Biodiversidade) in 2018, conservation target species of flora and fauna are extinction-threatened species (**Table 2**) that go beyond impacts of land road infrastructure, and they could be considered good examples for prevention, mitigation and/or protection actions against negative impacts on ecosystems in general.

[25] Brazilian Institute of Geography and Statistics (IBGE), 2021. Sena Madureira. Available at: <https://bdiaweb.ibge.gov.br/#/home>. Last access: 24/06/2022.

[26] ICMBio (Instituto Chico Mendes de Conservação da Biodiversidade), 2018. Plan for Reducing the Impact of Land Road Infrastructures on Biodiversity (PRIM). Available at: < https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/plano-de-reducao-de-impactos-sobre-a-biodiversidade/rodovias-e-ferrovias >. Last access: 24/06/2022.

[27] Schipper et al. 2008. The status of the world's land and marine mammals: diversity, threat, and knowledge. Science. 322: 225-230.

[28] ACRE. 2010. Livro Temático - Recursos naturais: Biodiversidade e ambientes do Acre. ZEE/AC, Fase II, escala1:250.000/Programa Estadual de Zoneamento Ecológico. Rio Branco, SEMA.

Table 2 – Conservation target species, according to Plan for Reducing the Impact of Land Road Infrastructures on Biodiversity (PRIM – ICMBio)

Biodiversity Component	Group or Family	Species
Fauna	Birds	*Alectrurus tricolor*
		Asio stygius
		Coryphaspiza melanotis
		Cranioleuca vulpecula
		Crax fasciolata pinima
		Frederickena unduliger
		Hydropsalis anomala
		Lophotriccus eulophotes
		Phaethornis aethopygus
		Sporophila maximiliani
		Strix virgata
		Syndactyla ucayalae
		Urubitinga coronata;
	Mammals	*Ateles chamek*
		Atelocynus microtis
		Blastocerus dichotomus
		Chrysocyon brachyurus
		Lagothrix cana cana
		Leopardus wiedii
		Lycalopex vetulus
		Myrmecophaga tridactyla
		Panthera onca
		Priodontes maximus
		Puma concolor
		Puma yagouaroundi
		Tapirus terrestris
Flora	Fabaceae	*Apuleia leiocarpa*
	Lecythidaceae	*Bertholletia excelsa*
	Lauraceae	*Mezilaurus itauba*
	Meliaceae	*Swietenia macrophylla*
	Myristicaceae	*Virola surinamensis*

In addition, there is a zone with high conservation priority of 6.209,89 ha (**Figure 11**) located inside the project area, according to ZEE (3rd Edition). It means that conservation actions (flora and fauna), sustainable use and benefit-sharing of the Brazilian biodiversity have high priority in these areas.

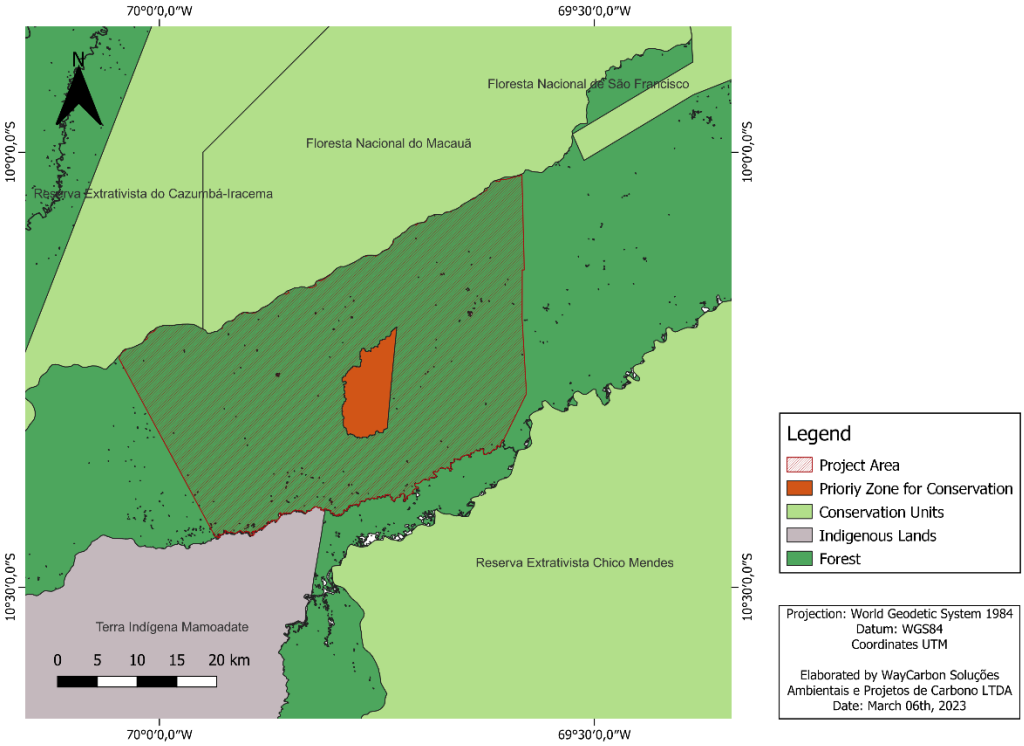


Figure 11 - Zone with high conservation priority within the IACO REDD+. Fonte: ZEE-AC (2021)**Erro! Indicador não definido.** .

1.14. Compliance with Laws, Statutes and Other Regulatory Frameworks

The IACO REDD+ Project and its proponents is in full compliance with all applicable and relevant national, state, and local laws, including statutes and regulatory frameworks.

National Laws and Regulatory Frameworks

Brazilian Federal Constitution[29]: In the Chapter 6, Article 225, the Paragraph 1 discusses the ecologically well-balanced environment through the preservation and restoration of essential ecological processes and provide for the ecological management of species and ecosystems, as well as the preservation of the diversity and integrity of the country's genetic heritage and inspect entities dedicated to research and manipulation of genetic material. Further, in Paragraph 4 is stated: "The Brazilian Amazonian Forest, the Atlantic Forest, the Serra do Mar, the Pantanal Mato-Grossense and the coastal zone are part of the national patrimony, and they shall be used, as provided by law, under conditions which ensure the preservation of the environment." The IACO REDD+ project activities will protect approximately 147

[29] Georgetown University, "1988 Constitution, with 1996 reforms in English" Available at: <https://pdba.georgetown.edu/Constitutions/Brazil/english96.html#mozTocId920049> Last access: 30/04/2022

thousand hectares of Brazilian Amazonian Forest, ensuring an ecologically balanced environment and preserving one of the most biodiverse areas in the world [30].

Brazilian Forest Code (Law Nº 12.651, 25/05/2012)[31]: In Chapter 1, Article 1, is stated: "This Law establishes general standards on the protection of vegetation, permanent preservation areas, and legal reserve areas". It establishes that every rural property located in forested areas should have a Permanent Preservation Area and Legal Reserve areas (LR) of eighty percent (80%) of a rural property in the Brazilian Legal Amazon. In addition, in Chapter 5, Article 26 is stated: The removal of native vegetation to alternative land use, are conditioned to the registration of the property in the Rural Environmental Registry - CAR, mentioned in art. 29, and the prior authorization of the competent state agency Sisnama (Environment National System), corresponding to national and state environmental agencies". In the case of Acre State, the official agency is the Environmental State Secretariat (SEMA). All properties belonging to the IACO REDD+ project have officially allocated 80% of their total area as LR and all the Permanent Preservation Areas (APPs) are respected. Moreover, all of them are duly registered in CAR. Finally, as all properties included in the IACO REDD+ project are in full compliance with this law, it is expected that any forest conversion must be formally authorized by the competent body.

Brazilian National Policy on Climate Change (Law Nº 12.187, 29/12/2009)[32]: The PNMC defines actions and measures aimed at mitigating and adapting to climate change, with the following specific objectives for deforestation: seek a sustained reduction in deforestation rates in all Brazilian biomes, until reaching zero illegal deforestation and eliminating the net loss of area of forest cover in Brazil by 2020. The IACO REDD+ Carbon Project's primary purpose is to avoid the GHG emissions from the deforestation of 60,805 hectares of original Amazon rainforest with estimated GHG emission reductions over the 30 years of project lifetime, are of 23,204,699 tCO2e (annual average of 773,489 tCO2e), contributing with climate change mitigation.

State Laws and Regulatory Frameworks

Decree N°. 7.734 of 06/06/2014[33]: This Decree, consisting of 4 Chapters divided into 12 articles, regulates the Rural Environmental Registry (CAR) within the State of Acre. In the Chapter 3, Article 4, is stated: "All rural properties existing in the State of Acre, including those that already have the Rural Environmental Licensing - LAR and those that extend to other States, must be registered in the CAR". All properties (registrations) incorporated into the IACO REDD+ project are in full compliance with the CAR in the Sicar-Acre system.

SISA Acre (Law n°. 2,308 /2010) and Jurisdictional Program of the State of Acre (2013): "The Acre Environmental Services Incentive System – SISA is linked to the Forest Environmental Asset Valuation Policy, which is composed of a set of interconnected programs, projects and actions, whose purpose is

[30] PANUNCIO, M.; et al. WWF's Living Amazon Initiative. A comprehensive approach to conserving the largest rainforest and river system on Earth. 2010.

[31] BRASIL. Law nº. 12.651, of 25 May 2012. Forest Code. Diário Oficial [da] República Federativa do Brasil, Brasília, DF, 25 May 2012. Available in English at: < https://www.gov.br/mj/pt-br/acesso-a-informacao/atuacao-internacional/legislacao-traduzida/lei-no-12-651-de-25-de-maio-de-2012-senasp_eng-docx.pdf>. Last access: 30/04/2022

[32] Law No. 12.187 instituting the National Policy on Climate Change (PNMC). Available at < https://www.braziliannr.com/brazilian-environmental-legislation/law-no-12187-brazilian-national-policy-on-climate-change>. Last access: 02/06/2022

[33] Decree nº 7734 of 06/06/2014 regulating the Rural Environmental Registry (CAR) within the State of Acre. Available at < http://extwprlegs1.fao.org/docs/html/bra137574.htm>. Last access: 03/05/2022

the conservation and improvement of environmental quality throughout the state." In one of SISA Acre programs, the ISA Carbon program, which will be implemented under a fully jurisdictional approach, at the subnational scale, intends to incorporate incentives and projects related to reducing emissions from deforestation and forest degradation – REDD+. In the SISA Acre's description, particularly in articles 22 and 23, there is no provision of any determination, rule, limitation, or specification on the execution of REDD projects in the Acre State territory. In the articles 24, 25 and 26 there is a mention on the establishment of a preliminary period and commitment to the emission reduction target, as well as the establishment of a limit of registrable carbon units for special projects, and the intention to implement a system of accounting for reductions. However, there is no definition or regulation on the application of these themes. Thus, the SISA-Carbon Program does not have legal applicability to REDD projects until all the issues mentioned above are fully regulated. In addition, there is no prohibition on carrying out these projects by the private sector, nor the obligation for private REDD projects to adhere to the SISA-Carbon Program. Regarding the Acre REDD jurisdictional program, it is a public administration document that serves as a guide, which allows others to voluntarily join the Program if they choose. Moreover, it was not formally validated under the VCS, or any other standard of REDD+ in Brazil or worldwide. Therefore, there are no obligations for the IACO REDD+ Project in adhesion to the jurisdictional program of the State of Acre and there is no risk of double-counting since the Government of Acre does not have a jurisdictional program validated by a carbon market standard.

1.15. Participation under Other GHG Programs

1.15.1. Projects Registered (or seeking registration) under Other GHG Program(s)

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

1.15.2. Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG program.

1.16. Other Forms of Credit

1.16.1. Emissions Trading Programs and Other Binding Limits

The activities that result on the GHG removal of the project are not included in any other emission trading programs or mechanisms that includes GHG allowance trading.

1.16.2. Other Forms of Environmental Credit

The activities that result on the GHG removal of the project are not included in any other emission trading programs or mechanisms that includes GHG allowance trading.

1.17. Sustainable Development Contributions

The IACO REDD+ Project is responsible for more than just mitigating climate change by avoiding carbon emissions from deforestation. The project will also ensure the conservation of a large biodiversity hotspot area and implement a series of social and biodiversity conservation activities for the benefit of the local community, envisioning the future incorporation of the CCB Standard.

It is also important to highlight how the project activity is in line with the nationally determined Contribution, conceived under the Paris Agreement, which outlines the efforts each country is willing to make in order to reduce national emissions and adapt to the impacts of climate change. The Brazilian

NDC has a specific theme for the forestry and land use change sectors[34], in which, of the 5 goals established, the IACO REDD+ Project directly contributes with two:

- The importance of enforcing the forestry code, which has already been observed and resulted on further efforts on conservation and restoration of legal reserves and permanent protection areas.
- The importance of enforcing the end of illegal deforestation at the Amazonian biome and grant the compensation of emissions caused by legal vegetation suppression until 2030.

The project benefits are also in line with the SDGs (Sustainable Development Goals), which were nationalized[35]. The IACO REDD+ Project activities can contribute to the sustainable development of the following socioeconomic and environmental issues.

Ensure healthy lives and promote well-being for all at all ages

United Nations Goals (UN): 3.b Support research and development of vaccines and medicines for communicable and noncommunicable diseases, which primarily affect developing countries. Provide access to essential medicines and vaccines at affordable prices. In line with the Doha Declaration, which affirms the right of developing countries to make full use of the provisions of the TRIPS agreement on flexibilities to protect public health and, in particular, provide access to medicines for all.

3.c Substantially increase health financing and the recruitment, development and training, and retention of health personnel in developing countries, especially in least developed countries and small island developing states.

National Goals: 3.b Support research and development of health technologies and innovations for communicable and non-communicable diseases, provide access to these technologies and innovations incorporated into the SUS, including medicines and vaccines, to the entire population.

3.c Substantially increase health funding and the recruitment, development, training and retention of health personnel, especially in the most vulnerable territories.

Project activity: The project aims to install internet points at the health post in order to enable online consultations and healthy preventive education. In addition, the project aims to sign agreements with doctors from neighboring cities so that face-to-face care can be provided, especially for women going through motherhood.

Indicators to be monitored:

- Number of online consultations.

[34] MMA. REDD+ e a NDC do Brasil, 2019. Available at: < http://redd.mma.gov.br/pt/redd-e-a-indc-brasileira>. Last Access: 20th October. 2021.

[35] IPEA. **ODS – Metas Nacionais dos Objetivos de Desenvolvimento Sustentável.** 2018. Available at: < https://www.ipea.gov.br/portal/images/stories/PDFs/livros/livros/180801_ods_metas_nac_dos_obj_de_desenv_susten_propos_de_adequa.pdf>. Last access: 20th October 2021.

- Number of women benefited from the activity during motherhood;
- Number of people benefited from improvement of the number of consultation after project implementation.

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

United Nations Goals (UN): 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent work and entrepreneurship.

4.a Build and improve physical education facilities that are child-friendly and gender-sensitive and that provide safe, non-violent, inclusive and effective learning environments for all.

National goals: 4.4 By 2030, substantially increase the number of young people and adults who have the necessary skills, especially technical and professional, for employment, decent work and entrepreneurship.

4.a Offer physical school infrastructure suited to the needs of the child, accessible to people with disabilities and gender-sensitive, which ensures the existence of safe, non-violent, inclusive and effective learning environments for all.

Project activity: Construction of support point for studies in the preserved area, structures that allow researchers to stay (bathroom, bedroom, kitchen, study room). The project aims to contact universities as a way of encouraging research in the area. The project also foresees the promotion of training courses in various segments.

Indicators to be monitored:

- Number of structures construed
- Record of contact with educational institutions to encourage the use of the space and formal evaluation of the structure by those who use it
- Number of training courses promoted by the project activities

Achieve gender equality and empower all women and girls

United Nations Goals (UN): 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life.

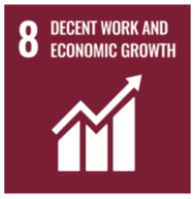
5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Program of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences.

National goals: 5.5 Ensure the full and effective participation of women and equal opportunities for leadership at all levels of decision-making in the public sphere, in its political and economic dimensions, considering the intersections with race, ethnicity, age, disability, sexual orientation, gender identity, territoriality, culture, religion and nationality, especially for women from the countryside, the forest, the waters and the urban peripheries.

Project activity: Encourage women and girls to actively participate in project activities; Promote lectures on gender equality. Specific training to promote the financial development of girls and women. The definition of which courses will be provided should be based on consultation with women in the community. Monitoring of gender equality opportunities in project indicators; development of female empowerment activities; workshops, trainings and other activities aimed at the development of community members and health care targeted at girls and women.

Indicators to be monitored:

- Proportion of seats occupied by women in assemblies and courses offered by the project.
- Proportion of women in decision-making positions.
- Number of specific medical consultations for the female public.



Promoting inclusive and sustainable economic growth, full and productive employment, and decent work for all

United Nations Goals (UN): 8.2 Achieve higher levels of productivity in economies through diversification, technological modernization, and innovation, including through a focus on high value-added and labor-intensive sectors.

National goals: 8.2 Achieve higher levels of productivity, through diversification and adding value, technological modernization, innovation, management, and worker qualification; focused on labor-intensive sectors.

Project activity: The project aims to stimulate the production of handicrafts and other agricultural activities in the region, offering technical assistance and production guidance, especially to women, in partnership with a Brazilian visual artist. Products from the region will be marketed through the project website. Still, the Project foresees the hiring of people residing around the project area for some of the project activities, ensuring employment.

Indicators to be monitored:

- Number of persons benefited by the technical assistance and production guidance;
- Number of people hired for project activities.

Take urgent action to combat climate change and its impacts

United Nations Goals (UN): 13.1 Strengthen resilience and adaptability to climate-related risks and natural disasters in all countries.

13.3 Improve education, raise awareness, and raise human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

National goals: 13.1 Strengthen resilience and adaptability to climate-related risks and natural disasters in all countries.

13.3 Improve education, raise awareness, and raise human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Project activity: Protection of the forest area. Annual training of the community in firefighting. Training of forest patrols with members of local communities. With this, the project involves the avoidance of conversion of 60,805 hectares of forest over its lifespan and it is an essential activity for climate change mitigation. The project has as one of its activities, the promotion of training, mainly in the following scopes of environmental awareness and climate change, biodiversity and ecosystem services and sustainable management of forests, agricultural lands, and grasslands.

Indicators to be monitored:

- Number of training for the firefighting;
- Number and records of occurrences of fire
- Number and records of patrollers operations,
- GHG Emissions reductions and removals.

Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt the loss of biodiversity.

United Nation Goals (UN): 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in accordance with obligations under international agreements.

National goals: 15.1.1br Until 2020, will be conserved, through systems of conservation units provided for in the Law of the National System of Conservation Units (SNUC), and other categories of officially protected areas such as Permanent Preservation Areas (APPs), Legal Reserves (RLs) and indigenous lands with native vegetation, at least 30% of the Amazon, 17% of each of the other terrestrial biomes and 10% of marine and coastal areas, mainly areas of special importance for biodiversity and ecosystem services, ensuring and respecting the demarcation, regularization and effective and equitable

management, aimed at ensuring interconnection, integration and ecological representation in broader terrestrial and marine landscapes.

Project activity: Given the trend towards cattle ranching in the region, the project will offer technical assistance in sustainable pasture management practices to local producers. These measures should avoid the need to open new pasture areas, improve productivity, lower the costs of raising animals and mitigate soil degradation. Also, as a main activity of the project, there is the conservation of 136 million of native forest where the IACO REDD+ Project is located.

Indicators to be monitored:

- Number of technical assistances offered.
- Area (ha) conserved by project activities.

1.18. Additional Information Relevant to the Project

Leakage Management

Avoided unplanned deforestation component

The AUD leakage assessment for this project on AUD component were determined as per VMD0010 – "Estimation of emissions from activity shifting for avoiding unplanned deforestation and avoiding unplanned wetland degradation (LK-ASU)", which sets out a procedure for assessing and estimating the increase in GHG emissions resulting from unplanned deforestation displacement from the project boundary. Regardless of accounting of GHG emissions from possible unplanned deforestation displacement, the IACO REDD+ Project addressed several leakage management activities, which were designed based on the social diagnosis carried out in the project area and in neighbor communities. As the unplanned deforestation is likely to occur in "transition configuration" on IACO REDD+ Project, two different groups of deforestation agents may be displaced: Local Deforestation Agents and immigrant Deforestation Agents.

The following leakage activities were designed to prevent deforestation of local agents:

- Training courses. Training will be offered on different topics, but especially on environmental awareness and climate change, biodiversity and ecosystem services and sustainable management of forests, agricultural lands, and grasslands. These trainings will be open to anyone who is interested and will be disseminated to the entire local community and neighbors to the project area.
- Improvement and diversification of the local economy. the IACO REDD+ Project will provide technical assistance to support existing agricultural activities and promoting culture by encouraging handicrafts for women residents in project area region. Project proponents are committed to complete transparency and will not benefit financially from sales.
- Combating illegal land occupation. Illegal land occupation and logging will be tackled with support from the local community and the project's proximity to stakeholders.

As can be difficult to reach and influence the land use decisions of immigrant agents of deforestation, the main leakage management activity will be to bring people involved with the project closer to land occupation laws and institutions that can act promptly to prevent invasions. Thus, the following leakage activity was designed to prevent deforestation of immigrant agents:

- Legal support focused on land issues. The IACO REDD+ Project proponents will provide legal support to residents of the project area zone. In addition to the land tenure regularization intention, information about the land laws in force in the State of Acre and in Brazil will be presented.

Avoided planned deforestation component

As determined as per VMD009 "Estimation of emissions from activity shifting for avoiding planned deforestation/forest degradation and avoiding planned wetland degradation (LK-ASP)" by planned deforestation, the leakage should be managed by monitoring conversion events from other private areas of the same IACO REDD+ Project landowners. As the IACO REDD+ Project landowners, have no other properties together, the risk of displacement of planned deforestation activities is reduced through the realization of new revenues from the sale of carbon credits, which serve to replace the revenues foregone by cancelling the planned deforestation and new livestock activities.

Commercially Sensitive Information

There is no commercially sensitive information omitted from the public Project Description by the project proponents.

Further Information

There is no further relevant information to be included about the project.

2 SAFEGUARDS

2.1 No Net Harm

With the implementation of the IACO REDD+ Project, positive significant net environmental and socio-economic impacts on the project target area are expected. However, it is recognized by project proponents that it is possible that many people may be dependent on forest resource degradation activities such as firewood cutting and hunting, so attempts to reduce degradation by implementing a REDD+ project may bring some negative impacts to the local community and even make their life difficult (which can increase leakage). To assess the potential negative socio-economic impacts of the project activities, a socioeconomic and cultural survey is being carried out in the surrounding community mapped. With all results in hand, the potential negative impacts of the project activities will be analyzed, and mitigation measures will be considered as mentioned in detail in the section AFOLU-Specific Safeguards.

Specifically in the project region, deforestation and burning of forests as ways of opening new areas for grazing is a common practice (see section 2.2). In recent years, areas on the edges of the project area have been opened up in this way for cattle ranching (see **Figure 2** and **Figure 12**). This type of deforestation usually occurs in 3 stages during the driest and hottest months. In the first, small trees and lianas are cut manually. Then larger trees are felled with the help of equipment such as a chainsaw. Dead vegetation is left to dry for weeks and then burned to clear the land. Below is a photo of newly burned forest at the edge of the branch leading to the IACO REDD+ Project area, taken on one of the proponent's visits in July 2022. During this visit, it was possible to see several burned areas along the access branches. With implementation of this project there will be a significant effort to contain burning and its root cause, the deforestation. Forest Patrols, fire prevention and extinguishing and monitoring of forest cover using high resolution satellite images will be activities that will help in the fight against degradation and deforestation. In addition, a critical community development courses to increase

collective understanding of climate change and the importance of the forest will take place on a routine basis.

Figure 12 – Deforestation for implantation of pasture at projects surroundings, Rama Icuriã.

To prevent the impact over cattle ranching activities, which is the main economic activity at the project region, the project aims to offer technical assistance to community so that cattle raising is carried out in a sustainable way, promoting the recirculation of nutrients in the pasture, adopting the rotation of cattle in different pastures; encouraging agroforestry and silvicultural practices in grazing systems; ceasing the use of fire as a form of management, among other actions that help increase productivity and eliminate the need for new areas.

Also, in one of the project area visits, the team from Project Proponent was accompanied by a lawyer to solve the community's doubts about the possible means of land regularization and work's laws and possibles. These understanding is essential for each individual in the process of collectively transforming the cultural relationships and lifestyle of the local community.

A communication channel is being established for stakeholders to express their concerns and to solve potential conflicts and grievances that arise during project planning and implementation.

2.2 Local Stakeholder Consultation

Local Stakeholder Consultation

A) The procedures or methods used for engaging local stakeholders.

As stated in the methodology, local communities were mapped for the community consultation. Minimum of 20% of stakeholders relying on the Project Area are being consulted within a distance of 20 km of

project boundaries (

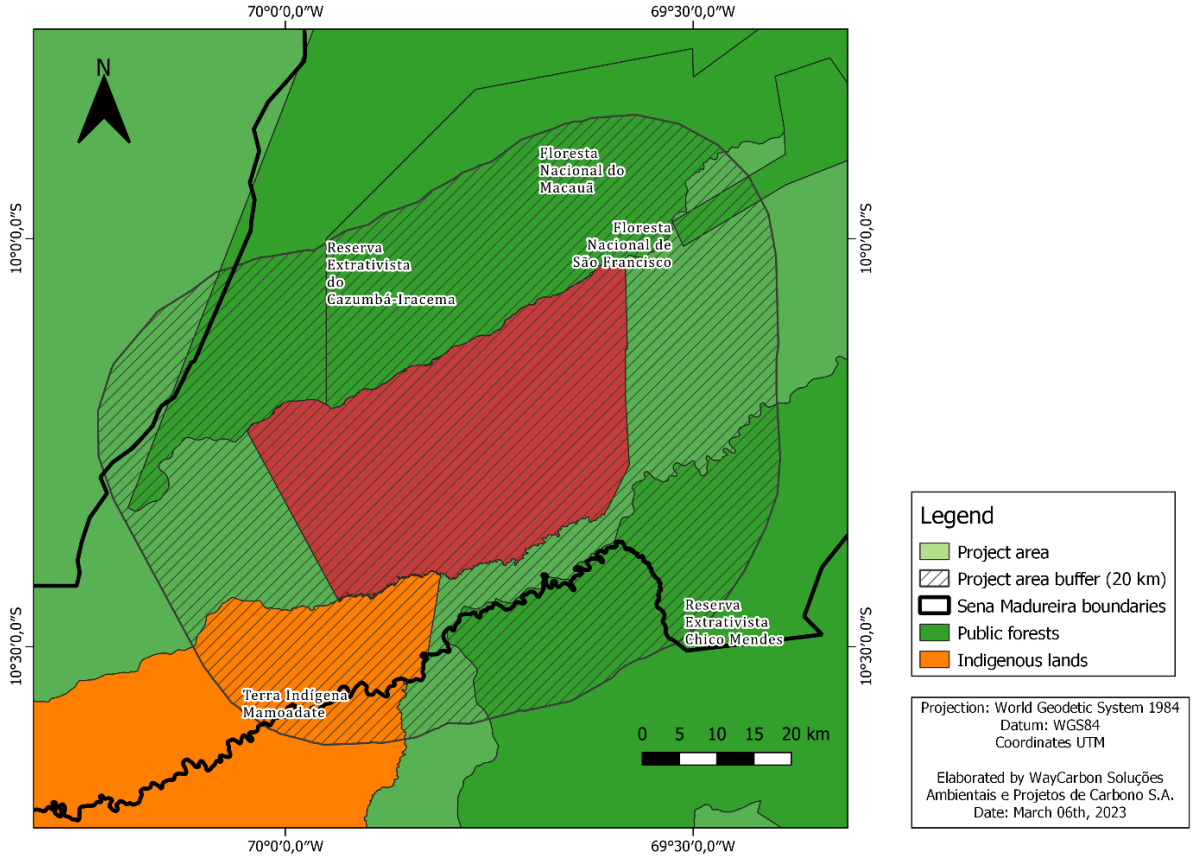


Figure 13).

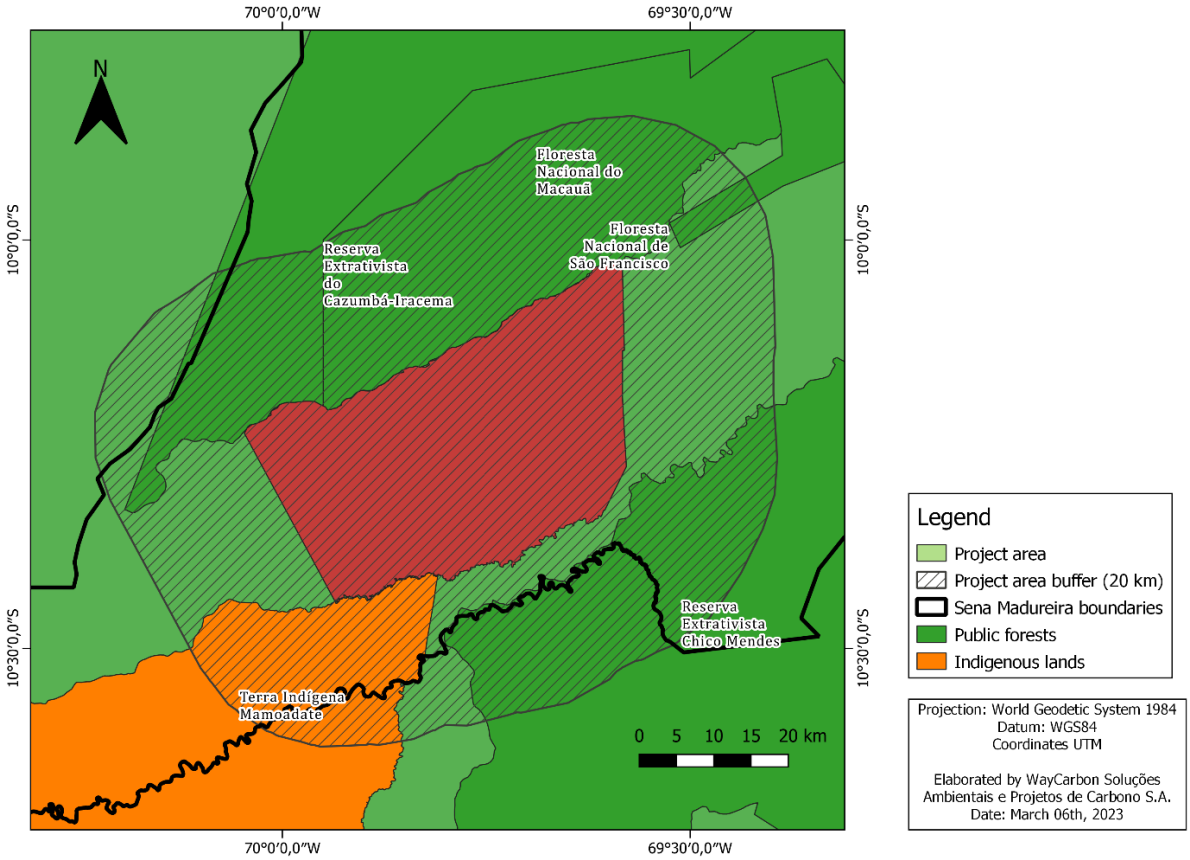


Figure 13 - The Project Area and 20km radius within which the neighbors were mapped.

Until the date, fifteen families classified as "traditional communities" neighboring the project area were consulted. The seven indigenous communities neighboring the project area were identified and the consulted began (details on section 2.5).

Since August 2022, the project proponent representant has conducted a series of local stakeholder consultations at different levels. This representant is a person trained on how to present the project and solve the most frequently asked questions. Also, in December 2022, a company specializing in the relationship with traditional communities was hired by the project proponents to officially initiate the relationship with local indigenous communities, as well as assist in the consultation of stakeholders based on traditions and local customs.

The methods used to consult depended on the target audience. The local stakeholder consultation included a pamphlet to better explain to the community how the REDD+ carbon project works and how the IACO REDD+ Project will work (**Figure 14**). As required in VCS standard 4.3, for the "Local stakeholder consultation", a comprehensive project summary is being actively presented to the communities in Portuguese language in the field. For the "Institutional Consultation", in turn, the government organs and other institutions are being contacted prior by e-mail and after, will be consulted *in loco*, when possible. In both cases, during the local stakeholder consultation, information on carbon project concept, initial planned activities of the IACO REDD+ Project, expected impacts and risks from the project implementation, contact ways and co-benefits are disseminated.

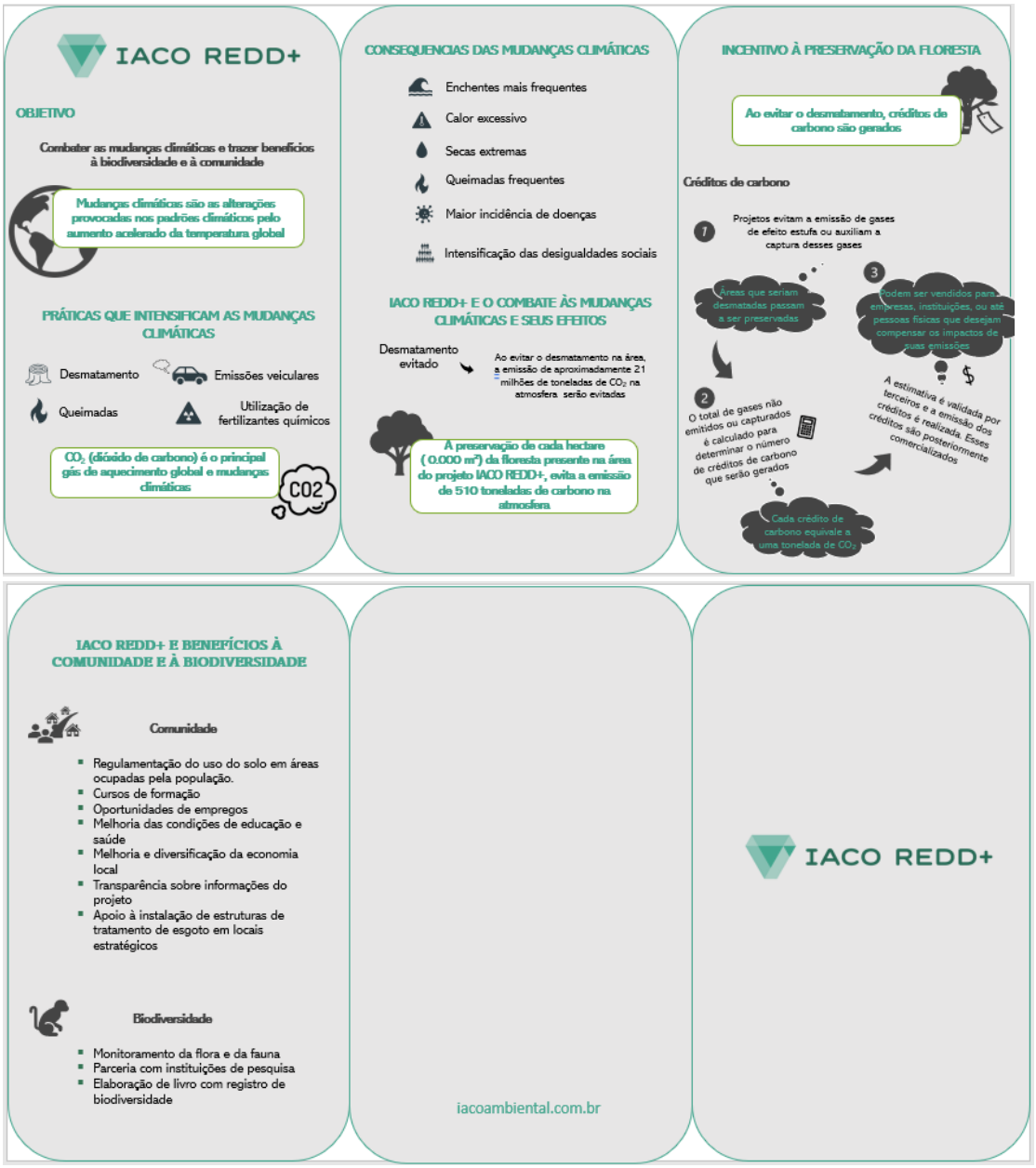


Figure 14– The IACO REDD+ Carbon Project flyer that is being used on onsite local stakeholder consultation.

Figure 15**:** First official consultation with the leaders and members of the indigenous villages that are neighboring the project areas.

Figure 16 - Local Stakeholder consultation– First visit on Santa Rosa indigenous community

Figure 17 - Local Stakeholder consultation

Figure 18 - Record of the meeting at the city hall of the municipality of Assis Brasil and at Health Post at Icuriã Branch

Figure 17 19: Record of the meeting at FUNAI – Rio Branco -Acre with representatives of FUNAI, ICMBio, Catraia Soluções Ambientais and project proponents.

B) How due account of all and any input received during the consultation has been taken

During the consultation, all questions raised by stakeholders are answered promptly. In addition, all contributions received during the consultation will be duly considered and its outcome communicated to the communities.

C) Local stakeholder consultation documents:

Two documents are being collected during the stakeholder consultation:

I. Declaration of knowledge about the Project: the respondents declare that they received a visit from a representative of the project, who are aware of the objectives and area of the Project.

II. Customary Resource Use Survey: Questionnaire used for neighbor interviews to fully understand community natural resource use and management activities within the Project Area.

All statements are duly stored and made available during the audit.

Actions for keeping the contact

The project proponent understands that stakeholders want and need to be involved in project design, implementation, monitoring and evaluation throughout the project lifetime. Therefore, the IACO REDD+ Project will keep the following methods of communication with stakeholders that during the project period:

WebSite: The project already has the rights of a virtual address in which information's about its operations, documentations and current activities will be disposed; the site may also be used for the divulgation and commercialization of products made by the stakeholders of the project (handcrafted products).

Phone line: A phone contact of a representative of the project will be shared with stakeholders.

In personal communication: during the project period visits, workshops, meetings and interviews will be realized at the communities in other to maintain contact and transparency between proponents, stakeholders, and community. As required by the VCS standard, local community will be consulted continuously before each monitoring event and notified of VVB visits.

The communication with project stakeholders that live in the project area will be facilitated by the definition of representatives of the local communities, members who are able to collect comments, complains and opinions of local stakeholders as well as inform them of project actions. The communication will be made via phone or in person visits. Any communication related to grievances, opinions, other relevant issues related to the project shall be made via email in other to be registered. Any subject that requires an answer by the project proponents shall be replied within 7 days. Any issue that are not amicably resolved by this contact shall be referred to mediation by a neutral third party (Action must be taken in 30 days).

Any issue that are not resolved through mediation shall be referred either to arbitration, to the extent allowed by the laws of the relevant jurisdiction or competent courts in the relevant jurisdiction, without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any (The time to accomplish this stage is dependent on local jurisdiction delays).

2.3. Environmental Impact

The IACO REDD+ Project consists of a 136,364 hectares total Project Area of protected Amazon rainforest, located in the municipality of Sena Madureira, in the state of Acre. The municipality has livestock as its main economical source[43] and its rural communities presents cultural practices of deforestation and forest degradation.

As will be presented at the 4.1 section, over the historical reference period of the present project (2012 – 2021) the State of Acre presented a consistent year-on-year increase in deforestation – except for 2017 and 2018. The peak of deforestation rates was reached in 2021 with a total of 4,923.21 deforested hectares.

Among the causes of deforestation in the area, the possibility of legal deforestation of 20% of the area and the increase in demand for hardwood stand out, the advance of the frontier of livestock colonization and subsistence, marked by the need for new areas due to the processes of soil degradation and the illegal commercialization of timber resources. The project can prevent legal deforestation from happening and reduce the pressure of illegal deforestation on the forest through technical training of local producers in sustainable production practices. In addition, there will be other benefits arising from the preservation of the forest: protection of local biodiversity and areas of traditional indigenous use (specified in section 1.13).

Thus, there are no environmental negative impact to be caused by the project. The project itself seeks to avoid such impacts from avoiding deforestation.

2.4. Public Comments

To be filled after the public comments period is closed.

2.5. AFOLU-Specific Safeguards

With the purpose of starting a friendly and transparent relationship with the communities around the project area, on July 17, 2022, the first visit to the area was carried out with the aim to know the local residents, their needs and influence on project area, besides presenting the Project concept, its purposes and prospects to bring positive benefits to local communities.

As described in section 1.11, the activities envisaged by the Project have a linked social component. Given the synergy that many activities already carried out by local communities and their interest in participating in Project activities, the proponents intend to strengthen their relationship with communities through guidelines for procedures related to the CCB seal (Climate, Community and Biodiversity), also helping with its intention to incorporate the seal into the Project in the future.

Local Stakeholder Identification and Background

Three major groups were mapped and identified:

- **Traditional communities:** With the objective of identifying the traditional communities living in the project's zone influence, high resolution satellite images were first consulted, and site visits were carried out. In the first project area visit it was identified fifteen "non-indigenous" families, composed by 57 people living near to project area. These families are not located in conservation units and do not have legal ownership of the land. Just one family are living in the project area for 5 years, another for 11 years and the others have been living in the area for over 20 years.

  Because they reside near to the project area, this social group is considered as stakeholder.

Traditional communities residing close to the project area in the Chico Mendes RESEX and FLONA Macauã conservation units are still being identified and may be consulted if there is proof that there is a dependency relationship with the project area. Through preliminary conversations with local and institutional stakeholders and available literature[36,37], such families are not reliant on the project area.

- **Indigenous people residing within 20 km of the project area:** At first, the FUNAI map database of TIs (Indigenous Territories) was consulted. From this database, four indigenous communities were mapped near to the project area: "Terra Indígena Manoadade", "Vida na Floresta", "Mulateiro" and "Santa Rosa". Since 2022 July, some visits to the indigenous communities were made by the project representative with the aim to fill in the information gaps on indigenous occupation around of the project area. From these visits, three more indigenous communities were identified, adding a total of seven indigenous communities made up of two ethnic groups, Manchineri and Jaminawa, who use the project region to maintain their traditional way of life.

Community name	Ethnic
Terra Índigena Manoadate	Manchineri and Jaminawa
Mulateiro	Manchineri
Santa Rosa	Manchineri
Vida na Floresta	Manchineri
Cafanaú	Jaminawa
Boca do Riozinho	Jaminawa
Guajará	Jaminawa

The Mamoadate Indigenous Land (TI) was ratified in 1991 and is occupied by the Jaminawa and Manxineru ethnic groups, in addition to the presence of isolated indigenous peoples. With an extension of 314,647 hectares, the indigenous land is located on the international limits between the south of the State of Acre and the north of the Department of Madre de Dios, Peru. According to the latest Ethnomapping of the Mamoadate Indigenous Land[38], these indigenous peoples do not use the project area to maintain their traditional customs (**Figure 20**).

[36] Vivências E Experiências Dos Moradores Da Flona Macauã, Fortunato Martins Filho,2018. Available at < https://periodicos.ufac.br/index.php/jamaxi/article/view/2212 >

[37] Plano de Manejo Reserva Extrativista Chico Mendes, 2006. Available at: https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/amazonia/lista-de-ucs/resex-chico-mendes/arquivos/plano_de_manejo_reserva_extrativista_chico_mendes.pdf

[38] Etnomapeamento da Terra Indígena Mamoadate, Povo Jaminawa e Povo Machineri, 2016

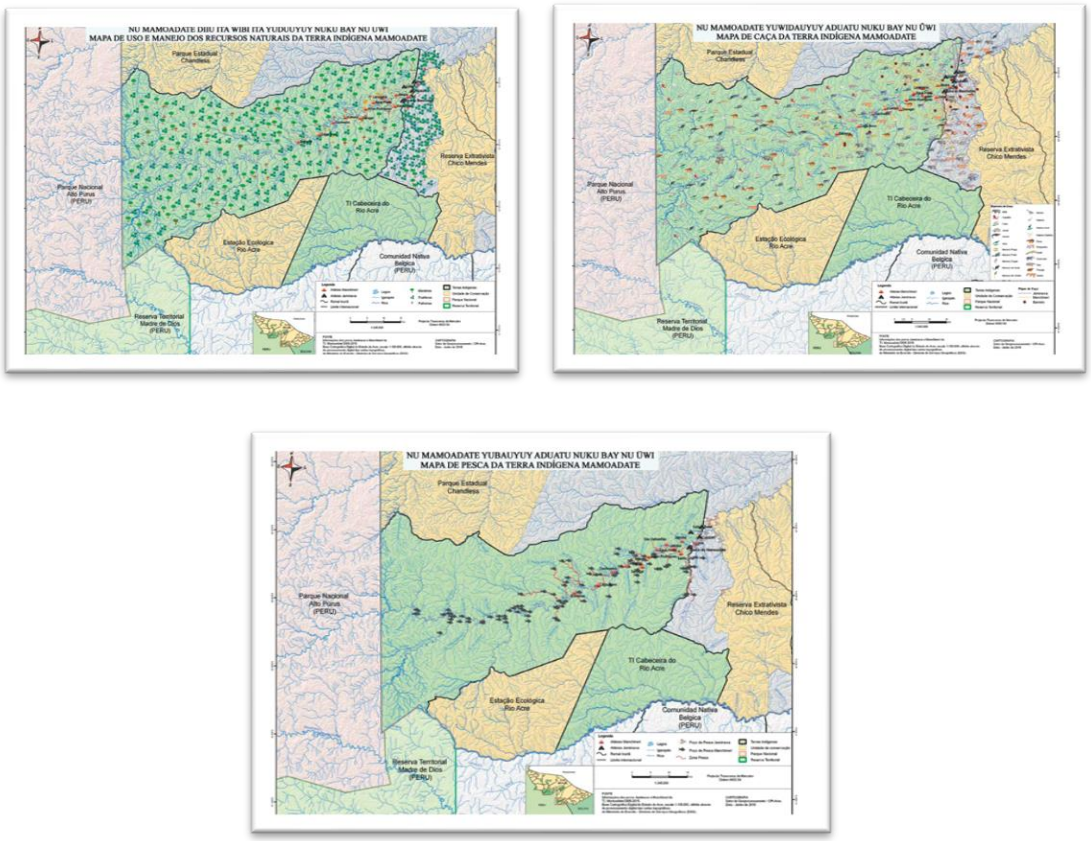


Figure 20 - Use of resources by the indigenous population of the TI Manoadate [38]

With the exception of TI Mamoadate, there is no official demarcation of the indigenous lands occupied by other indigenous peoples neighboring the project. However, their traditional customs and habits are rights fully recognized by the project proponents. By understanding the need to follow contact through practices that include traditional processes, the IACO REDD+ Project proponents hired a company specializing in social issues. Thus, the first official visit to indigenous communities occurred on 2022 October, by a company specializing in traditional communities hired by the project proponents. On this occasion, the relationship between the project proponents and these communities officially began. The leaders and some community members expressed interest in closely following the entire project implementation process, a desire to be present in discussions and field work. Thus, shortly after this visit, a meeting was organized in Assis Brasil/AC with the project representative and the leaders who showed interest in participating in this other meeting. All photographic records and minutes of meetings held are attached to the PD and available to the VVB and Verra.

In December of 2022, a new stage in the community relationship process of IACO REDD+ Project began, in which the main objective was to support actions and develop agendas to building a Term of Consent with indigenous communities. The process of obtaining free prior and informed consent began guided by the official document Diretriz Operacional sobre o Consentimento Livre, Prévio e Informado[39], from 2020.

Description of the social, economic, and cultural diversity within local stakeholder groups

[39] https://accountability-framework.org/wp-content/uploads/2020/04/DO_CLPI-Feb2020.pdf

In a second step of Local Stakeholder Identification and background, a socio-economic diagnosis is being carried out, with interviews with families belonging in the surrounding communities. A description of social, economic, and cultural diversity is being constructed for each of the identified stakeholders.

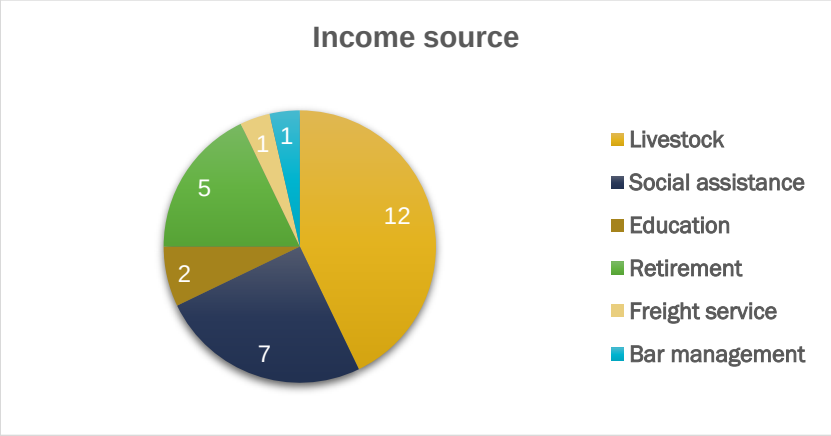
Local traditional communities

The following information was obtained through the interview of fifteen families that live near to project area and are recognized as traditional local community. These families are not located in conservation units. Interviews were conducted in each family house with one or two family members. It was remarkable that some questions related to opinions about the future of the communities had usually been answered by male family representatives.

Table 3 - Demographic information of local communities

Total number of residents in this community group	57
Number of families	15
Average number of members per family	4
Average number of contributors per household	2

The main income sources were asked for each family, and they are mainly: livestock and federal social assistance. The number as families that counts with each income source is presented below. None of the families felt comfortable to declare their total monthly income.



Graphic 1 - Income sources by families classified as “traditional community.”

Figure 21 - Local livestock activities in the project area surroundings

Ten families interviewed had declared that they carry out deforestation activities and five of these declared the use of fire as a form of management. One of the families get food from horticulture and animal domestication In two interviews the predominant land use cycle was explained, which is described in the flowchart below.

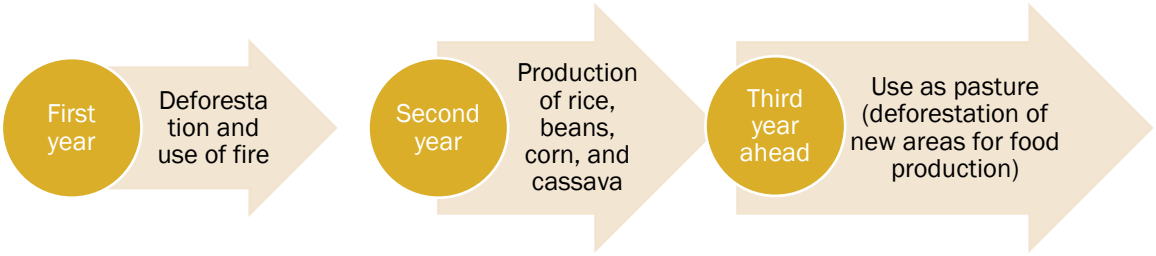
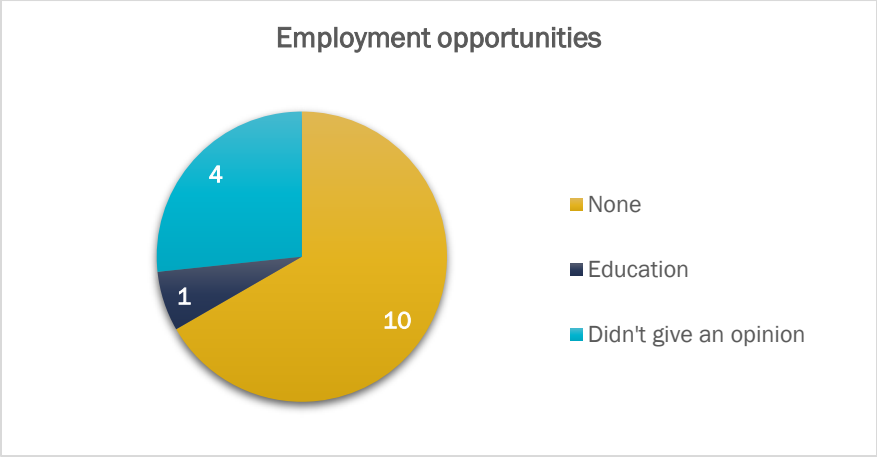


Figure 22 - Main land use cycle made by the local community

Figure 23 - Storage place for tools used in agriculture and livestock.

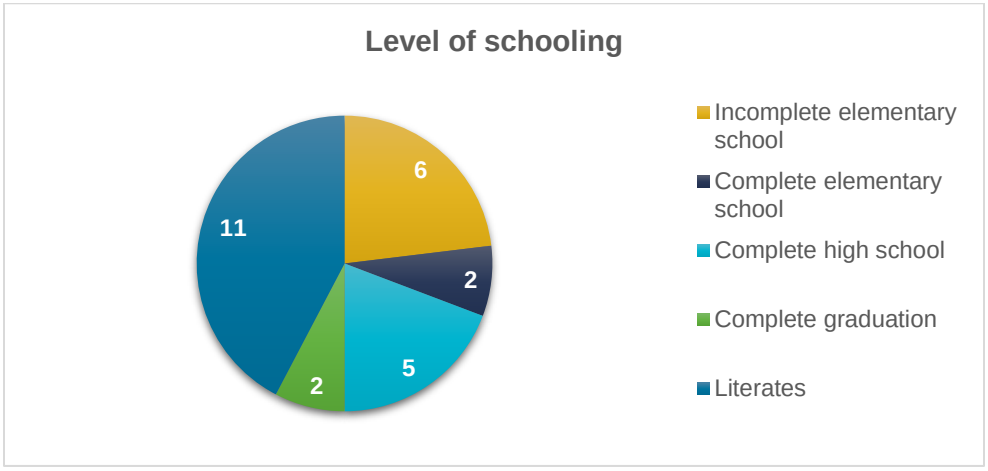
The cycle explained above reaffirms the need to disseminate environmental awareness and assistance on sustainable management techniques and livestock in order to guarantee the preservation of forest areas. As a good parameter, none of the families declared food insecurity or hungry.

Families were asked about their views on the employment opportunities of the area. Their answers are presented below, in which “None” means no job opportunities, and “Education” was mentioned as an opportunity since the activities of nearby schools were suspended due to the pandemic.



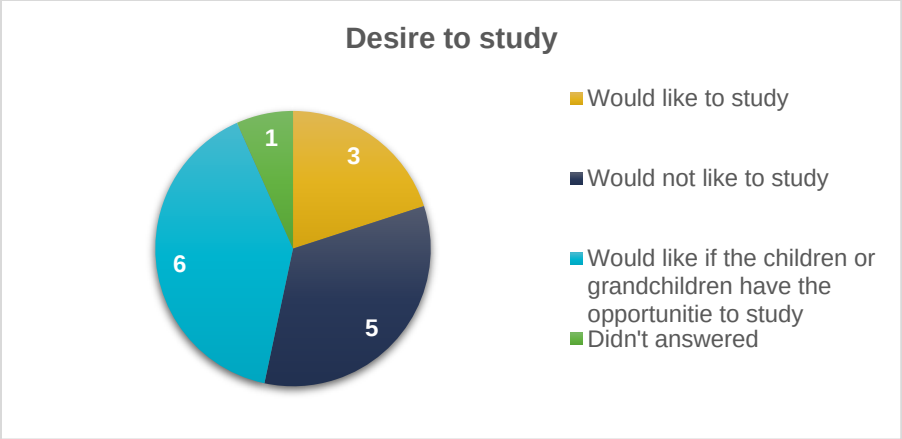
Graphic 2 – Employment opportunities mentioned by local community.

Families were asked about their school level. One limitation of this question was that usually the answers were only about the interviewed or included only a conjugate, not of the whole family. As the relationship with the communities grows closer, general data will be collected. In the project area, there are two people who completed graduation courses: History and Pedagogy. However, in general, most of population didn’t complete elementary school. Study opportunities are limited to the elementary school in Icuriã Branch.



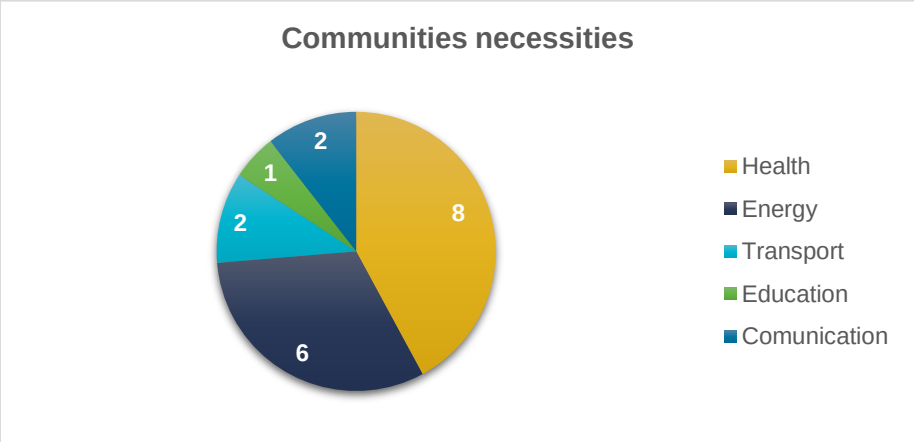
Graphic 3 – School level of community’s members

Community members were asked about their desire to study, this questioning is limited by considering only the interviewee's answer, that is, it does not cover the will of all residents. However, the answer allows an analysis regarding the educational limitation in the project region.



Graphic 4 – Population's desire to study.

Community members were asked about their needs in the region. Each member could answer more than once for this question. The graphic below presents the count of times each issue was mentioned.



Graphic 5 – Necessities appointed by the community.

All answers were supported by similar justifications. As for health, despite the existence of a health post in the area (**Figure 24**), some people need to go to nearby cities to receive medical care. Those who are dependent on medical treatment could not account for public transport services close to their houses, thus, they must use their own automobiles. Some of the residents spend months a year in the city or go up to four times a month to treat various ailments.

Figure 24 – Picture taken in front of Icuriã Health Post

Lastly, the main energy sources are power generators and photovoltaic energy panels, however, some members reported that there are inconsistencies in the system in meeting local needs. There is no public electricity supply in the area, communication takes place via radio and television, which are supplied with solar generators.

Indigenous communities around project area

Recognizing that engagement and knowledge of indigenous peoples must be done in culturally appropriate and specific processes, information that will detail social, economic and cultural aspects of these stakeholders is being collected and will be available for audit by the VVB.

From the first contacts, it is known that Aldeia Mulateiro comprises fourteen families, Santa Rosa village comprises 16 families, Vida na Floresta village comprises seven families, Capernaum village comprises six families, Boca do Riozinho is made up of five families and the Guajará village by three families. All these indigenous communities do not have demarcated land, although there is an initial phase demarcation process indicated by FUNAI.

Communities living around the project area and are reliant on project area

Communities around the project area are being deeply investigated and if these groups are to be considered stakeholders, social, economic and diversity descriptions will be included.

Following public institutions are also being consulted:

- SEMA – State Department of the Environment – Responsible for carrying out activities related to environmental management, promoting environmental education, regulation, control, regularization, protection, conservation, and recovery of natural resources. The nearest SEMA headquarters to the project site is Rio Branco, Acre's capital.

- FUNAI, Rio Branco AC. The role of FUNAI, Rio Branco AC is the official body that represents indigenous peoples in the Acre State. In November 2022, the first contact was made with the National Indian Foundation (FUNAI) so that the relationship and integration between the project and the indigenous peoples residing in the project area is guided in a fair manner and always based on the best practices. On 11 January 2023, the first meeting took place at FUNAI - Rio Branco to present the concept and area of the project. On 27 February 2023, the project proponents met in person with FUNAI representatives and other institutional stakeholders (**Figure 17 19**).
- SEMAPI, Rio Branco AC. The State Secretariat for the Environment and Indigenous Policies (SEMAPI) carries out important work that integrates sustainable development and environmental conservation in Acre. Taking care of the environment in a broad way, and also of people, is their mission. On 27 February 2023, the first with project proponents meeting took place at SEMAPI - Rio Branco to present the concept and area of the project.
- Assis Brasil Prefecture – Responsible for public management, promoting sustainable, social and economic development. On July 20, 2022 a project representative made contact with the mayor of Assis Brasil, Mr. Jerry Correia Marinho and with Mr. Genildo Bonfim Bezerra (Bebé), merchant, rural producer, former councilor and regional opinion maker.
- Secretary of Health of Assis Brasil. Health unit that provides health care services in the project region. At the time, the project's concept and its benefits were presented by the proponents of the project (**Figure 18**).
- Federal University of Acre: Educational institution. Carries out research in the field of forestry engineering and sustainability. Contacts within the university are being created and the project will be presented soon.

Public bodies will benefit from the project as it will open up another means of articulation with other actors in order to improve the implementation and permeability of public policies. In addition, it is interesting the approximation between the private and public sectors in actions that aim to meet community demands and strengthen government relations. Research institutions will benefit from the project as facilities for research on biodiversity are foreseen with the implementation of the project.

Risks and Respect for Local Stakeholder Resources

Although the project proponents do not have previous experience in the development of the activities proposed with the project, partnerships were made for the elaboration of the project description, forest inventory, emissions reduction calculation and identification, engagement and consultation of stakeholders based on previous companies' experiences. It is important to note that the project proponent or any other entity involved in project design or implementation are involved in any form of discrimination or sexual harassment.

The risk analysis was done using the tool "AFOLU Non-Permanence Risk Tool, v. 4.0", approved by the VCS. The result will be presented to the verification body in a document attached to the PDD, through the Risk Report and the risk tool. The result of the IACO REDD+ Project risk analysis is a risk of 10%.

Other possible risks to the project benefits have been identified:

Risk: Lack of interest and engagement of stakeholders in participating in the Project's proposed activities.

Mitigation actions: Stimulation to all stakeholders for effective participation and involvement in the decisions related to the Project and in the engagement in the implementation and participation of the activities. Furthermore, the project proposal is to improve and disseminate the existing means of communication to communicate all stakeholders about necessary information, events, meetings and necessary updates.

Risk: Failure to communicate with other stakeholders

Mitigation actions: adapting the means of communication to the local context and facilitating the availability of these means.

Risk: Disputes over access/use rights (or overlapping rights)

Mitigation actions: Asset control and judicial monitoring of possible claims.

Risk: Internal conflicts over land use, within local communities

Mitigation actions: Conflict management and resolution: Develop capacities in conjunction with local leaders and social specialists to understand the expectations, interests of groups and power networks within local communities and in their environment.

Finally, as the IACO REDD+ Project is a conservation project, no invasive species will be introduced or facilitated to thrive, no non-native species will be planted, and no fertilizers or other agrochemicals will be used.

Communication and consultation

Since the first visit of the project proponents to the area, the means of communication have been established and publicized. All community representatives have the cell phone number of the project representative. In addition, the project representative maintained direct contact with one of the community representatives.

All site visits were prearranged between project and community representatives. Since July 2022, the project representative has been in contact with the communities (traditional and indigenous communities) four times. All communication and consultations were done in a manner that was culturally appropriate and respectful of language and gender sensitivity.

In one of the visit opportunities, the project proponents took a legal advisor with them to present and clarify any doubts related to their rights, laws and regulations, covering land tenure and workers' rights in the host country (**Figure 25**).

Figure 25 - Elvio Leonardi de Freitas, legal advisor of the project in his presentation for traditional communities

As an official procedure from IACO REDD+ Project, the process of receiving, analyzing and responding to grievances parting from projects stakeholders (community members) will be dealt with as follows (VCS Standard 4.2; item 3.17.18):

1) The project proponent shall attempt to amicably resolve all grievances and provide a written response to the grievances in a manner that is culturally appropriate.

   Due to communication limitations with local communities (lack of internet or telephone signal), responses will be carried out through field visits. After the grievance registration, those designated by the proponents must appear in the community within 14 days and announce the official response through a document of possession of the community members. The document must be disseminated and read among interested parties in the community.

2) Any grievances that are not resolved by amicable negotiations shall be referred to mediation by a neutral third party (30 days from the date on which the population opposes the amicable resolution proposed previously).

3) Any grievances that are not resolved through mediation shall be referred either to a) arbitration, to the extent allowed by the laws of the relevant jurisdiction or b) competent courts in the relevant jurisdiction, without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any. (Time dependent on local jurisdiction delays).

The process of VCS Program validation and verification were presented during the project consultation (see section 2.2) and the validation/verification body's site visit will be notified in advance.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The project activity will apply the approved VCS Methodology VM0007 "REDD+ Methodology Framework (REDD+ MF)", Version 1.6, 08 September 2020.

Furthermore, the following modules and tools were used:

Carbon stocks modules

- VMD0001 Estimation of carbon stocks in the above- and belowground biomass in the live tree and non-tree pools (CP-AB), Version v1.1, 11 October 2013.
- VMD0005 Estimation of carbon stocks in the long-term wood products pool (CP-W), Version 1.1, 20 November 2012.
- VDM0006 Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation and planned wetland degradation (BL-PL), Version 1.3, 08 September 2020.
- VMD0007 Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation and unplanned wetland degradation (BL-UP), Version v3.3, 08 September 2020.

Leakage modules

- VMD0009 Estimation of emissions from activity shifting for avoiding planned deforestation/forest degradation and avoiding planned wetland degradation (LK-ASP)
- VMD0010 Estimation of emissions from activity shifting for avoiding unplanned deforestation and avoiding unplanned wetland degradation (LK-ASU), Version 1.2, 08 September 2020.
- VMD0011 Estimation of emissions from market-effects (LK-ME), version 1.1, 03 December 2010.

GHG Emissions baseline and project scenario

- VMD0013 Estimation of greenhouse gas emissions from biomass and peat burning (E-BPB), version 2.2, 08 September 2020.
- VMD0015 Methods for monitoring of greenhouse gas emissions and removals in REDD project activities (M-REDD), Version 2.2, 08 September 2020.
- VMD0016 Methods for stratification of the project area (X-STR), Version 1.2, 08 September 2020
- VMD0017 Estimation of uncertainty for REDD+ project activities (X-UNC), Version 2.2, 08 September 2020.

Tools

- VT0001 Tool for the demonstration and assessment of additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) project activities (T-ADD), Version 3.0, 1 February 2012

- VCS AFOLU Non-Permanence Risk Tool (T-BAR), Version 4.0, 19 September 2019

3.2 Applicability of Methodology

Table 4 - Applicability conditions and project adherence for the REDD methodology framework module.

Module	*Applicability condition*	*Project adherence*
VM0007 - REDD-MF – Section 4.2.1	Land in the project area has qualified as forest (following the definition used by VCS) at least 10 years before the project start date.	Condition satisfied. Satellite images (**Figure 1**) show that 100% of the project area is qualified as forest in 2012, that is, at least 10 years before the project start date.
	If land within the project area is peatland and emissions from the soil carbon pool are deemed significant, the relevant WRC modules (see Table 1) must be applied alongside other relevant modules.	Not applicable. The land within the project area is not classified as peatland.
	Baseline deforestation and forest degradation in the project area fall within one or more of the following categories: • Unplanned deforestation (VCS category AUDD); • Planned deforestation/degradation (VCS category APD);	Condition satisfied. As described in section 1.18, the project area presents an imminent risk of deforestation by agents who do not have legal and incontestable documents on the right to deforest and are residents of nearby regions or immigrants. Thus, the baseline deforestation falls into the category of unplanned deforestation (AUD). In addition, as all properties located in the IACO REDD+ Project area are in accordance with the Brazilian Forest Law that allows the landowner to legally suppress the forest areas, the conversion of forest lands to deforested conditions is legally permitted and considered a risk. Thus, this baseline deforestation falls into the category of planned deforestation (APD).

	Leakage avoidance activities must not include: • Agricultural lands that are flooded to increase production (e.g, paddy rice); • Intensifying livestock production through the use of feed-lots and/or manure lagoons.	Condition satisfied. Neither establishment of agriculture on flooded land, nor intensification of livestock production through use of "feed-lots" and/or manure lagoons is promoted by the project.
VM0007 - REDD-MF – Section 4.2.2	Baseline agents of deforestation must: (i) clear the land for settlements, crop production (agriculturalist) or ranching, where such clearing for crop production or ranching does not amount to large scale industrial agriculture activities; (ii) have no documented and uncontested legal right to deforest the land for these purposes; and (iii) be either residents in the Reference Region for Deforestation or immigrants. Under any other condition this methodology must not be used.	Conditions satisfied. As shown in section 1.13, agents of deforestation clear the land for cattle ranching or subsistence colonization, have no documented and uncontested legal right, and are either residents in the Reference Region for Deforestation or immigrants.
	If, in the baseline scenario of avoiding unplanned deforestation project activities, post-deforestation land use constitutes reforestation, this methodology may not be used.	Condition satisfied. The post-deforestation baseline scenario does not include reforestation as alternative land use.
VMD0001 – CP-AB	This module is applicable to all forest types and age classes. Inclusion of the aboveground tree biomass pool as part of the project boundary is mandatory as per the framework module REDD-MF.	Mandatory module. The inclusion of the aboveground tree biomass reservoir as part of the project boundary is mandatory for all AFOLU projects. All applicability conditions were met.
VDM0005-CP-W	This module is applicable to all cases where wood is harvested for conversion to wood products for commercial markets, for all forest types and age classes.	Mandatory module since logging operations are expected to happen in the baseline scenario prior to the conversion of forest to non-forest.

VMD0006 – BL-PL	The module is applicable for estimating the baseline emissions on forest lands (usually privately or government owned) that are legally authorized and documented to be converted to non-forest land.	Condition satisfied. The module is mandatory for all projects where the baseline deforestation falls into the category of planned deforestation (APD). As the IACO REDD+ project is in full compliance with the forest code (see Section 1.14), any forest conversion should be formally authorized by the competent body.
VMD0007 – BL-UP	The module shall be applied to all project activities where the baseline agents of deforestation: (i) clear the land for settlements, crop production (agriculturalist) or ranching, where such clearing for crop production or ranching does not amount to large scale industrial agriculture activities; (ii) have no documented and uncontested legal right to deforest the land for these purposes; and (iii) are either resident in the region (reference region—cf. section 1 below) or immigrants.	Condition satisfied. The module is mandatory for all projects that the baseline deforestation falls into the category of unplanned deforestation (AUD). As the IACO REDD+ Project area has no income, landowners cannot afford the efforts and costs to maintain long-term surveillance of the project boundaries to avoid encroachment on the areas.
	Where pre-project, unsustainable fuelwood collection is occurring within the project boundaries, Modules BL-DFW and LK-DFW must be used to determine potential leakage.	Not applicable. Unsustainable fuelwood collection is not occurring within the REDD project boundaries. In initial interviews with local residents (see section 2.5), no family claimed to use fuelwood.
VMD0009 - LK-ASP	The module is applicable for estimating the leakage emissions due to activity shifting from forest lands that are legally authorized and documented to be converted to non-forest land, including activity shifting to forested wetland that is drained or degraded as a consequence of project implementation.	Mandatory module. The IACO REDD+ Project met the applicability condition of this module because the baseline scenario is the conversion of forest lands that are legally authorized and documented to non-forest land. This module is used to estimate the le
VMD0010 – LK-ASU	Activities subject to potential displacement are conversion of forest land to grazing lands, crop lands, and other land uses.	As the project baseline is unplanned deforestation with the conversion of forest land to grazing lands or croplands, this module is mandatory.

VMD0011-LK-ME	This module is applicable for calculating market-effects leakage from REDD projects that are anticipated to reduce levels of wood harvest substantially and permanently.	As the project baseline has wood sales within the APD component, this module is mandatory.
VMD0013 – E-BPB	This module is applicable to REDD project activities with emissions from biomass burning and REDD-WRC project activities with emissions from biomass and/or peat burning. This module is also applicable to RWE and ARR-RWE project activities with emissions from peat burning.	As it is common for deforestation to occur by burning and cutting [40] in the project region, this module is mandatory.
VMD0015 – M-REDD	The module is mandatory for REDD, CIW-REDD, RWE-REDD and stand-alone CIW project activities	Mandatory module. The IACO REDD+ is a REDD project.
	Where selective logging is taking place in the project case: Emissions from logging may be omitted if it can be demonstrated the emissions are de minimis using Tool T-SIG. If emissions from logging are not omitted as de minimis, logging may only take place within forest management areas that possess and maintain a Forest Stewardship Council (FSC) certificate for the years when the selective logging occurs. Logging operations may only conduct selective logging that maintains a land cover that meets the definition of forest within the project boundary. All trees cut for timber extraction during logging operations must have a DBH greater than 30 cm. During logging operations, only the bole/log of the felled tree may be	Not applicable. The project does not involve selective logging.

[40] Branco–Acre, Rio. "DINÂMICA DO DESMATAMENTO EM 2017 NO ESTADO DO ACRE-PRODES." Available at: < http://semapi.acre.gov.br/wp-content/uploads/sites/20/2020/06/Relatorio-Desmatamento-PRODES-2017-FINAL_20181015_Revisado_20200413.pdf>. Last access: 29th April, 2022

	removed. The top/crown of the tree must remain within the forested area. The logging practices cannot include the piling and/or burning of logging slash Volume of timber harvested must be measured and monitored.	
VMD0016 – X-STR	Any module referencing strata *i* must be used in combination with this module. In case of REDD, above-ground biomass stratification is only used for pre-deforestation forest classes, and strata are the same in the baseline and the project scenario. Post deforestation land uses are not stratified. Instead, average post deforestation stock values (e.g. "Simple" or "Historical area-weighted" approaches are used, as per Module BL-UP).	Mandatory module. As described in section 1.13, different forest types are existing in the project area characterizing different strata.
	For peatland rewetting and conservation project activities this module must be used to delineate non peat versus peat and to stratify the peat according to peat depth and soil emission characteristics, unless it can be demonstrated that the expected emissions from the soil organic carbon pool or change in the soil organic carbon pool in the project scenario is de minimis, In the case of WRC project activities, the project boundary must be designed such that the negative effect of drainage activities that occur outside the project area on the project GHG benefits are minimized	Not applicable. The land within the project area is not classified as peatland or wetland.
VMD0017 – X-UNC	This module is mandatory when using methodology REDD-MF.	Mandatory module. The IACO REDD+ is a REDD+ project.
T-ADD	Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity shall not lead to	Condition satisfied. Project activities do not violate any applicable laws. They all aligned with government guidelines.

	violation of any applicable law even if the law is not enforced.	
	This tool is not applicable to small - scale afforestation and reforestation project activities	Condition satisfied. The IACO REDD+ is a REDD+ project.
T-BAR		Mandatory tool for AFOLU projects.

3.3 Project Boundary

Geographical boundaries

According to the VM0007 methodology, where multiple baselines exist (e.g., planned deforestation and unplanned deforestation) there must be no overlap in boundaries between areas appropriate to each of the baselines. Thus, the two project types cannot occur on the same piece of land. Therefore, geographical boundaries were defined separately for unplanned deforestation activities, which cover 108,988 hectares, and for planned deforestation activities, which cover 27,376 hectares or 20% of the total property area.

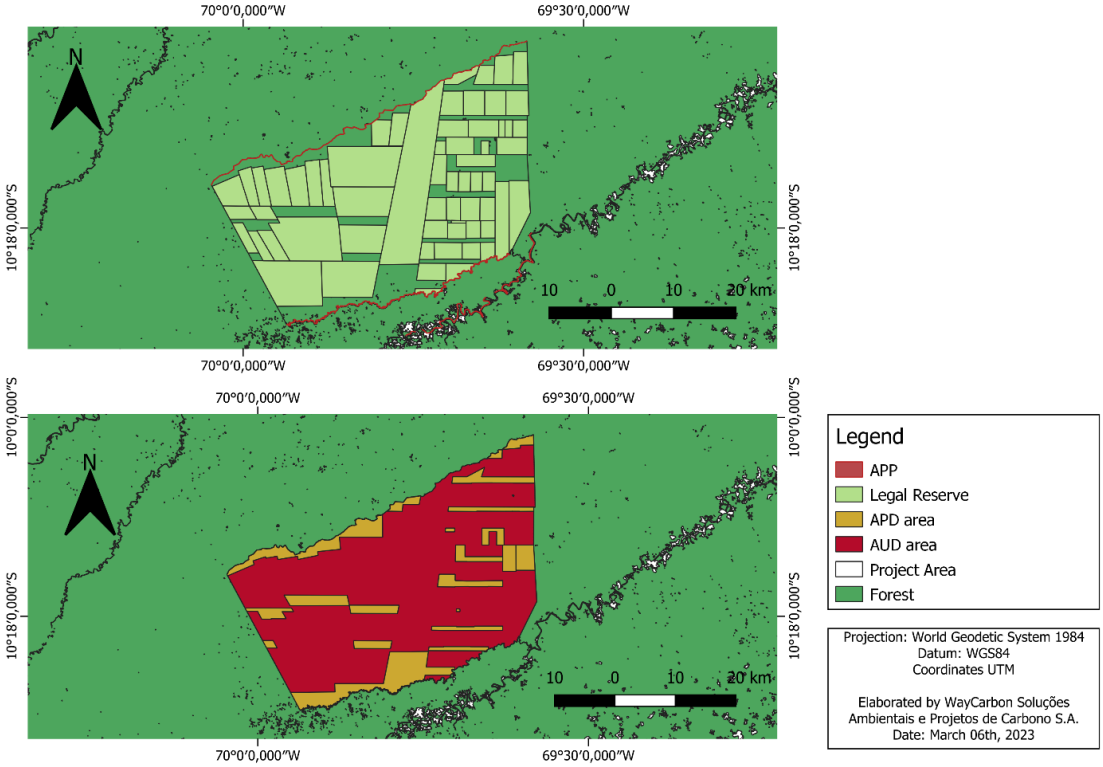


Figure 26 - Geographic boundaries of the unplanned deforestation component (AUD) and the planned deforestation component (APD), as well as the permanent preservation area (APP) and legal reserve boundaries.

Avoided unplanned deforestation component

According to the VM0007 methodology, project activity to avoided unplanned deforestation is conducted in the spatial delineation of Project Area, Reference Region, and Leakage Belt following the module BL-UP. The project area under avoided unplanned deforestation activities is constituted of 108,988 hectares which corresponds to the forest that has been present for more than 10 years before the project start date. The definition of the Reference Region and the Leakage Belt was performed based on a detailed analysis of the factors to be characterized (such as agents of deforestation) or quantified (such as the proportion of forest types).

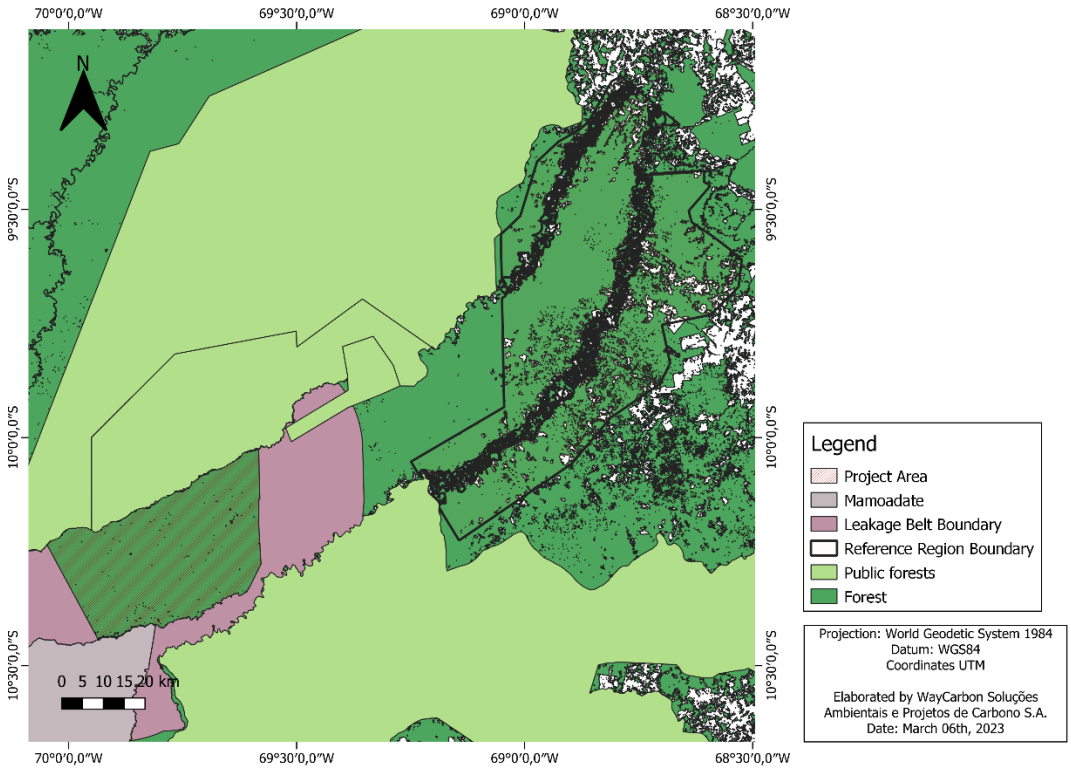


Figure 27 - Location of project area, leakage belt and RRD.

Although the reference region is composed of a Reference region for projecting the rate of deforestation (RRD) and a Reference region for projecting the location of deforestation (RRL), the RRD was the only Reference Region defined in this project.

The RRD was defined based on the characteristics of deforestation agents (access and mobility), laws, statutes, regulatory frameworks, social customs, and environmental conditions. Thus, the RRD was defined within the same municipality and state, to ensure that the systems of laws and governance, social structure, and customs are similar to those occurring in the project area. All areas that have restricted access and different governance systems, such as conservation units and indigenous lands) were excluded from the reference region. Moreover, the main mobility vector for deforestation agents are the same navigable rivers**Erro! Indicador não definido.**. Finally, the type of vegetation and soil, slope, land cover, and use, precipitation, and temperature were similar to the conditions found in the project area (see **Table 4**).

The range of soil types in Acre state is suitable for cattle ranching, and pasture can be successfully established in the variety of these soils.

The minimum area of the RRD was defined by following equations specified in BL-UP:

$$MREF = RAF * PA$$

$$RAF = 7500 * PA^{-0.7,}$$

Where:

MREF is Minimum size of reference region for projecting rate of deforestation; ha

PA is Unplanned deforestation project area; ha

RAF is Reference Area Factor. Factor to multiply times project area to get minimum reference area; dimensionless

Given the project area have in 108,988 ha, the RRD should be at least 243,374.5 ha. The selected RRD had 331,537.26 ha of forest cover at the beginning of the reference period (in 2012), which meets the minimum required by the methodology.

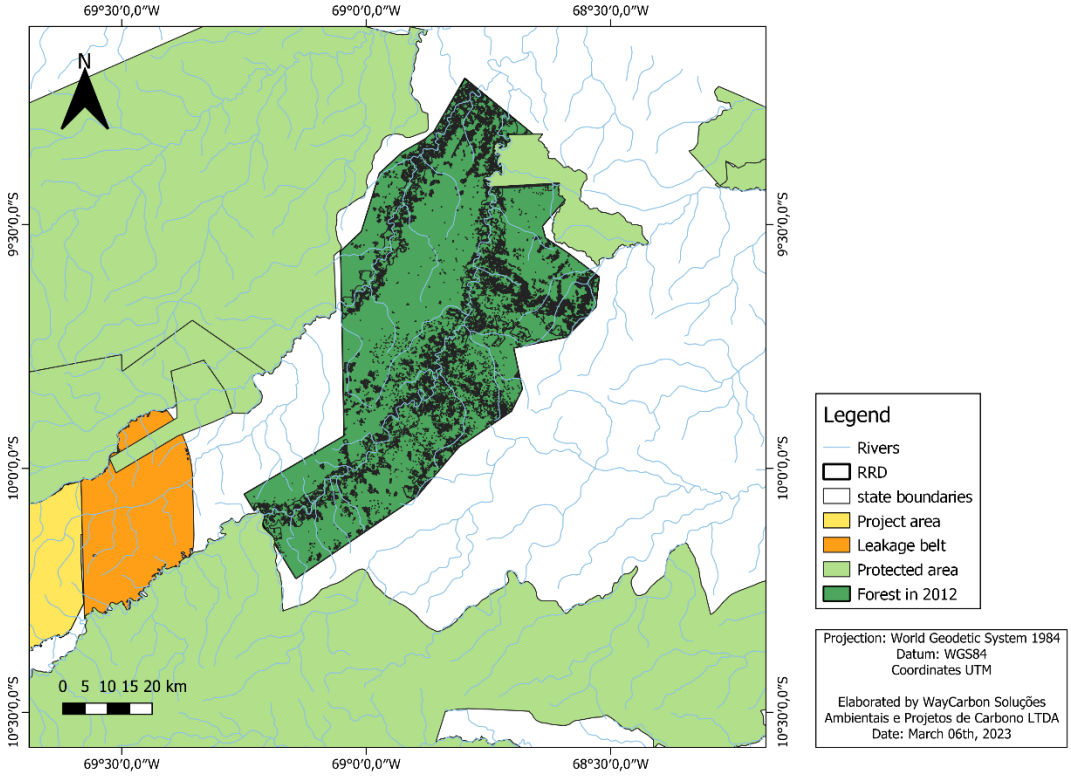


Figure 28 - Forest cover's RRD in 2012

The Leakage Belt is the area surrounding or near the project area where leakage caused by activity displacement is expected to occur. It was defined by the distribution of closed forests in the region and the methodological requisite of similar landscape conditions and accessibility of deforestation agents with project area and a minimum area requirement (i.e., ≥90% of the project area). The leakage belt covers 167,322 hectares of forest which is more than 100% of the project area.

Table 5 - Comparison of vegetation, elevation, slope, and soil type of the project area, reference region for deforestation (RRD) and leakage belt.

	Category	Project area	RRD	Leakage belt
Vegetation (%)	Alluvial open rainforest	3.45	3.51	10.55
	Lowland open rainforest	96.55	96.49	89.44
	Other physiognomies			
Elevation (%)	0 – 500 m	100	100	100
Slope (%)	<15%	81.05	83.65	80.52
	>= 15%	18.95	16.35	19.47
Soil (%)	Gleisol	3.45	3.20	11.34
	Luvisol	64.10	21.79	52.15
	Argisol	32.45	75.01	36.50
	Other (water courses)			
Rivers (m/ha)		1.56	1.63	2.29

Avoided planned deforestation component

The APD project area is constituted of 27,376 hectares which corresponds to the forest that can be legally converted to other land uses for commercial activities, with the authorization of the responsible environmental agency in each state.

Temporal boundaries

Start date and end date of the historical reference period

According to the module BL-UP and BL-PP, the starting date of the historical reference period must be between 9 and 12 years in the past and the end date must be within two years before project start date. Since the project start date is defined in 2022, the reference period for calculating the rate of unplanned and planned deforestation was defined as the period between 2012 and 2021.

Carbon pools

The IACO REDD+ Project considers the carbon pools listed in the tables below. Their inclusion or exclusion within the boundary of the project activity, as well as the respective justification/explanation, are also described in the tables below.

Avoided unplanned deforestation component

The carbon stock assessment was designed by the protocol established in the module VMD0007 (BL-UP) and VMD0001 (CP-AB).

Table 6 - Carbon stocks included or excluded in the limit of IACO REDD+ Project, of the proposed AUD project activity.

Carbon pools	Included?	Justification/Explanation
Above-ground of live trees	Yes	This pool is mandatory and always significant
Above-ground live of non-trees	Yes	The inclusion of this component is particularly important in the project area since most of the species present in the area are bamboos and palms.
Below-ground of live trees	Yes	Significant carbon pool.
Below-ground of live non-trees	Yes	The inclusion of this component is particularly important in the project area since most of the species present in the area are bamboos and palms.
Deadwood	No	Conservatively excluded, as allowed by methodology.
Harvested wood products	No	No long-term wood product activities were observed in the project area. According to the socio-environmental diagnosis made with the community that lives around the project area (see section 2), there is no commercialization of wood products.
Litter	No	Conservatively excluded, as allowed by methodology.
Soil organic carbon	No	Conservatively excluded, as allowed by methodology.

GHG emission sources included in the IACO REDD+ Project boundary are listed in the table below with the respective justification/explanation for inclusion or exclusion. REDD projects can emit GHGs by burning biomass, use of fertilizers and use of fossil fuels in vehicles and stationary equipment.

Table 7. Sources and GHG included or excluded within the boundary of the proposed AUD project activity

Source		Gas	Included?	Justification/Explanation
Baseline	Biomass burning	CO_2	No	Excluded as recommended by the applied methodology. Counted as carbon stock change.
		CH_4	Yes	Included as non-CO2 emissions from biomass burning in the baseline scenario, according to the methodology.
		N_2O	Yes	
		Other	No	No other GHG gases were considered in the baseline scenario.
	Livestock emissions	CO_2	No	Not a significant source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	
		Other	No	No other GHG gases were considered in the baseline scenario
Project	Biomass burning	CO_2	No	Excluded as recommended by the applied methodology. Counted as carbon stock change.
		CH_4	No	As recommended by methodology, Non-CO2 gases emitted from woody biomass burning - must be included if fire occurs. Biomass burning is not predicted by project scenario.
		N_2O	No	
		Other	No	No other GHG gases were considered in this project activity.
	Livestock emissions	CO_2	No	Not a significant source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	
		Other	No	No other GHG gases were considered in the baseline scenario

Avoided planned deforestation component

The carbon stock assessment was designed by the protocol established in the module VMD0006 (BL-PL) and VMD0001 (CP-AB).

Table 8 - Carbon stocks included or excluded in the limit of IACO REDD+ Project, of the proposed APD project activity

Carbon pools	Included?	Justification/Explanation
Above-ground of live trees	Yes	This pool is mandatory and always significant
Above-ground live of non-trees	Yes	The inclusion of this component is particularly important in the project area since most of the species present in the area are bamboos and palms.
Below-ground of live trees	Yes	Significant carbon pool.
Below-ground of live non-trees	Yes	The inclusion of this component is particularly important in the project area since most of the species present in the area are bamboos and palms.
Deadwood	No	Conservatively excluded, as allowed by methodology.
Harvested wood products	Yes	Inclusion of the harvested wood pool as part of the project boundary is mandatory when the process of the deforestation involves timber harvesting for commercial markets.
Litter	No	Conservatively excluded, as allowed by methodology.
Soil organic carbon	No	Conservatively excluded, as allowed by methodology.

Table 9 - Sources and GHG included or excluded within the boundary of the proposed APD project activity

Source		Gas	Included?	Justification/Explanation
Baseline	Biomass burning	CO_2	No	Excluded as recommended by the applied methodology. Counted as carbon stock change.
		CH_4	No	No biomass burning was considered in the baseline scenario.
		N_2O	No	
		Other	No	No other GHG gases were considered in the baseline scenario.
	Combustion	CO_2	No	Carbon emissions from harvesting equipment, log transport in the baseline scenario can be conservatively excluded according to VM0007

Source		Gas	Included?	Justification/Explanation
	of Fossil Fuels	CH_4	No	Non-CO2 emissions from harvesting equipment, log transport in the baseline scenario can be conservatively excluded according to VM0007
		N_2O	No	
	Use of Fertilizer	CO_2	No	No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.
		CH_4	No	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	No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.
Project	Biomass burning	CO_2	No	Excluded as recommended by the applied methodology. Counted as carbon stock change.
		CH_4	No	As recommended by methodology, Non-CO2 gases emitted from woody biomass burning - must be included if fire occurs. Biomass burning is not predicted by project scenario.
		N_2O	No	
		Other	No	No other GHG gases were considered in this project activity.
	Combustion of Fossil Fuels	CO_2	No	Carbon emissions from harvesting equipment, log transport in the baseline scenario can be conservatively excluded according to VM0007
		CH_4	No	Non-CO2 emissions from harvesting equipment, log transport in the baseline scenario can be conservatively excluded according to VM0007
		N_2O	No	
	Use of Fertilizer	CO_2	No	No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.
		CH_4	No	No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.
		N_2O	No	

Source		Gas	Included?	Justification/Explanation
		Other	No	No increase in fertilizer use is contemplated in the project case as part of leakage mitigation or any other activity.

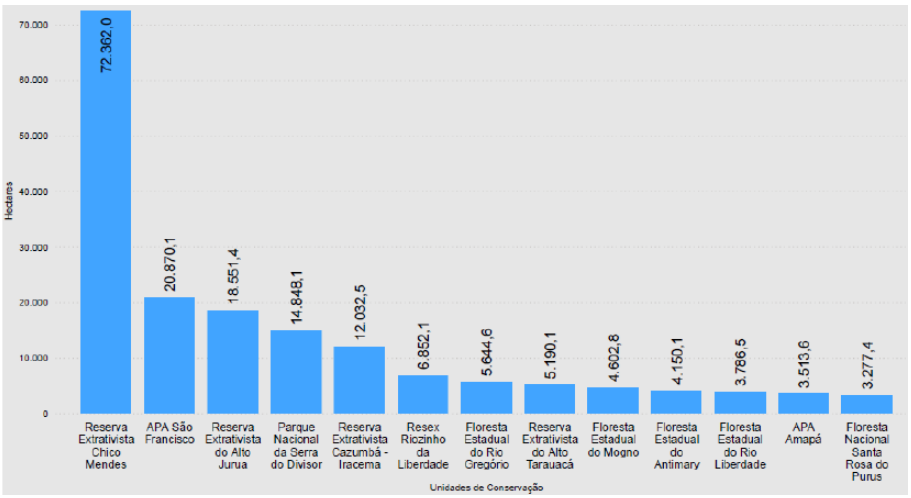
3.4 Baseline Scenario

Avoided unplanned deforestation component

In the baseline scenario, forest is expected to be converted to non-forest by the agents of deforestation acting in the reference region, project area and leakage belt, as described below.

Sena Madureira, the municipality where the IACO REDD+ Project is located, is the 41st Brazilian municipality with the largest area of deforestation in 2021, with an average of 22.5 hectares deforested per day[1]. In a historic deforestation context, the municipality has the second largest area of accumulated deforestation in the state between 1988 and 2020, a total of 212,917.6 hectares[42]. In 2020, the municipality had the second-largest extension of the deforested area, 7,322.2 hectares or 11.8%[42]. Currently, Sena Madureira holds more than 5% of the total converted area in the state, although less than 10% of its territory has been deforested[1].

The deforestation in the project region is widespread and affects public and private forests[1]. For instance, since 2012 at least 840 hectares of the farm "Fazenda Guanabara/ Senegal" have been deforested (**Figure 2**), for the establishment of cattle raising and subsistence (details available in section 2.5). In addition, the accumulated deforestation data in the Conservation Units (UCs) of the State of Acre included in the ZEE-phase II show that 178,594.3 hectares were deforested in UCs in the state by 2020, of which 72,362.0 hectares were deforested within the Chico Mendes Extractive Reserve and 12,032.5 hectares within the Cazumbá –Iracema Extractive Reserve, both neighboring the IACO REDD+ Project area. These same data show that in 2020 the Chico Mendes Extractive Reserve and the Cazumbá –Iracema Extractive Reserve were among the three UCs with the largest deforested areas, with 5,922.5 and 878.1 ha deforested respectively[2]. Finally, the data analyzed in the Indigenous Lands included in the ZEE - Phase II, show the accumulated deforestation until the year 2020 with a total of 31,335.0 hectares and the Mamoadate Indigenous Land, neighboring the IACO REDD+ Project area, with 128.9 ha in 2019 and 85.0 ha in 2020.



Graphic 1 - Largest accumulated deforestation in Conservation Units, until 2020. Source: Inpe/Prodes.2021. Available in ZEE II [2]

Regardless of whether it occurs in public or private forests, livestock farming was responsible for almost all the deforestation validated by MapBiomas Alerta in 2021 in the project region and represents the main activity driving the dynamics of environmental transformations that the state of Acre has been experiencing in recent years[1] .

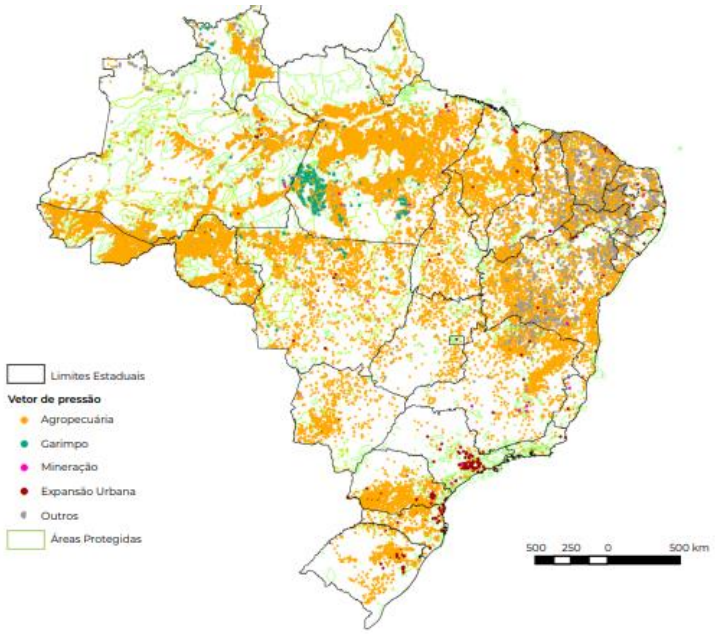


Figure 29 - Distribution in Brazil and characteristics of deforestation alerts by the different pressure vectors. In orange is deforestation alerts from agricultural and livestocks agents. Source: MapBiomas Report, 2022 [1]

Historical data show that cultivated pastures (81%) and areas with secondary vegetation (13%) continue to be the main uses of deforested areas in the Acre state[41]. Between 2006 and 2018, Acre's cattle herd grew by 23%, pasture areas by 25%, and accumulated deforestation by 18%[42]. According to ZEE III, published in 2022, the deforestation is strongly related with the continued expansion of cultivated pasture areas and the growth in the share of this land use in the total deforested area, simultaneously with the reduction of the area destined for agriculture. According to the latest available data on land use and land cover[43], the municipalities of Sena Madureira, where the IACO REDD+ Project area is implemented, and Assis Brasil, the municipality closest to the project area, have together approximately 8.09% of their areas covered by agricultural and livestock lands. In 2012, this value was 5.33% and in 2000 it was 3.19%. So, in 21 years (2000-2021), the land use for agricultural and livestock in project zone increased by 153%.

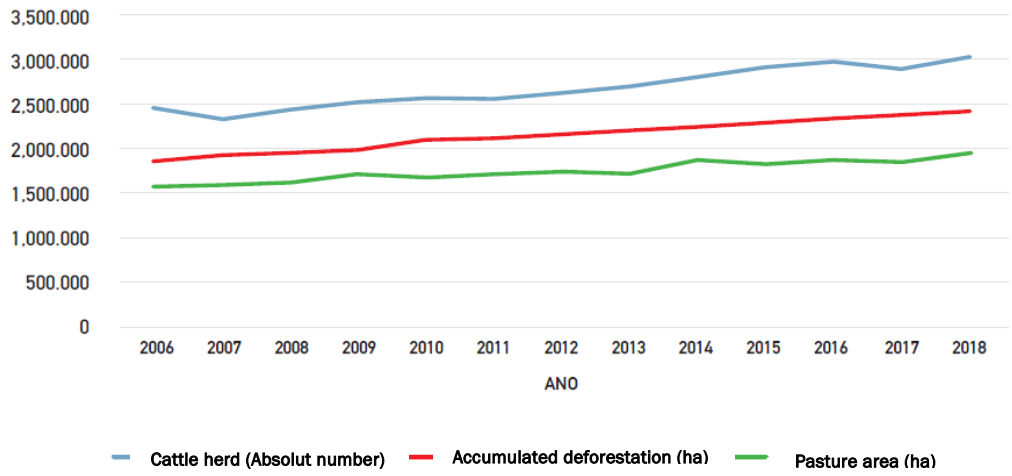


Figure 30 - Evolution of the cattle herd, the accumulated deforestation of the cultivated pasture area. Source: ZEE do Acre Fase III

According to the regional context description above, the conversion of native forest to pasture is common practice in the IACO REDD+ Project region. Hence, it is expected that the forest will be converted to pasture, since without the activities proposed by the IACO REDD+ Project to contain unplanned deforestation. It is assumed that the property would certainly undergo the same deforestation intensity of its region has been suffering.

Avoided planned deforestation component

In the baseline scenario, forest is expected to be converted to non-forest by the landowners, to try to maximize their financial returns per hectare of land. Forest harvesting and conversion to livestock is the most likely land use scenario as described below.

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[41] AMARAL, E. F. do. et al. Inventário de emissões antrópicas e sumidouros de gases de efeito estufa do Estado do Acre: ano-base 2014. Rio Branco, AC: Embrapa Acre, 2018. 65 p.

[42] ACRE, Governo do Estado Zoneamento ecológico-econômico do Acre: fase III: escala 1:250.000: documento-síntese / Secretária de Estado do Meio Ambiente. – Rio Branco: Semapi, 2021. Available at: < http://semapi.acre.gov.br/wp-content/uploads/sites/20/2021/12/COMPLETO-Resumo-Executivo-do-ZEE-Acre-Fase-III_V16_WEB.pdf>

[43] MapBiomas coleção 7, 2022.

Brazil is the largest beef exporter in the world, accounting for almost a fifth of total global beef exports. With more than 230 million head of cattle, it has the second largest cattle herd in the world and the rearing is largely done on pasture. The nine states that make up the Brazilian Amazon have almost 40% of the national cattle herd[44]. Estimates show that about 70% of the deforested land in the Amazon is destined for cattle ranching[45]. In Acre State, about 81% of deforested areas is used for cultivated pastures[46].

Many studies seek to understand the relationship between deforestation and the expansion of cattle ranching in the Amazon. So far, what has been documented is that the increase in world demand for meat and the low cost of land in the Amazon[47], greatly stimulate the opening of land for the activity. In addition, the livestock (pasture) is generally financed through initial capital obtained in the extraction of wood in amazon lands, which makes the activity viable and even more financially attractive.

Since 2013, the landowners of the Fazenda Guanabara/Petrópolis parcels have plans for planned deforestation as permitted by national law 12,651 (more details on section 1.14). In 2015, a request for forest cover suppression was filed with IMAC: Instituto do Meio Ambiente do Acre (Acre Environmental Institute, in English) to obtain permission to suppress native vegetation in 20% of the property's area. The purpose of this suppress was the timber exploration and the creation of pastures, a much-needed income and commonly seen activity at the region where the project is located.

3.5 Additionality

The latest version of the tool "The AR-TOOL02, "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", version 01, was used to identify credible alternative land use scenarios and evaluate both the alternatives and the proposed project scenarios, and to demonstrate the additionality of the project. The applicability conditions for the tool are detailed under section 3.2 and dully met.

The additionality and baseline identification must follow the steps:

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

STEP 1. Identification of alternative scenarios activity

STEP 2. Barrier analysis

STEP 3. Investment analysis (if needed)

STEP 4. Common practice analysis

[44] EISENHAMMER, S. One Brazilian farmer tried – and failed – to ranch more responsibly in the Amazon. Reuters, 2020. reut.rs/3zIBWqa

[45] TYUKAVINA, A.; et al. Types and rates of forest disturbance in Brazilian Legal Amazon, 2000–2013. Science advances, v. 3, n. 4, p. e1601047, 2017.

[46] AMARAL, E. F. do. et al. Inventário de emissões antrópicas e sumidouros de gases de efeito estufa do Estado do Acre: ano-base 2014. Rio Branco, AC: Embrapa Acre, 2018. 65 p.

[47] Overlay land use data from MapBiomas, pasture quality data from Lapig/MapBiomas, cattle herd from PPM/IBGE, and land price data from IHS Markit

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

Outcome: The start date of the project activity is of 16 December 2021, after 31 December 1999, as required by the AR-TOOL02.

In addition, the incentive from the planned sale of carbon credits, was seriously considered in the decision to proceed with the IACO REDD+ Project activities. Prior to the project start date, the proponents began a series of negotiations to carry out a technical and financial feasibility study to be carried out as Stage I of the carbon project development. On 12 November 2021, the IACO Ambiental partners received a preliminary economic feasibility study from a consulting firm. The first proposal submitted by WayCarbon, which included the technical and financial feasibility study stage in three credit sales scenarios, was requested and sent to the project proponents on December 15, 2021.

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

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

Unplanned deforestation component:

SCENARIO 01: Continuation of the pre-project land use:

The first alternative land use scenario is the continuation of current (pre project) land use scenario, where REDD carbon project is not implemented. Under the pre-project scenario, there are no economic activities being carried out in the Project Area or Project Zone. Thus, there are no costs or revenues for this scenario. Scenario 01 was included in accordance with A/R CDM project activities (T-ADD) requirements.

Hence, the alternative Scenario 01 is deemed as a plausible alternative land use scenario to the project activity.

SCENARIO 02: Conservation of the forest area within the project boundary without being registered as a VCS AFOLU project;

Scenario 02 represents the Conservation of the forest area within the limits of the Project carried out without being registered as an AFOLU VCS project activity.

Effective Amazon rainforest conservation in the project area would be unlikely in any scenario where there is no carbon revenue. Since 2012 at least 840 hectares of the farm “Fazenda Guanabara/ Senegal” have been deforested (**Figure 1** and **Figure 3**), for the establishment of cattle raising and subsistence (details available in section 2.5). As the IACO REDD+ Project area has no income, landowners cannot afford the efforts and costs to maintain long-term surveillance of the project boundaries to avoid encroachment and deforestation. The long-term surveillance costs are determined as being R$ 540,198.50 as the initial investments, followed by average continued annual costs of R$ 224,700.00, as described in the table below. This results in average continued per month spending of R$ 18,725.00 for the entire project area.

Table 10 – Approximate costs for implementing scenario 2.

Activity	Initial Cost	Maintenance cost	Frequency
Purchase of car and boat for forest patrols	R$ 50,000.00	R$ 14,700.00[48]	Annually
Long-term data sets of acoustic activity	R$ 160,198.5*	R$ 0	-
Hiring people for forest patrol (3-5)	R$ 180,000.00	R$ 180,000.00	Annually
Basecamp	R$ 350,000.00	R$ 2,000.00	Annually
Equipments	R$ 150,000.00	R$ 8,000.00	Annually
Trainings	R$ 0	R$ 20,000.00	Annually
Total	R$ 540,198.50	R$ 224,700.00	-

* Dollar value on October 18, 2022 (R$5.25)

Hence, the alternative Scenario 02 is deemed as a plausible but not financially attractive without carbon credit income. Scenario 2 was included in accordance with A/R CDM project activities (T ADD) requirements.

SCENARIO 03: Small-scale beef cattle and subsistence farming;

The third alternative land use scenario is the unplanned deforestation of project area due to uncontrolled encroachment by small and medium cattle ranchers.

Since 2012 at least 840 hectares of the farm "Fazenda Guanabara/ Senegal" have been deforested (**Figure 1** and **Figure 2**), for the establishment of cattle raising and subsistence (details available in section 2.5). This deforestation pattern is similar to that found for the entire state of Acre, where the highest deforestation rates occur in land tenure categories that involve explicit land tenure, such as private lots, for subsistence and implementation of agriculture and livestock activities. Currently, private lots are of great importance in terms of deforestation, containing more than 28% of all deforestation in Acre[1]. In addition, according to the ZEE III, there is a strong trend towards the expansion of pasture areas for cattle ranching to the Sena Madureira region, mainly along highways and main rivers. Between 2006 and 2018, Acre's cattle herd grew by 23% and pasture areas by 25%. According to the IBGE, the number of cattle in 2020 showed the highest increase (8.3%) compared to the previous year among all the nine states of the Legal Amazon and Sena Madureira is the municipality with the second largest number of cattle of the state [22].

[48] Custos anuais previstos de manutenção do veículo. Fonte: https://www.uol.com.br/carros/noticias/redacao/2022/02/21/manter-um-carro-na-garagem-custa-mais-de-r-27-mil-por-ano.htm#:~:text=Custos%20esquecidos&text=J%C3%A1%20o%20custo%20de%20oportunidade,ou%20mensal%20de%20R%24%202.263.

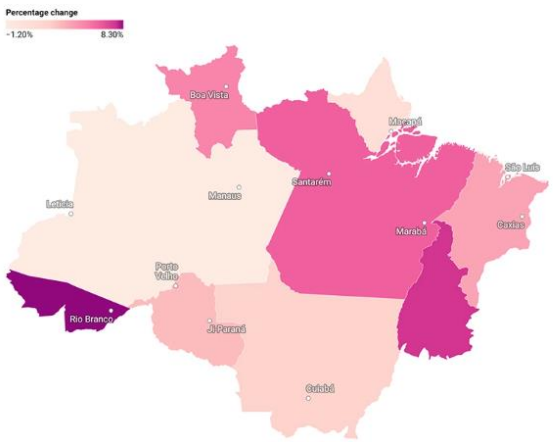

Figure 31 - Cattle herd growth rate in the Legal Amazon between 2019 and 2020. Source: IBGE,2021[49]

As the project area is bordered by one of the main rivers in the state and is located in one of the municipalities with the greatest tendency to open land for livestock and subsistence, it can be concluded that without additional efforts, project area is increasingly prone to being deforested by small and medium cattle ranchers.

Hence, the alternative Scenario 03 is deemed as a plausible alternative land use scenario to the project activity.

Outcome: For all land use scenarios, credibility is justified by current practices in the region of the project. Literature and field observations corroborate this reality. Then, the SCENARIOS 01, 02 and 03, detailed above, could occur on the land within the project boundary.

Planned deforestation component:

SCENARIO 01: Continuation of the pre-project land use

The first alternative land use scenario is the continuation of current (pre project) land use scenario, where REDD carbon project is not implemented. Under the pre-project scenario, there are no activities being carried out in the Project Area or Project Zone. Thus, there are no costs or revenues for this scenario. Scenario 01 was included in accordance with A/R CDM project activities (T-ADD) requirements.

Hence, the alternative Scenario 01 is deemed as a plausible alternative land use scenario to the project activity.

SCENARIO 02: Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project:

Scenario 02 represents the Conservation of the forest area within the limits of the Project carried out without being registered as an AFOLU VCS project activity.

The forest conservation and maintenance activities have an annual cost estimated at R$ 224,700.00 throughout the project lifetime (see **Table 10**). As in the project area there are no economic activities, this scenario involves costs but no income. Then, the forest conservation in the project area without carbon revenue is unlikely.

[49] Instituto Brasileiro de Geografia e Estatística (IBGE)

Hence, the alternative Scenario 02 is unlikely, but deemed as a plausible alternative land use scenario to the project activity.

SCENARIO 03: Cattle ranching

The third alternative land use scenario is the continuation of current (pre project) land use scenario, where no REDD carbon project is implemented, and the landowners will proceed with the planned deforestation plan to try to maximize their financial returns per hectare of land. Forest harvesting and conversion to livestock is the most likely land use scenario if the IACO REDD+ Project is undertaken.

As described in detail on above sections, about 81% of deforested areas in the Acre State is used for cultivated pastures[50] and opening land for cattle ranching is currently the main driver of deforestation in the state. These data corroborate data from *Zoneamento ecológico-econômico do Acre* that show that the economy in Acre is centered on livestocks, especially on cattle raising[42]. Particularity, the municipality of Sena Madureira, where the project is located, until 2004 had the highest participation in the sector and, in 2016, reached the figure of 117 million, and rising to 91 million in 2018.

Several factors fueled the growth of the cattle industry in Acre, including an increase in international demand for meat and meat products, especially from China, according to IBGE data of 2021.

Hence, the alternative Scenario 01 for planned deforestation component is deemed as a plausible alternative land use scenario to the project activity.

Outcome: For all land use scenarios, credibility is justified by current practices in the region of the project. Literature and field observations corroborate this reality. Then, the SCENARIOS 01, 02 and 03, detailed above, could occur on the land within the project boundary.

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

Unplanned deforestation component:

SCENARIO 01 and 02: Forest conservation within the project area is always in compliance with all applicable legal and regulatory requirements. For the 02 proposed scenario, only legal documents of ownership of the properties are relevant. As detailed in section 1.7, all lots of Fazenda Guanabara/Senegal are in legal compliance.

Hence, these scenarios are in compliance with legal and regulatory requirements.

SCENARIO 03: Practices adopted in scenario 03 are not in accordance with mandatory legislation and regulations. Deforestation occurs in a systematic and widespread way in the legal Amazon. Between 1997 and 2003, 81% of the deforestation identified was outside the authorization of government agencies, that is, illegal deforestation[51]. Currently, at the least 94% of the Brazilian Amazon deforestation have some level of illegality [52] and is driven by the lack of oversight, land grabbing and advancement of pasture areas.

[50] AMARAL, E. F. do. et al. Inventário de emissões antrópicas e sumidouros de gases de efeito estufa do Estado do Acre: ano-base 2014. Rio Branco, AC: Embrapa Acre, 2018. 65 p.

[51] HIGUCHI, N.; et al. Governos locais amazônicos e as questões climáticas globais. Edição dos autores, v. 104, 2009.

[52] VALDIONES, A. P.; et al., 2021. Illegal Deforestation and Conversion in the Amazon and Matopiba: lack of transparency and access to information. Available at < https://www.icv.org.br/website/wp-content/uploads/2021/05/icv-relatorio-ing-v1-1.pdf>

Particularly, in the state of Acre, the transparency of ecosystems clearing permits (ASV) data is very precarious, with information that either does not exist or is made available inadequately or incompletely. By the way that data are currently presented, it is impossible to differentiate between legal and illegal deforestation/conversion. However, the state deforestation rate in 2021 was the highest in the last decade. From January to December 2021, Acre lost 889 km² of forest, which is equivalent to 90,000 football fields. If compared to 2020, the year in which the state recorded a loss of 694 km² of forest cover, the increase was 28%[53].

Hence, this scenario is not in compliance applicable mandatory legal requirements but is widespread on project region.

Outcome: Is has been demonstrated that SCENARIOS 01 and 02 are in compliance with mandatory legislation and regulations taking into account their enforcement in the region or country. SCENARIO 03 is not in compliance with mandatory legislation and regulations but is widespread in the project region.

Planned deforestation component:

SCENARIO 01 and 02: Forest conservation within the project area is always in compliance with all applicable legal and regulatory requirements. For the 02 proposed scenario, only legal documents of ownership of the properties are relevant. As detailed in section 1.7, all lots of Fazenda Guanabara/Senegal are in legal compliance.

Hence, these scenarios are in compliance with legal and regulatory requirements.

SCENARIO 03: The application of an authorized deforestation is regulated in Brazil by the laws Nº 12,651, decree Nº 5,975. Deforestation to cattle raising in the Amazon Forest is legal as long as the owner follows the 80% Legal Reserve and Permanent Preservation Areas restriction described in the Brazilian legislation. The remaining 20% of land may be deforested by license. Then, the landowner must have officially allocated 80% of its total area as LR (Legal Reserve) and have a deforestation authorization for clearing the area for pasture.

As all areas of the IACO REDD+ Project have RL allocated and are in full legal compliance, livestock in the IACO REDD+ project area is legalized.

Hence, this scenario is in compliance applicable mandatory legal requirements.

Outcome: Is has been demonstrated that SCENARIOS 01, 02 and 03 are in compliance with mandatory legislation and regulations taking into account their enforcement in the region or country.

STEP 2. Barrier analysis

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

Unpanned deforestation component:

BARRIERS RELATED TO INVESTIMENT

Investment barriers exist in terms of Scenarios 1 and 2. Currently in Brazil, options for forest conservation on private properties without revenue are insignificant. The most likely would be the creation of a RPPN (Reserva Particular do Patrimônio Natural), which is a conservation unit (UC) of private domain, recorded

[53] Sistema de Alerta de Desmatamento (SAD) do Instituto do Homem e Meio Ambiente da Amazônia (Imazon).

in perpetuity in the registration of the property, with the objective of conserving biological diversity[54]. The benefits achieved by it are Preserved property rights; Exemption from the ITR referring to the area created as RPPN; Priority in the analysis of projects by the National Environment Fund (FNMA), of the MMA (Ministry of the Environment of Brazil); Preference in the analysis of requests for granting agricultural credit, with official credit institutions, for projects to be implemented in properties that contain RPPN in their perimeter and Possibilities of cooperation with private and public entities in the protection, management and management of the Unit[54]. However, the costs associated with creating them far outweigh[55] the incentives provided.

In addition, as described above, for conservation of the forest area within the project boundary, it is necessary to implement and maintain some activities, such as physical patrolling of the forest area and Basecamp construction to support patrolling operations, Installation of signboards to inform the presence of the REDD+ project, Fire Prevention and Extinguishing e High resolution satellite imagery for monitoring forest cover and biodiversity conservation. The operating costs only for the physical patrolling activity in the long run are R$ 540,198.50 as the initial investments, average continued annual costs of R$ 224,700.00, as described in Table 10. This results in average continued per month spending of R$ 18,725.00 for the entire project area.

In this sense, landowners do not have sufficient financial resources to maintain activities in the long term. Therefore, Investment barriers exist in terms of conservation scenarios without the revenue from carbon credits.

On the other hand, there are few restrictions on obtaining financing for the implementation of scenario 03, even considering that the activities carried out occupy illegally invaded and deforested areas. Agribusiness in Brazil is recognized for its participation in the national economy, which safeguards its support even in times of institutional crisis. A survey by the National Confederation of Agriculture and Livestock (CNA) shows that the Gross Value of Production in 2020 reached R$ 728.6 billion, which is the highest real figure in the history of the sector. Compared to 2019, the sector had an increase of 11.8%[61]. Amid the pandemic, agribusiness is expected to account for 23.6% of the country's total GDP. These statistics corroborate State initiatives to promote Brazilian agribusiness, such as the recent Agribusiness Law (Law No. 13,986/20), created on April 7, 2020, which deals with incentives created by the government to stimulate the sector after the Covid 19 pandemic. In a brief description, the Agribusiness Law presents legislative innovations in several areas of agribusiness, addressing topics ranging from financing to rural credit, which brings a relevant increase in legal security for domestic and foreign investors. Besides the numerous funding resources and credit lines for cattle raising activities, the implementation of cattle raising activities can be funded by initial capital obtained with timber sales after deforestation, and subsequently benefit from speculation of the value of deforested land.

BARRIERS RELATED TO SOCIAL CONDITIONS AND LAND-USE PRACTICES:

Social conditions and local tradition of land use are barriers for the implementation of all forest conservation scenarios without VCU income, that is, the scenarios 01 and 02.

The traditional practices observed in the region of the project area can be barriers to conservation activities. As was identified in the Socioeconomic Diagnosis, most people living in the project area region do not benefit financially from conservation and forest resources. Conversely, the livestock farming is a

[54] https://www.gov.br/icmbio/pt-br/servicos/crie-sua-reserva/perguntas-e-respostas-sobre-rppn

[55] ICMbio (2012) Perguntas e Respostas sobre Reserva Particular do Patrimônio Natural: https://www.icmbio.gov.br/portal/images/stories/comunicacao/downloads/perguntaserespostasrppn.pdf

cultural legacy in the region[42]. During the last decade, there has been an effective advance in the implementation of livestock in the project region: In 2012, 2.66% of the project region land use was livestock[56]. In 2021, the livestock represented 4.04% of the project region land use, being the most representative land activity[56]. In addition, since 2012 at least 840 hectares of the farm "Fazenda Guanabara/ Senegal" have been deforested (**Figure 1** and **Figure 2**), for the establishment of cattle raising and subsistence (details available in section 2.5). In general, the livestock is the main economic activity of these families, and the conservation of forest areas prevents the initial financial input that makes livestock farming viable. This pattern of deforestation can be caused by the private landowners themselves and also by land grabbers, through encroachments on unprotected areas. During the visits to the project area, which took place in July, August, September and October of 2022, it was possible to see several burned areas along the access branches.

Figure 32 - Burned areas in Project area.

BARRIERS RELATED TO LAND TENURE, OWNERSHIP, INHERITANCE, AND PROPERTY RIGHTS:

The lack of suitable land tenure legislation and regulation to support the security of tenure is a barrier for the implementation of the scenarios 01 and 02.

Appropriation of unused private land is not a recent social phenomenon in Brazilian history, on the contrary, it is so old that it becomes difficult to determine when it became a recurring practice[57]. Recent data show that by the end of 2020, more than 14 million hectares of unintended public forests, or 29% of the total area, were illegally registered as private property in the National Rural Environmental Registry System (CAR)[58]. As the CAR is self-declared, squatters design in the system supposed rural properties in unallocated public forests, to simulate a right to land that they do not have. The same occurs with private property without active surveillance.

By declaring ownership in the CAR, the right to clear surplus legal reserve is legitimized, even without any legal approval. Then, the deforestation and fires come together [58]. In the project region, the deforestation usually occur in 3 stages during the driest and hottest months. In the first, small trees and lianas are cut manually. Then larger trees are felled with the help of equipment such as a chainsaw. Dead vegetation is left to dry for weeks and then burned to clear the land. The squatter occupies the land, illegally sells the extracted wood, and establishes agricultural or livestock production.

[56] Relatório MapBiomas, 2022

[57] NOGUEIRA, B; LIMA, N. A. Combatendo a grilagem no amazonas através dos projetos de desenvolvimento sustentável. Nova Hileia | Revista Eletrônica de Direito Ambiental da Amazônia. ISSN: 2525 – 4537, [S.l.], v. 3, n. 1, dez. 2018. ISSN 2525-4537. Available at: <http://periodicos.uea.edu.br/index.php/novahileia/article/view/1261>.

[58] IPAAM, 2021. Available at: <https://ipam.org.br/florestas-publicas-nao-destinadas-e-grilagem/>

In this context, the CAR is part of the process of grabbing lands with conserved forests. As land-grabbers, are in many cases associated with cattle farming[59], barriers related to land tenure, ownership, inheritance, and property rights exists for conservation scenarios (01 and 02) and not prevent the implementation of the small-scale beef cattle and subsistence farming (scenario 03).

Planned deforestation component:

BARRIERS RELATED TO INVESTIMENT

Investment barriers exist in terms of Scenarios 1 and 2. Currently in Brazil, options for forest conservation on private properties without revenue are insignificant. The most likely would be the creation of a RPPN (Reserva Particular do Patrimônio Natural), which is a conservation unit (UC) of private domain, recorded in perpetuity in the registration of the property, with the objective of conserving biological diversity[54]. The benefits achieved by it are Preserved property rights; Exemption from the ITR referring to the area created as RPPN; Priority in the analysis of projects by the National Environment Fund (FNMA), of the MMA (Ministry of the Environment of Brazil); Preference in the analysis of requests for granting agricultural credit, with official credit institutions, for projects to be implemented in properties that contain RPPN in their perimeter and Possibilities of cooperation with private and public entities in the protection, management and management of the Unit[60]. However, the costs associated with creating them far outweigh the incentives provided.

In addition, as described above, for conservation of the forest area within the project boundary, it is necessary to implement and maintain some activities, such as physical patrolling of the forest area and Basecamp construction to support physical patrolling of the forest area and Basecamp construction to support patrolling operations, Installation of signboards to inform the presence of the REDD+ project, Fire Prevention and Extinguishing e High resolution satellite imagery for monitoring forest cover and biodiversity conservation. The operating costs in the long run are R$ 540,198.50 as the initial investments, average continued annual costs of R$ 224,700.00, as described in Table 10. This results in average continued per month spending of R$ 18,725.00 for the entire project area.

In this sense, landowners do not have sufficient financial resources to maintain activities in the long term. Therefore, Investment barriers exist in terms of conservation scenarios without the revenue from carbon credits.

On the other hand, there are few restrictions on obtaining financing for the implementation of scenario 03, even considering that the activities carried out occupy illegally invaded and deforested areas. Agribusiness in Brazil is recognized for its participation in the national economy, which safeguards its support even in times of institutional crisis. A survey by the National Confederation of Agriculture and Livestock (CNA) shows that the Gross Value of Production in 2020 reached R$ 728.6 billion, which is the highest real figure in the history of the sector. Compared to 2019, the sector had an increase of 11.8%[61]. Amid the pandemic, agribusiness is expected to account for 23.6% of the country's total GDP. These statistics corroborate State initiatives to promote Brazilian agribusiness, such as the recent Agribusiness Law (Law No. 13,986/20), created on April 7, 2020, which deals with incentives created by the

[59] MOUTINHO, P. et al. O fim do desmatamento ilegal na Amazônia brasileira: ferramentas e estratégias no combate à grilagem em terras públicas. Combate aos Crimes ambientais, p. 167. 2022.

[60] SOUZA, J.L.; et al. Perguntas e respostas sobre reserva particular do patrimônio natural. Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), 2012.

[61] Confederação Nacional da Agricultura e Pecuária (CNA), 2020.

government to stimulate the sector after the Covid 19 pandemic. In a brief description, the Agribusiness Law presents legislative innovations in several areas of agribusiness, addressing topics ranging from financing to rural credit, which brings a relevant increase in legal security for domestic and foreign investors. Besides the numerous funding resources and credit lines for cattle raising activities, the implementation of cattle raising activities can be funded by initial capital obtained with timber sales after deforestation, and subsequently benefit from speculation of the value of deforested land.

BARRIERS RELATED TO SOCIAL CONDITIONS AND LAND-USE PRACTICES:

Social conditions and local tradition of land use are barriers for the implementation of all forest conservation scenarios without VCU income, that is, the scenarios 01 and 02.

The traditional practices observed in the region of the project area can be barriers to conservation activities. As was identified in the Socioeconomic Diagnosis, most people living in the project area region do not benefit financially from conservation and forest resources. Conversely, the livestock farming is a cultural legacy in the region[42]. During the last decade, there has been an effective advance in the implementation of livestock in the project region: In 2012, 2.66% of the project region land use was livestock[62]. In 2021, the livestock represented 4.04% of the project region land use, being the most representative land activity. In addition, since 2012 at least 840 hectares of the farm "Fazenda Guanabara/ Senegal" have been deforested (**Figure 1** and **Figure 2**), for the establishment of cattle raising and subsistence (details available in section 2.5). In general, the livestock is the main economic activity of these families, and the conservation of forest areas prevents the initial financial input that makes livestock farming viable. This pattern of deforestation can be caused by the private landowners themselves and also by land grabbers, through encroachments on unprotected areas. During the visits to the project area, which took place in July, August, September and October of 2022, it was possible to see several burned areas along the access branches.

Figure 33 - Burned areas in Project boundaries

BARRIERS RELATED TO INSTITUTIONAL ORGANIZATION:

The lack of enforcement of forest or land-use-related legislation is a barrier for the implementation of the scenarios 01 and 02.

Currently, under the Brazilian Forest Code (Law No. 12,651/2012), rural properties located in the Legal Amazon, in forest areas, are required to reserve 80% of their area for Permanent Preservation Areas and Legal Reserves. However, since its first version, in 1934, the Forest Code has undergone several updates and there is little inspection of the area and limits that are deforested in practice. Once farmers start to deforest their lands, it is common practice for them not to respect the limits established by law, and to

[62] Relatório MapBiomas, 2022

deselect Legal Reserve areas and APPs. A recent study showed that in 92% of cases, deforestation exceeds the area with legal suppression permission[63]. Furthermore, considering the lack of incentives for conservation at the national level, institutional barriers are relevant for any conservation scenarios (01 and 02).

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

Unplanned deforestation component

- Investments barriers
- Barriers related to social conditions and local tradition
- Barriers related to land tenure, ownership, inheritance, and property rights

Planned deforestation component

- Investments barriers
- Barriers related to social conditions and local tradition
- Institutional barriers

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

Barriers identified in the outcome of step 2a, prevent conservation activities in the region in which the project is inserted. The assessment of barriers took into account the local socioeconomic context, as well as access to information and legislation available in the country. Small-scale beef cattle and subsistence farming and Cattle ranching is not prevented by barriers listed in Step 2a.

Table 11 - Summary of barriers faced for alternative land-use scenarios

Scenario	Barrier
Unplanned deforestation component	
SCENARIO 01: Continuation of the pre-project land use	• Investments barriers • Barriers related to social conditions and local tradition • Barriers related to land tenure, ownership, inheritance, and property rights
SCENARIO 02: Conservation of the forest area within the project boundary without being registered as a VCS AFOLU project	• Investments barriers • Barriers related to social conditions and local tradition • Barriers related to land tenure, ownership, inheritance, and property rights

[63] STRASSBURG, B. et al. Aumentando a produção agrícola e evitando o desmatamento–um estudo de caso para o Mato Grosso, Brasil. Rio de Janeiro: ISS/ICV, 2013.

SCENARIO 03: Small-scale beef cattle and subsistence farming	No barriers
Planned deforestation component	
SCENARIO 01: Continuation of the pre-project land use	• Investments barriers • Barriers related to social conditions and local tradition. • Institutional barriers
SCENARIO 02: Conservation of the property's forest cover, without exploitation of the 20% permitted by law	• Investments barriers • Barriers related to social conditions and local tradition • Institutional barriers
SCENARIO 01: Cattle ranching	- No barriers

Sub-step 2c. Determination of baseline scenario (if allowed by the barrier analysis)

Unplanned deforestation component

Scenario 03, Small-scale beef cattle, would not be impeded at any of the barriers identified in sub-step 2a. In this context, in the absence of the project, this scenario is the most plausible and likely for land use.

As the list contains only one land use scenario, the tool A/R "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" directs towards the development of Step 4: Common practice test.

Planned deforestation component

Scenario 03, Cattle ranching, would not be impeded at any of the barriers identified in sub-step 2a. In this context, in the absence of the project, this scenario is the most plausible and likely for land use.

As the list contains only one land use scenario, the tool A/R "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" directs towards the development of Step 4: Common practice test.

STEP 3. Investment analysis

According to A/R Methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", there is only one land use scenario without barriers, the step 3 (investment analysis) is not required.

STEP 4. Common practice analysis

The step 4 of the A/R Methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", is based on the analysis of areas with similar

activities to the proposed in the IACO REDD+ Project, which have already spread in the Project's geographic area. Other registered VCS AFOLU project activities shall not be included in this analysis.

Unplanned and planned deforestation component

In the surroundings of the Project area, there are several Conservation Units (CUs), listed in **Table 12** below, with their respective characteristics and similar to the model proposed by the IACO REDD+ Project.

Table 12 - Conservation Units present in the surroundings of the IACO Project area.

Conservation Units	Area (ha)	Responsible Body	References
FLONA Macauã	176,349.02	Federal Conservation Unit	https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/amazonia/lista-de-ucs/flona-do-macaua/flona-do-macaua https://uc.socioambiental.org/arp/646
Reserva Extrativista Cazumbá-Iracema	754,987.10	Federal Conservation Unit	https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/amazonia/lista-de-ucs/resex-do-cazumba-iracema/resex-do-cazumba-iracema
Mamoadate Indigenous Lands	312,584.49	Federal Conservation Unit	https://terrasindigenas.org.br/pt-br/terras-indigenas/3752
Reserva Extrativista Chico Mendes	916,917.93	Federal Conservation Unit	https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/amazonia/lista-de-ucs/resex-chico-mendes/resex-chico-mendes https://uc.socioambiental.org/arp/626

FLONA Macauã has similar characteristics with the REDD+ Project Area in terms of scale (ha) and environmental characteristics. Created by Decree No. 96,189 of 21 June 1988, FLONA Macauã is one of the conservation units for sustainable development, managed by the Chico Mendes Institute for

Biodiversity Conservation (ICMBio). Unlike the context of the IACO REDD+ Project, FLONA has premises for sustainable development and exploitation of forest resources, counting on a Sustainable Forest Management Plan.

When it comes to conservation-related activities, the Mamoadate Indigenous Land is similar to the conservation activities proposed by the IACO REDD+ Project. The Mamoadate TI, approved by Decree No. 254 of October 29, 1991, aims to conserve natural resources, as well as protect the resident peoples of the Indigenous Land and reduce pressure for the use of forest resources (AMAAIAC, 2016). It differs from the scope of the IACO REDD+ Project by the scale and presence of indigenous peoples who use the Mamoadate TI area for subsistence, which does not occur in the IACO REDD+ Project area.

The other two RESEX (RESEX Cazumbá-Iracema and RESEX Chico Mendes) have the sustainable extraction of natural resources as their main activity, in addition to having a much larger scale than the Project area.

Although all these areas have mechanisms for monitoring and controlling deforestation in their territory, the big difference between them and the IACO REDD+ Project area is that the project area is composed of private properties, while all the others are areas belonging to the Brazilian State. Private areas intended for conservation, for example, RPPNs, are not present in the geographical area of the project, nor in the same jurisdiction (state)[64].

In addition, another great highlight of this project is the monitoring of local biodiversity and social activities that will bring benefits to the local community. Therefore, the proposed VCS REDD project activity is not the common practices in the project geographic area and, hence it is additional.

3.6 Methodology Deviations

No methodology deviations were applied.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to VM0007 requirements, the baseline scenario is established following the BL-UP and BL-PL modules as the project is concerned to unplanned deforestation and planned deforestation respectively. All criteria and procedures established in the methodologies applied for the quantification of reduction and removal of GHG emissions were applied separately for each project activity.

Estimation of carbon stock changes and greenhouse gas emissions

Avoided unplanned deforestation component

For terrestrial carbon pools in REDD project activities (non-wetland), the baseline carbon stocks changes must be determined as:

[64] ICMBio, 2022 . Availaible at : < https://www.gov.br/icmbio/pt-br/servicos/geoprocessamento/mapa-tematico-e-dados-geoestatisticos-das-unidades-de-conservacao-federais/areaucsfederaiscategoriaago2022.pdf>

$$\Delta C_{BSL,i,t} = A_{unplanned,i,t} * \left(\Delta C_{ABtree,i} - \Delta C_{WP,i} + \Delta C_{ABnon-tree,i} + \Delta C_{LI,i}\right) + \left(\sum_{t-10}^{t} A_{unplanned,i,t}\right) * \left(\Delta C_{BBtree,i} + \Delta C_{BBnon-tree,i} + \Delta C_{DW,i}\right) * \left(\frac{1}{10}\right) + \left(\sum_{t-20}^{t} A_{unplanned,i,t}\right) * \left(C_{wp100,i} + \Delta C_{SOC,i}\right) * \left(\frac{1}{20}\right)$$

Where:

$\Delta C_{BSL,i,t}$	Sum of the baseline carbon stock change in all terrestrial pools in stratum *i* in year *t*, t CO_2e (calculated separately for the project area [PA] and the leakage belt [LB])
$A_{unplanned,i,t}$	Area of unplanned deforestation in forest stratum *i* in year *t*; ha
$C_{WP,i}$	Carbon stock entering the wood products pool from stratum *i*; t CO_2e ha^{-1}
$C_{wp100,i}$	Carbon stock entering the wood products pool at the time of deforestation that is expected to be emitted over 100-years from stratum *i*; t CO_2e ha^{-1}
$\Delta C_{AB\_tree,i}$	Baseline carbon stock change in aboveground tree biomass in stratum *i*; t CO_2e ha^{-1}
$\Delta C_{BB\_tree,i}$	Baseline carbon stock change in belowground tree biomass in stratum *i*; t CO_2e ha^{-1}
$\Delta C_{ABnon-tree,i}$	Baseline carbon stock change in aboveground non-tree biomass in stratum *i*; t CO_2e ha^{-1}
$\Delta C_{BB\_non-tree,i}$	Baseline carbon stock change in belowground non-tree biomass in stratum *i*; t CO_2e ha^{-1}
$\Delta C_{DW,i}$	Baseline carbon stock change in dead wood in stratum *i*; t CO_2e ha^{-1}
$\Delta C_{LI,i}$	Baseline carbon stock change in litter in stratum *i*; t CO_2e ha^{-1}
$\Delta C_{SOC,i}$	Baseline carbon stock change in terrestrial soil organic carbon in stratum *i*; t CO_2e ha^{-1}
I	1, 2, 3, … *M* strata

Avoided planned deforestation component

$$\Delta C_{BSL,planned} = \sum_{t=1}^{t*} \sum_{i=1}^{M} \left(\Delta C_{BSL,i,t} + GHG_{BSL-E,i,t}\right)$$

Where:

$\Delta C_{BSL,planned}$	Net greenhouse gas emissions in the baseline from planned deforestation up to year t*; t CO_2 -e
$\Delta C_{BSL,i,t}$ year t; t CO_2e	Net carbon stock changes in all pools in the baseline stratum i in

$\mathrm{GHG}_{BSL-E,i,t}$	Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline stratum i in year t; t CO_2 -e yr^{-1}
i	1, 2, 3, …M strata
t	1, 2, 3, … t* years elapsed since the projected start of the project activity

Estimation of annual areas of deforestation

Avoided unplanned deforestation component

The estimation of annual areas of unplanned deforestation was based on a simple historic analysis respecting the following criteria:

- Be conducted on at least 3 time points that are 3 years apart minimum on a maximum period of 12 years (the last date being no more than 2 years before project start date);
- Resolution of the spatial data must be 30 m × 30 m or less.
- Produce an initial map with a forest/non-forest classification accuracy better than 90%.

Table 13: Estimation of annual areas of unplanned deforestation

Year	Deforestation area (ha)	Deforestation annual rate (%)
2012	1,818	0.648
2013	2,431	0.872
2014	2,301	0.833
2015	3,373	1.231
2016	2,343	0.866
2017	2,730	1.018
2018	2,925	1.101
2019	2,925	1.114
2020	3,260	1.255
2021	8,807	3.434

MapBiomas, collection 7 was used to estimation of annual areas of unplanned deforestation. The general accuracy of 95%[65].

According with BL-UP module (VMD0007, v3.3), the outcome of the calculations must be the area of forest at the beginning and end of the historical reference period, and the number of hectares deforested for each interval of the historical reference period. Then, only areas that were permanently deforested were accounted as deforestation, i.e. where post-deforestation land use constitutes reforestation this area is not included in the deforestation estimates.

[65] https://mapbiomas.org/accuracy-statistics

Therefore, the gross deforestation rate in RRD was **1,237% per year.**

Table 14 - IACO Carbon Project Sum of baseline carbon stock change.

Year	A unplanned$_{i,t}$ (ha)
1	1,327.02
2	1,310.60
3	1,294.39
4	1,278.38
5	1,262.56
6	1,246.95
7	1,231.52
8	1,216.29
9	1,201.24
10	1,186.38
11	1,171.71
12	1,157.21
13	1,142.90
14	1,128.76
15	1,114.80
16	1,101.01
17	1,087.39
18	1,073.94
19	1,060.65
20	1,047.53
21	1,034.57
22	1,021.78
23	1,009.14
24	996.65
25	984.33
26	972.15
27	960.12
28	948.25
29	936.52
30	924.93
Total	33,429.68

Uncertainty: The module of Estimation of Uncertainty for REDD+ Project Activities (X-UNC) focuses on the following sources of uncertainty applicable to this project: i) Determination of rates of deforestation and degradation; It is assumed that there is zero uncertainty in baseline rate of deforestation (item “i” above), as numbers are equal to a long-term average (BL-UP; which is the case in this project, where deforestation rate was taken as the average of the reference period).

Avoided planned deforestation component

Agent of planned deforestation

The agent of planned deforestation is the landowner.

Area of deforestation

According to methodology, the area of deforestation (A planned.i) is defined as an immediate site specific threat of deforestation, which can be demonstrated by the following points:

- Legal permissibility for deforestation: Legal permission to clear 20% of the project property is established by demonstrating compliance of the baseline with Brazilian forestry laws (Lei nº12.651, de 25 de maio de 2012)[66]. Once the property of the project is in full compliance with Brazilian forest laws, that is, the legal reserve area and areas of permanent protection (APPs) are preserved and documented, in absence of carbon project implementation, any native vegetation in excess are legally allowed to be deforested and the deforestation request will be submitted for approval.
- Suitability of project area for conversion to alternative non-forest land use: Suitability for conversion of the Project Area to non-forest is demonstrated Table 15. This table demonstrates that the Project Area has similar environmental conditions to the proxy areas that have already been converted to pasture. Also, the following pictures from near of project boundaries are indicative of the baseline land use in the region whereby native vegetation has been cleared for cattle pasture.

Figure 34 - Photo of baseline land use pasture in the project zone

[66] Código Florestal Brasileiro. Disponível em: < http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12651.htm > Acesso em 18 de outubro de 2022.

Figure 35 - Photo of baseline land use pasture in the project zone

Figure 36 - Photo of baseline land use pasture in the project zone

- **Government approval for deforestation to occur:** In 2015, together with IMAC (Instituto de Meio Ambiente do Acre), a request was made to suppress 20% of the native vegetation cover for commercial purposes;
- **Intent to deforest:** In 2015, a request for forest cover suppression was filed with IMAC: Instituto do Meio Ambiente do Acre (Acre Environmental Institute, in English) to obtain permission to suppress native vegetation in 20% of the property's area. The purpose of this suppress was the timber exploration and the creation of pastures, a much-needed income and commonly seen activity at the region where the project is located. Between 2015 and 2019, the project proponents consulted different service providers in order to

ask for proposals for infrastructure and labor for the implementation of the aforementioned activities. In 2019, the landowners received a proposal for a commercial partnership with a logging company and returned to the idea of planned deforestation by requesting an environmental service for suppression for the purpose of logging and analysis of pasture production in 2019 and 2021. All this evidence demonstrates a valid and verifiable land use management plan for deforesting the project area.

Rate and Annual area of deforestation cleared in the baseline

Proxy areas

We estimated rate of planned deforestation in the baseline using 7 areas located in Acre state.

These areas had similar conditions found in project area such as:

1. All proxy' areas are within Acre state, dominated by open tropical moist forest.
2. Land conversion practices are the same as those used by the baseline agent, involving authorized clearings throughout Acre for livestock. The source used was MapBiomas colletion 7.
3. Pasture is the post-deforestation land use class, like to the baseline scenario, which was assessed using remote sensing time series from 2012 to 2021.
4. We considered proxy areas limits as private lands from the Acre state SICAR platform (https://www.car.gov.br/#/) which ones are under similar management and land use rights (business as usual scenario) as the project area. We selected rural properties with remaining vegetation besides Legal Reserve (80%), because landowners are able to legally deforest according to Forest Code;
5. We eliminated those areas overlapped with protected areas (indigenous lands and conservation units) and INCRA settlements;
6. We include all deforestation events occurred within 10 years prior to the baseline period.
7. Proxy' areas have similar vegetation, elevation (< 500m) and slope (Gentle)(**Table 15**) to the project area. Most of Acre's soils are suitable for pasture and can be successfully used for cattle raising (**Table 16**).

Table 15 - Comparison of vegetation, elevation, slope, and soil type of the project area and proxy areas.

Factors assessed	Category	Project Area	Area #1	Area #2	Area #3	Area #4	Area #5	Area #6	Area #7
Vegetation (%)									
	Lowland open rainforest	**96.55**	96	100	100	98	87	68	52
	Alluvial open rainforest	**3.45**	4	0	0	2	13	32	48

Elevation (%)									
	0 - 500m	**100**	100	100	100	100	100	100	100
Slope (%)									
	Gentle (< 15%)	**81.05**	91	92	88	84	98	82	96
	Steep (≥ 15%)	**18.95**	9	8	12	16	2	18	4
Soils (%)									
	Gleisol	**6.45**	0	0	0	5	24	42	48
	Luvisol	**64.10**	100	100	100	95	76	58	52
	Argisol	**32.45**	0	0	0	0	0	0	0

While proxy areas have different soil types, **Table 16** makes clear all soil types support cattle ranching in Acre state.

Table 16 - Soil types in pasture areas in the Acre State.

Soil type	Soils area (ha)	Pasture area (ha)	Pasture area (%)
Argisol	6,161,527.79	1,308,745.80	21%
Spodosol	5,436.61	275.37	5%
Gleysol	1,118,581.52	193,963.00	17%
Latosol	339,727.55	241,609.92	71%
Luvisol	8,569,477.31	408,252.96	5%
Plinthosol	177,450.88	24,611.68	14%

Source: MapBiomas, collection 7. 2022

The rate of deforestation from 2012 to 2021 for the 6 proxy areas were assessed using equation below and, based on this, $D\%_{planned,i,t}$ was estimated (the baseline rate of deforestation). In other words, the equation below estimates the projected annual proportion of land that will be deforested.

$$D\%_{planned,i,t} = {\langle \sum_{pn=1}^{n*} D\%_{pn}/Yrs_{pn} \rangle}/_{n}$$

Where:

$D\%_{planned,i,t}$	Projected annual proportion of land that will be deforested in stratum *i* during year *t*. If actual annual proportion is known and documented (e.g. 25% per year for 4 years), set to proportion; %
$D\%_{pn}$	Percent of deforestation in land parcel *pn* etc of a proxy area as a result of planned deforestation as defined in this module; %

Yrs_{pn}	Number of years over which deforestation occurred in land parcel *pn* in proxy area; years
n	Total number of land parcels examined
pn	1, 2, 3, …n* land parcels examined in proxy area
I	1, 2, 3, …M strata

Table 17 - Parameters and description to calculate the project annual proportion of land that will be deforested.

Parameter	Description	Values
$D\%_{planned,i,t}$	Projected annual proportion of land that will be deforested in stratum i during year t.; %	15,32%
$D\%_{pn}$	Percent of deforestation in land parcel *pn* etc of a proxy area as a result of planned deforestation as defined in module VMD0006	See the **Table 18**
Yrs_{pn}	Number of years over which deforestation occurred in land parcel pn in proxy area	See the **Table 18**

Table 18– Equation parameters used to calculate $D\%_{planned,i,t}$ (the projected annual proportion of land that will be deforested).

Proxy Area	Area #1	Area #2	Area #3	Area #4	Area #5	Area #6	Area #7
Deforested area 2012 - 2022	119.90	28.22	24.49	219.55	4.57	1.39	5.74
Parcel Area (20% of remaining forest in 2011)	161.25	29.72	40.05	868.53	40.08	17.15	10.92
$D\%_{pn}$	74.35%	94.94%	61.16%	25.28%	11.41%	8.10%	52.50%
Yrs_{pn}	5	3	4	3	1	1	3
pn	1	1	1	1	1	1	1

n	7						
$D\%_{pn}/Yrs_{pn}$	14.87%	31.65%	15.29%	8.43%	11.41%	8.10%	17.50%
D%planned,i,t	15,32%						

Table 19 – IACO REDD+ Carbon Project Sum of annual area of deforestation in Stratum 1 and 2

Year	AA planned,i,t (ha)
1	4,194.57
2	4,194.57
3	4,194.57
4	4,194.57
5	4,194.57
6	4,194.57
7	2,208.71
Total	27,376.11

Likelihood of Deforestation L-Di

According to VMD0006, v1.3, the likelihood of deforestation (L-Di) is set to be 100%, because the project area is not under government control and is not zoned for deforestation.

Risk of Abandonment

The risk of abandonment is considered based on proxy areas that have the same class of deforestation agent in an interval of 10 years. Properties close to the project area will be analyzed based on the same classes and agents of deforestation, climate and topography. Thus, how the history of land use conversion will be analyzed. If any of the proxy areas have been abandoned to forest growth, then thee planned deforestation activities is not eligible and this module must not be used.

Uncertainty

As explained, the X-UNC106 Estimation of Uncertainty for REDD+ Project Activities module, where rate of deforestation is derived from measurements of proxy areas (see Module BL-PL): the uncertainty must be equal to the 95% confidence interval as a percentage of the mean of the area deforested in each proxy (D%pn) divided by the number of years over which deforestation occurred in each proxy (Yrspn). Then, the calculated uncertainty for planned area deforestation was 7.42%.

Estimation of carbon stocks:

Stratification:

Pre-deforestation strata (forest strata): The vegetation stratification in project area, RRD and Leakage belt is based on ancillary data (IBGE,2021) that can serve as a proxy for potential biomass classes, as allowed by Module X-STR.

	Stratum	Sub-stratum	Project area
Vegetation (%)	Open rainforest	Alluvial open rainforest	3.45
	Open rainforest	Lowland open rainforest	96.55
	Other physiognomies		0

Post-deforestation strata (non-forest land uses): As detailed in section 3.4, most likely post-deforestation land use is pasture. The same value adopted by the authority responsible for the National GHG Inventory was used in calculations. The carbon stocks on livestock after deforestation is 27.8 tonCO_2/hectare, considering aboveground and belowground carbon stocks[67].

Calculation of carbon pools

Above-ground and below-ground carbon stocks:

The method chosen for sampling and estimation of carbon stocks in aboveground tree biomass is described in VMD0001 as "Part 1, Option 1. Fixed Area Plots with Allometric Equation method".

The first field campaign for data collection in project area took place on October of 2022. A total of 24 plots were sampled for the carbon stock analysis, totaling four hectares sampled. Of the four plots, two were measured in the Alluvial open rainforest and two in the Lowland open rainforest, following the stratification area. Another field campaign is under development to increase sampling of the Lowland open rainforest carbon stock. For the VVB audit, the forest inventory will already be finalized, and all data will be updated.

All trees with diameter at breast height (DBH) of ≥5 cm and a minimum height (H) of 1.3 m is measurement in the installed nested plots. Field measurements for the carbon stock assessment closely followed the requirements stated in the VM0007 VCS framework and the carbon stock measurement international protocols:

Fixed area plots:

A stratified random sampling of transects grouped in two stages is being carried out containing eight rectangular plots of 1,200 square meters, totaling 0.96 hectares per transect (see below). In each plot,

[67] Source: http://redd.mma.gov.br/images/FREL/RR_LULUCF_Mudana-de-Uso-e-Floresta.pdf (Table 5, is the value of 7.57 tC/ha, for the Amazon biome, multiplied by the 44/12 conversion factor)

two subplots is sampled for sampling the understory of 100 square meters, at the beginning – left and end – right of each plot for sampling palms and bamboo.

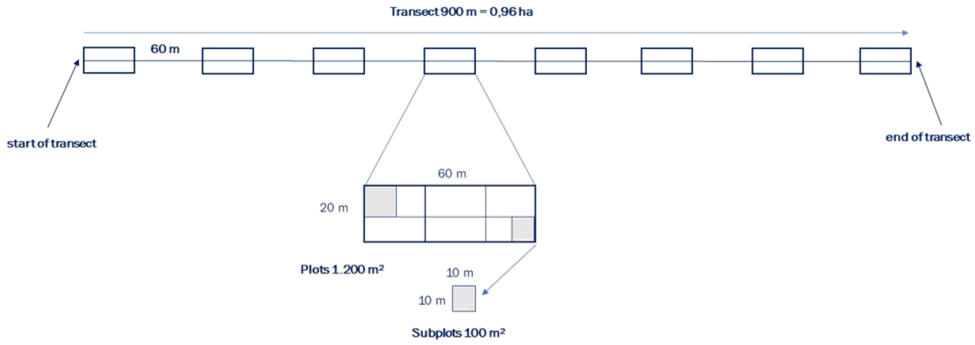

Figure 37: Transect sampling method used.

Measure of Diameter at Breast Height (DBH)

All tree individuals including palm trees with a CAP (circumference at Breast Height) of 31.4 cm (or DBH of 10 cm) is measured at a height of 1.30 meters from the ground. Forked stems over 1.3 meters consider two individuals; for subplots of 100 m², all trees are considered, including bamboos and palm trees with 15.7 ≥ CAP ≤ 31.4 cm (or 5 ≥ DBH ≤ 10 cm) measured at a height of 1.30 meters above the ground and without bifurcation. Forked stems over 1.3 meters consider two individuals.

In situations other than the straight shaft pattern, the DBH measurement followed the following strategies:

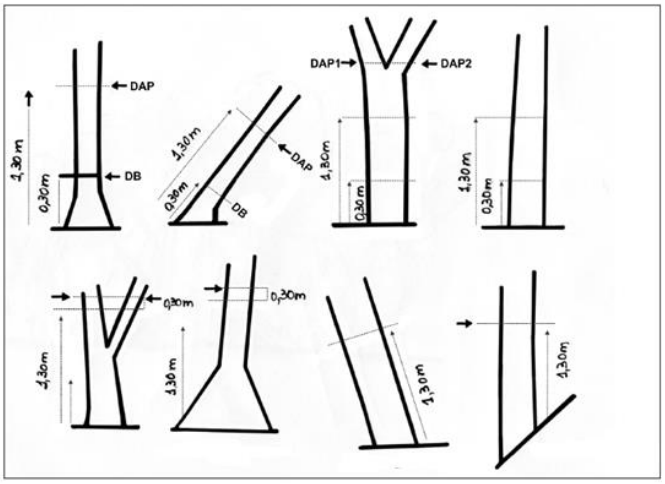

Figure 38: DBH measurement in non-standard situations. Source: Embrapa[68]

Measure of Tree Height (H)

[68] Protocolo de medição e estimativa de biomassa e carbono florestal. Embrapa Florestas, 2014

Measurements of at least three tree heights in each of the sampling units is included. Height is measured in trees with a minimum diameter of 20 cm and the maximum diameter reflected the largest trees present.

Height measurements are taken using a Haglof Ec II digital clinometer.

Measures of Palms and Bamboo:

Bamboo and Palm trees have CAP and height measured and estimation of biomass stocks done with specific equations (see below).

Allometric equations

After running some comparation tests for data verification prior to data processing, on the collected data and different models (in more detail in attachment 1), the project team concluded that the best fit estimating above-ground biomass (AGB) of trees was the pantropical allometric equation formulated by Chave et al. (2014)[69]. Chave et al. (2014) is a common allometric equation for tropical forests requiring only two parameters (DBH and wood density). Species wood density was obtained from the Global Wood Density database, filtered by Tropical South America [70]. For the species with no available wood density value, the genera or family mean values were used. Together with the carbon fraction (CFj) used, i.e. the standard conversion factor of 0.47[71] (IPCC, 2006), these equations (fj (X, Y), in equation below) were used to estimate the carbon stock in aboveground biomass for each individual tree with the equation:

$$C_{AB_{tree,sp,i}} = \sum_{j}^{s} \sum_{l=1}^{N_{j,sp,i}} f_j\,(X, Y \ldots) \times CF_j$$

Where:

$C_{AB_{tree,sp,i}}$	Carbon stock in aboveground biomass of trees in plot sp in stratum i; t C
CF_j	Carbon fraction of biomass for species group j; t C t^{-1} d.m.
$f_j(X,Y..)$	Aboveground biomass of trees based on allometric equation for species group j based on measured tree variable(s); t. d.m. $tree^{-1}$
i	1, 2, 3, ...M strata
j	1, 2, 3 ... S tree species
l	1, 2, 3, ... *Nj,sp,I* sequence number of individual trees of species group j in sample plot *sp* in stratum i

Subsequently, the mean carbon stock in aboveground biomass is calculated for each stratum and converted to carbon dioxide equivalents, using the equation:

---

[69] CHAVE, J.; et al. Improved allometric models to estimate the aboveground biomass of tropical trees. Global change biology, v. 20, n. 10, p. 3177-3190, 2014.

[70] CHAVE, J.; et al. Towards a worldwide wood economics spectrum. Ecol Lett. 2009 Apr;12(4):351-66. doi: 10.1111/j.1461-0248.2009.01285.x. Epub 2009 Feb 20. PMID: 19243406.

$$C_{AB_{tree,i}} = \sum_{sp=1}^{P_i} \frac{C_{AB_{tree},sp,i}}{A_{sp,i}} \times \frac{44}{12}$$

Where:

$C_{AB\_tree,i}$	Mean aboveground biomass carbon stock in stratum *i;* t CO_2-e ha^{-1}
$C_{AB\_tree,sp,i,t}$	Aboveground biomass carbon stock of trees in sample plot *sp* of stratum *i* , t C
A_{spi}	Area of sample plot *sp* in stratum *i;* ha
sp	1, 2, 3 … P_i sample plots in stratum *i*
i	1, 2, 3 …M strata
44/12	Ratio of molecular weight of CO_2 to carbon

One should note that dividing the aboveground biomass carbon stock of trees in each sample plot ($C_{AB\_tree,i}$) by the area of that plot (A_{spi}) to extrapolate the estimate to the area of a full hectare is equivalent to multiplying the aboveground biomass carbon stock of trees in each sample plot ($C_{AB\_tree,sp,i,t}$) by a scaling factor, i.e. calculating the proportion of an hectare (10,000 m^2) that is occupied by a given plot (or nest in this case) using a scaling factor. The scaling factor is calculated as follows:

$$Scaling_{factot} = \frac{10{,}000m^2}{Area_{plot}(m^2)}$$

Table 20 – Preliminary estimate of above-ground carbon stocks in each vegetation type present in the project area from forest inventory

	Above-ground carbon stocks (Mg) per hectare
Alluvial open rainforest	151,403
Lowland open rainforest	108,314

The mean carbon stock in belowground tree biomass per unit area was estimated based on field measurements of aboveground parameters in sample plots. Root to shoot ratios were coupled with the allometric equations method used for estimation of aboveground biomass to calculate belowground from aboveground biomass. Option 1 from VMD0001(Fixed area plots with root to shoot ratio) was followed.

$$C_{BB_{tree}},sp,i = R * C_{AB_{tree}},sp,i$$

Where:

$C_{BB\_tree,sp,i}$	Belowground tree biomass carbon stock of trees in plot sp, in stratum *i*; t C
$C_{AB\_tree,sp,i}$	Aboveground tree biomass carbon stock of trees in plot sp, in stratum *i;* t C

R	Root to shoot ratio; *t* root d.m. t^{-1} shoot d.m.
i	1, 2, 3, ...M strata

Root to shoot ratio used to estimate belowground biomass was 0.20, the most conservative value proposed by IPCC for tropical and subtropical forests[72].

Wood products carbon stocks:

To estimate the carbon of the commercial volume extracted in the process of deforestation, the following equation was applied, which is applicable both for unplanned and planned deforestation components, according to "Option 2: Commercial inventory estimation", as recommended in the CP-W:

$$C_{XB,i} = C_{AB_{tree},i} * \frac{1}{BCEF} * Pcom_i$$

Where:

CXB,i	Mean stock of extracted biomass carbon from stratum *i;* t CO_2-e ha^{-1}
$CAB_{tree,i}$	Mean aboveground biomass carbon stock in stratum *i;* tCO_2-e ha^{-1}
$BCEF$	Biomass conversion and expansion factor (BCEF) for conversion of merchantable volume to total aboveground tree biomass; dimensionless
$Pcom_i$	Commercial volume as a percent of total aboveground volume in stratum *i.*

The value of BCEF used was 1.32, according to CP-AB -page 14, being the average of the three proposed factors. For percentage of commercial volume, a commercial volume equation used in Acre, Brazil[73] was used in forest inventory data. Then, the value applicable was 0.00986.

The mean carbon stock entering the wood products pool at the time of deforestation was calculated as follow:

$$C_{WP,i} = \sum_{ty=s,w,oir,p,o} C_{XB,ty,i} * (1 - WW_{ty})$$

Where:

$C_{WP,i}$	Carbon stock in long-term wood products pool (stock remaining in wood products after 100 years) from stratum *i* post deforestation; t CO_2-e ha^{-1}
$C_{XB,ty,i}$	Mean stock of extracted biomass carbon by class of wood productty from stratum *i;* t CO_2-e ha^{-1}

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

[73] THAINES, F.; et al. Equações para estimativa de volume de madeira para a região da bacia do Rio Ituxi, Lábrea, AM. Pesquisa Florestal Brasileira, v. 30, n. 64, p. 283-283, 2010.

WW_{ty} Wood waste. The fraction immediately emitted through mill inefficiency by class of wood product ty; dimensionless (0.24 for developing countries; Winjum et al. 1998 cited by CP-W)

ty Wood product class –defined here as sawnwood (s)

The wood waste used was 0.24, value default for developing countries[74]. Finally, to calculate the amount of wood products entering the pool at the time of deforestation (that is expected to be emitted over a 100-year timeframe, the equation below was used:

$$C_{CW100,i} = C_{WP,i} - C_{WP,i} * \left(1 - SLF_p\right) * (1 - Ofp)$$

Where:

$C_{WP100,i}$ Carbon stock entering the wood products pool at the time of deforestation that is expected to be emitted over 100-years from stratum *i*; t CO_2-e ha^{-1}

$C_{WP,i}$ Carbon stock entering wood products pool at time of deforestation from stratum *i;* t CO_2-e ha^{-1}

SLF_{ty} Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product ty; dimensionless

OF_{ty} Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product ty; dimensionless

Ty Wood product class – defined here as sawnwood (s),

i 1, 2, 3, ...M strata

The fraction of wood products that will be emitted to the atmosphere within 5 and between 5 and 100 year of timber harvest by class of wood product used were 0.2[74] and 0.8[74], respectively.

Uncertainty: The module of Estimation of Uncertainty for REDD+ Project Activities (X-UNC) focuses on the following sources of uncertainty applicable to this project: Uncertainty associated with estimation of stocks in carbon pools and changes in carbon stocks.

The uncertainty associated with the initial carbon stock derived from the local forest inventory will be calculated at the end of the forest inventory and will be available for audit by the VVB.

For the post-deforestation carbon stock (i.e., pasture carbon stock; item “ii” above), the same value adopted by the authority responsible for the National GHG Inventory was used in calculations. Thus, it can be considered that an official national value has been taken and uncertainty can be regarded as zero in this case.

Deforestation location analysis:

[74] WINJUM, J.K., et al. Forest Harvests and Wood Products: Sources and Sinks of Atmospheric Carbon Dioxide, Forest Science, Volume 44, Issue 2, May 1998, Pages 272–284, https://doi.org/10.1093/forestscience/44.2.272

As deforestation location analysis was not required due to being a transition deforestation configuration, a conservative approach in the use of carbon stocks or areas deforested in the baseline was used. Then, the future deforestation was assumed to happen first in the Lowland open rainforest, that is, in the strata with the lowest carbon stocks (in all relevant carbon pools):

Table 21 – Preliminary estimate above-ground carbon stocks in each vegetation type present in the project area

	Above-ground carbon stocks (Mg) per hectare
Alluvial open rainforest	151,403
Lowland open rainforest	108,314

Source: Forest inventory (attachment 1)

Avoided unplanned deforestation component:

It is assumed that all unplanned deforestation will be located in the Lowland open rainforest, that is, in the strata with the lowest carbon stocks.

Avoided planned deforestation component:

Table 22 - Deforestation location for avoided planned deforestation component

Year	AA planned,i,t (ha)	Alluvial open rainforest	Lowland open rainforest
1	4,194.57		4,194.57
2	4,194.57		4,194.57
3	4,194.57		4,194.57
4	4,194.57		4,194.57
5	4,194.57		4,194.57
6	4,194.57	787.28	3,407.29
7	2,208.71	2,208.71	
Total	27,376.11	*2,995*	*24,380*

Estimation of the sum of baseline carbon stock changes (terrestrial carbon stocks)

Stock changes in aboveground biomass are emitted at the time of deforestation. Following deforestation, emissions from belowground biomass and wood products take place gradually over time. Stocks of belowground biomass are emitted from the year of deforestation at a linear rate equal to 1/10 of the initial stock annually, for 10 years. Carbon stocks entering the wood products pool and that are expected to be emitted over 100-years are emitted from the year of conversion/deforestation at a linear rate equal to 1/20 of the initial stock annually, for 20 years.

It is important to note that all these estimates were based on values collected in the field, but which will still be updated when the forest inventory is completed.

Avoided unplanned deforestation component

Year	AA (ha)	Baseline carbon stock emissions (tCO2e)
2022	1,327.02	521,395.56
2023	1,310.60	526,743.03
2024	1,294.39	532,024.34
2025	1,278.38	537,240.33
2026	1,262.56	542,391.80
2027	1,246.95	547,479.54
2028	1,231.52	552,504.34
2029	1,216.29	557,466.99
2030	1,201.24	562,368.26
2031	1,186.38	567,208.89
2032	1,171.71	561,449.12
2033	1,157.21	555,760.60
2034	1,142.90	550,142.44
2035	1,128.76	544,593.78
2036	1,114.80	539,224.67
2037	1,101.01	533,812.43
2038	1,087.39	528,467.15
2039	1,073.94	523,187.98
2040	1,060.65	517,974.12
2041	1,047.53	512.824.76
2042	1,034.57	506,482.49
2043	1,021.78	500,218.67
2044	1,009.14	494,032.34
2045	996.65	488,033.50
2046	984.33	481,888.37
2047	972.15	475,928.78
2048	960.12	470,042.91
2049	948.25	464,229.86
2050	936.52	458,488.71
2051	924.93	452,818.57
Total	33,429.68	*15,606.424*

Avoided planned deforestation component

Year	AA (ha)	Baseline carbon stock emissions (tCO2e)
2022	4.194,57	1.491.986,81
2023	4.194,57	1.529.276,36
2024	4.194,57	1.566.565,91
2025	4.194,57	1.603.855,46
2026	4.194,57	1.641.145,01
2027	4.194,57	1.798.543,64
2028	2.208,71	1.349.111,36
2029	-	253.968,22
2030	-	253.968,22
2031	-	253.968,22
2032	-	220.650,67
2033	--	187.333,12
2034	-	154.015,57
2035	-	120.698,01
2036	-	87.380,46
2037	-	51.575,18
2038	-	27.052,11
2039	-	27.052,11
2040	-	27.052,11
2041	-	27.052,11
2042	-	23.080,12
2043	-	19.108,12
2044	-	15.136,12
2045	-	11.164,12
2046	-	7.192,13
2047	-	2.923,55
2048	-	-
2049	-	-
2050	-	-
2051	-	-
	27.376,12	**12.750.854,84**

Emissions from biomass burning in the baseline

Estimation of greenhouse gas emissions from biomass burning was determined by VMD0013 module. The methodology was applied only for AUD component, since the use of fire for deforestation is not allowed although it is a common practice. It was used in the baseline, in both the project area and in the leakage belt.

$$E_{biomassabur\ n,i,t} = \sum_{g=1}^{G}(((A_{burn,i,t}\ xB_{i,t}xCOMF_i xG_{g,i})x10^{-3})xGWP_g)$$

Where:

$E_{biomassabur\ n,i,t}$ Greenhouse gas emissions due to biomass burning in stratum *i* in year *t* of each GHG (CO_2, CH_4, N_2O) (tCO_{2e});

$A_{burn,i,t}$ Area burnt for stratum *i* in year *t* (ha);

$B_{i,t}$ Average aboveground biomass stock before burning stratum *i*, year (t d.m.ha^{-1});

$COMF_i$ Combustion factor for stratum *i* (unitless);

$G_{g,i}$ Emissions factor for stratum *i* for gas *g* (kg t^{-1} d.m. burnt);

GWP_g Global warming potential for gas *g* (t CO_2/t gas g);

g 1, 2, 3 … G greenhouse gases including carbon dioxide[1], methane and nitrous oxide (unitless);

i 1, 2, 3 … *M* strata (unitless);

t 1, 2, 3 … t^* time elapsed since the start of the project activity (years).

The area burnt per year and average aboveground biomass stock before burning stratum is shown above. The default value of 0.50[75] was used for Combustion factor. The default values of 4.8 g/kg and 0.2 g/kg of dry matter burnt[76] were used for the emission factor of CH4 and N2O, respectively. For Global warming potential for gas, Global warming potential for gas default values from IPCC were used CH4 = 28; N2O = 265[77].

Year	AA (ha)	CH_4 (tCO2e)	N2O (tCO2e)
2022	1,327.02	35,416.2	13,966.2
2023	1,310.60	34,978.1	13,793.4
2024	1,294.39	34,545.4	13,622.8
2025	1,278.38	34,118.1	13,454.3
2026	1,262.56	33,696.0	13,287.9
2027	1,246.95	33,279.2	13,123.5
2028	1,231.52	32,867.5	12,961.2

[75] Table 2.6 of IPCC, 2006. IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Agriculture, Forestry and Other Land Use, Chapter 2, "Primary tropical moist forest" https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf

[76] Table 2.5 of I PCC, 2006. "Tropical forest" of Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines: For CH4: 6.8 - 2 = 4.8 g kg-1 dry matter burnt (conservative); For N2O: 0.20 g kg-1 dry matter burnt (unique value proposed): https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf (

[77] Source IPCC: WG1AR5_Chapter08_FINAL.pdf (ipcc.ch)

2029	1,216.29	32,461.0	12,800.8
2030	1,201.24	32,059.4	12,642.5
2031	1,186.38	31,662.8	12,486.1
2032	1,171.71	31,271.2	12,331.6
2033	1,157.21	30,884.4	12,179.1
2034	1,142.90	30,502.3	12,028.4
2035	1,128.76	30,125.0	11,879.7
2036	1,114.80	29,752.4	11,732.7
2037	1,101.01	29,384.3	11,587.6
2038	1,087.39	29,020.8	11,444.2
2039	1,073.94	28,661.8	11,302.7
2040	1,060.65	28,307.3	11,162.8
2041	1,047.53	27,957.1	11,024.8
2042	1,034.57	27,611.3	10,888.4
2043	1,021.78	27,269.8	10,753.7
2044	1,009.14	26,932.4	10,620.7
2045	996.65	26,599.3	10,489.3
2046	984.33	26,270.2	10,359.5
2047	972.15	25,945.3	10,231.4
2048	960.12	25,624.3	10,104.8
2049	948.25	25,307.4	9,979.8
2050	936.52	24,994.3	9,856.4
2051	924.93	24,685.1	9,734.5
Total	33,429.68	*892,189.8*	*351,830.8*

4.2 Project Emissions

Project emissions are estimated applying module M-REDD (VMD0015) of Methodology VM0007. The Net GHG emissions in the project case is estimated with the equation below:

$$\Delta C_{WPS-REDD} = \sum_{t=1}^{t*} (\Delta C_{P,DefPA,i,t} + \Delta C_{P,Deg,i,t} + \Delta C_{P,DistPA,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t})$$

Where:

$\Delta C_{WPS-REDD}$ Net GHG emissions in the REDD project scenario up to year t*; t CO2-e

$\Delta C_{P,DefPA,i,t}$ Net carbon stock change as a result of deforestation in the project area in the project case in stratum i in year t; t CO2-e

$\Delta C_{P,Deg,i,t}$ Net carbon stock change as a result of degradation in the project area in the project case in stratum i in year t; t CO2-e

$\Delta C_{P,DistPA,i,t}$ Net carbon stock change as a result of natural disturbance in the project area in the project case in stratum i in year t; t CO2-e

$GHG_{P-E,i,t}$	Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum i in year t; t CO2-e
$\Delta C_{P,Enh,i,t}$	Net carbon stock change as a result of forest growth and sequestration during the project in areas projected to be deforested in the baseline2 in stratum i in year t; t CO2-e
i	1, 2, 3, ...M strata
t	1, 2, 3, ... t* years elapsed since the start of the project activity

The procedure according to the module VMD0015, is implemented by applying 3 steps:

STEP 1. Selection and analyses of sources of land-use and land-cover (LU/LC) change data

STEP 2. Interpretation and analyses

STEP 3. Documentation

However, as there is currently no activity in the Project Area, there are no project emissions to be calculated.

4.3 Leakage

Avoided unplanned deforestation component

Activities that deforestation agents would implement inside the project area in the absence of the REDD project activity could be displaced outside the project boundary as a consequence of the implementation of the REDD project activity. Where this displacement of activities increases the rate of deforestation, the related carbon stock changes and non-CO2 emissions must be estimated and counted as leakage.

According with module LKS-ASU (VMD0010), the proportion migrating to the leakage belt is calculated by following steps:

Step 1: Estimation of baseline carbon stock changes and GHG emissions in the leakage belt
Rational: The leakage belt was estimated according to module VMD0007. The area of leakage belt has 167,322 hectares and presents environmental conditions and vegetation similar to the project area.

Step 2: Estimation of the proportions of area deforested by immigrant and local deforestation agents in the baseline.

Rational: The proportion of baseline deforestation caused by immigrating population ($PROP_{IMM}$) will be estimated for a period from 2012 to 2021, as used by calculation of deforestation rate. Data collected in the field with local communities were used for these estimates. This value will be available upon completion of the field survey and will be available for audit by the VVB.

$PROP_{RES}$ = the proportion of area deforested by the population that has been resident in and around the leakage belt and project area for ≥ 5 years

$PROP_{IMM}$ = the proportion of area deforested by population that has migrated into the area in the last 5 years

Step 3: Estimation of unplanned deforestation displaced from the project area to the leakage belt

Rational: **Ex-ante**: Leakage prevention activities will be implemented, then the factor must be equal to the proportion of the baseline agents estimated to be given the opportunity to participate in leakage prevention activities. Leakage prevention activities must be planned to replace income, product generation and livelihood.

Step 4: Estimation of Unplanned Deforestation Displaced from the Project Area to Outside the Leakage Belt was calculated with the equation below:

$$AVFOR = TOTFOR - PROTFOR - MANFOR$$

Where:

AVFOR	Total available national forest area for unplanned deforestation (ha);
TOTFOR	Total available national forest area (ha);
PROTFOR	Total area of fully protected forests nationally (ha);
MANFOR	Total area of forests under active management nationally (ha).

Rational: Currently, the forest cover of the Amazon biome, as a representative of Total available national forest area is 331,574,665 ha[78]. PROTFOR is equal to 88,566,400 ha, representing 10.4% of the Brazilian territory[79] and, MANFOR is estimated in 1,400,000[80]. So, the result of AVFOR is equal to 241,608,265 ha.

The proportion of Leakage Belt area related to the total available national forest area (PROPLB), is 0,00064 (Leakage Belt area by AVFOR). The average carbon stock across the Leakage Belt (380.92 tCO2/ha; based on similarity analysis, data from the Project Area was applied to Leakage Belt area) and the average carbon stock for all available forest area outside the Leakage Belt (578.1 tCO2eq/ha[81]) were taken for calculation of the proportional difference in carbon stocks between areas of forest available for unplanned deforestation both inside and outside the Leakage Belt (PROPCS). PROPCS was calculated by dividing the stock outside the Leakage Belt by the stock inside the Leakage Belt, which results in a value of 1.51.

The proportional leakage for areas with immigrating populations (LKPROP) is equal to the immigrating proportion multiplied by the proportion of available national forest area outside the Leakage Belt multiplied by the proportional difference in stocks between forests inside and outside the Leakage Belt.

$$LK_{PROP} = PROP_{IMM} * (1 - PROP_{LB}) * PROP_{CS}$$

Where:

[78] MapBiomas Plataform, v 7.0 – Forest in Amazon Biome

[79] EMBRAPA: Síntese - Portal Embrapa

[80] IBAMA: Manejo sustentável autorizado pelo Ibama em 2019 totalizou 39 mil hectares

[81] Saatchi, R.A. Houghton, R.C. dos Santos Alvalá, J.V. Soares, and Yifan Yu. Distribution of Aboveground Live Biomass in the Amazon Basin. 2007. Available at: <https://www.researchgate.net/publication/227502927_Distribution_of_aboveground_live_biomass_in_the_Amazon_basin>

LK_{PROP} Proportional leakage for areas with immigrating populations; proportion

$PROP_{IMM}$ Estimated proportion of baseline deforestation caused by immigrating population; proportion

$PROP_{LB}$ Area of forest available for unplanned deforestation as a proportion of the total national forest area available for unplanned deforestation; proportion

$PROP_{CS}$ Proportional difference in stocks between areas of forest available for unplanned deforestation both inside and outside the Leakage Belt; proportion

Leakage due to the proportion of the baseline deforestation actors who are displaced to areas outside the Leakage Belt was therefore equal to the change in stocks in the baseline scenario minus the change in stocks in the project scenario multiplied by the proportional leakage factor for areas with immigrating populations:

$$\Delta C_{LK-ASU,OLB} = \left(\Delta C_{BSL,LK,unplanned} - \Delta C_{P,LB}\right) * LK_{PROP}$$

Where:

$\Delta C_{LK-ASU,OLB}$ Net CO2 emissions due to unplanned deforestation displaced outside the Leakage Belt ; t CO2-e

$\Delta C_{BSL,LK,unplanned}$ Net CO2 equivalent emissions in the baseline from unplanned deforestation in the leakage belt; t CO2-e

$\Delta C_{P,LB,}$ Net CO2 equivalent emissions within the leakage belt in the project case; t CO2-e

LK_{PROP} Proportional leakage for areas with immigrating populations; proportion

Step 5: Emissions from activity shifting resulting in peatland drainage

Rational: Project area does not have peatland or wetland.

Step 6. Emissions from leakage prevention activities

Rational: Leakage prevention measures do not include the use of fertilizers or the burning of biomass. As such, greenhouse gas emissions as a result of leakage of avoided deforestation activities (GHGLK,E) are assumed to be zero.

Step 7. Estimation of Total Leakage Due to the Displacement of Unplanned Deforestation

As described at the VMD0010 module equation for estimating total leakage due to the displacement of Unplanned Deforestation is:

$$\Delta C_{LK-AS,unplanned} = \Delta C_{LK-A\,SU-LB} + \Delta C_{LK-ASU-OLB} + GHG_{LK,E}$$

Whereas:

$$GHG_{LK-WRC-AS,unplanned} = \Delta C_{LK-ASU-PEAT} + \Delta C_{LK-ASU-TW}$$

Where:

$\Delta C_{LK\text{-}AS,unplanned}$ Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation Net CO2 emissions up to year t* (t CO2e);

$\Delta C_{LK\text{-}ASU\text{-}OLB}$ Net CO2 emissions due to unplanned deforestation displaced outside the leakage belt up to year t* (t CO2e);

$\Delta C_{LK\text{-}ASU\text{-}LB}$ Net CO2 emissions due to unplanned deforestation displaced from the project area to the leakage belt up to year t* (t CO2e);

$GHG_{LK,E}$ Greenhouse gas emissions as a result of leakage prevention activities up to year t*; see Equation 20 (t CO2-e);

$GHG_{LK\text{-}WRC\text{-}AS,unplanned}$ Net GHG emissions due to wetland degradation from unplanned deforestation displaced from the project area up to year t* (t CO2e);

$\Delta C_{LK\text{-}ASU\text{-}PEAT}$ Net GHG emissions due to peatland drainage from unplanned deforestation displaced from the project area up to year t* (t CO2e);

$\Delta C_{LK\text{-}ASU\text{-}TW}$ Net GHG emissions due to tidal wetland degradation from unplanned deforestation displaced from the project area up to year t* (t CO2e)

Rational: The Total Leakage Due to the Displacement of Unplanned Deforestation will be calculated upon completion of the field survey and will be available for audit by the VVB.

MARKET LEAKAGE

For this component, the VMD0011 module (LK-ME, v1.0) was used, which is applied in cases where there are deforestation processes that involve logging for commercial purposes. Total leakage due to market effects is estimated by the equation below:

$$\Delta C_{LK-ME} = LK_{MarketEffects,timber} + LK_{MarketEffects,FW/C}$$

Where:

$\Delta C_{LK\text{-}ME}$ Net greenhouse gas emissions due to market- effects leakage; t CO2-e

$LK_{MarketEffects,timber}$ Total GHG emissions due to market- effects leakage through decreased timber harvest; t CO2-e

$LK_{MarketEffects,FW/C}$ Total GHG emissions due to market leakage through decreased harvest of fuelwood and charcoal sold into regional and/or national markets; t CO2- e

Being that:

$$LK_{MarketEffects,timber} = \sum_{i=l}^{M} (LF_{ME} * AL_{T,i})$$

Where:

$LK_{MarketEffects,timber}$ Total GHG emissions due to market- effects leakage through decreased timber harvest; t CO2-e

LF_{ME} Leakage factor for market-effects calculations; dimensionless

$AL_{T,i}$ Summed emissions from timber harvest in stratum *i* in the baseline case potentially displaced through implementation of carbon project; t CO2-e

i 1,2,3,...M strata

According to preliminary estimates from the forest inventory, carbon stocks in the project area are, at most, 26% of the average stocks in the Amazon biome[81], then, the leakage factor (LFME) was adopted as 0.2 It is assumed that Leakage Belt area has characteristics similar to the project area in relation to: deforestation agent, laws and regulations, forest type, landscape conditions and accessibility.

Subsequently, it is necessary to estimate the emissions associated with the displaced logging activity, based on the total volume that would have been logged in the baseline in the Project Area, across strata and time periods:

$$AL_{T,i} = \sum_{t=1}^{t} (C_{BSL,XBT,i,t})$$

Where:

$AL_{T,i}$ Summed emissions from timber harvest in stratum i in the baseline case potentially displaced through implementation of carbon project; t CO2-e

$C_{BSL,XBT,i,t}$ Carbon emission due to displaced timber harvests in the baseline scenario in stratum i in time t; t CO2-e

i 1, 2, 3, ...M strata

t 1, 2, 3, ... t* years elapsed since the projected start of the REDD project activity

Being that:

$$C_{BSL,XBT,i,t} = \left(\left[V_{BSL,XE,i,t} * D_{mn} * CF\right] + \left[V_{BSL,XE,i,t} * LDF\right] + \left[V_{BSL,XE,i,t} * LIF\right]\right) * \frac{44}{12}$$

Where:

$C_{BSL,XBT,i,t}$ Carbon emission due to timber harvests in the baseline scenario in stratum *i* at time *t;* t CO2-e

$V_{BSL,EX,i,t}$ Volume of timber projected to be extracted from within the project boundary during the baseline in stratum *i* at time *t;* m^3

D_{mn} Mean wood density of commercially harvested species; t d.m.m^{-3} . The value must be the same as that used in the module CP-W if this pool is included in the baseline.

CF Carbon fraction of biomass for commercially harvested species j; t C t d.m.-1 . The value must be the same as that used in the module CP-W if this pool is included in the baseline.

LDF Logging damage factor; t C m^{-3} (default 0.53 t C m^{-3} for broadleaf and mixed forests; 0.25 t C m-3 for coniferous forests)

LIF Logging infrastructure factor; t C m^{-3} (default 0.29 t C m^{-3})

i 1, 2, 3, ... M strata

t 1, 2, 3, ... t* years elapsed since the projected start of the REDD project activity

These steps were used to calculate the leakage market of the "Above-ground carbon stocks" component, for the other components, the default factor of 15% was used.

Avoided unplanned deforestation component

Year	LF	Stratum	Hectares	VBSL	CBSL (tCO2)	CBSL (tCO2/ha)	ALT*LF
2022	0.2	Lowland Open Forest	1,327.02	29.67	119,3591	158,391.57	31,678.31
2023	0.2	Lowland Open Forest	1,310.60	29.67	119,3591	156,432.26	31,286.45
2024	0.2	Lowland Open Forest	1,294.39	29.67	119,3591	154,497.20	30,899.44
2025	0.2	Lowland Open Forest	1,278.38	29.67	119,3591	152,586.07	30,517.21
2026	0.2	Lowland Open Forest	1,262.56	29.67	119,3591	150,698.58	30,139.72
2027	0.2	Lowland Open Forest	1,246.95	29.67	119,3591	148,834.43	29,766.89
2028	0.2	Lowland Open Forest	1,231.52	29.67	119,3591	146,993.35	29,398.67
2029	0.2	Lowland Open Forest	1,216.29	29.67	119,3591	145,175.04	29,035.01
2030	0.2	Lowland Open Forest	1,201.24	29.67	119,3591	143,379.23	28,675.85
2031	0.2	Lowland Open Forest	1,186.38	29.67	119,3591	141,605.63	28,321.13
2032	0.2	Lowland Open Forest	1,171.71	29.67	119,3591	139,853.97	27,970.79
2033	0.2	Lowland Open Forest	1,157.21	29.67	119,3591	138,123.97	27,624.79

2034	0.2	Lowland Open Forest	1,142.90	29.67	119,3591	136,415.38	27,283,08
2035	0.2	Lowland Open Forest	1,128.76	29.67	119,3591	134,727.92	26,945,58
2036	0.2	Lowland Open Forest	1,114.80	29.67	119,3591	133,061.34	26,612.27
2037	0.2	Lowland Open Forest	1,101.01	29.67	119,3591	131,415.37	26,283.07
2038	0.2	Lowland Open Forest	1,087.39	29.67	119,3591	129,789.76	25,957.95
2039	0.2	Lowland Open Forest	1,073.94	29.67	119,3591	128,184.26	25,636.85
2040	0.2	Lowland Open Forest	1,060.65	29.67	119,3591	126,598.62	25,319.72
2041	0.2	Lowland Open Forest	1,047.53	29.67	119,3591	125,032.60	25,006.52
2042	0.2	Lowland Open Forest	1,034.57	29.67	119,3591	123,485.94	24,697.19
2043	0.2	Lowland Open Forest	1,021.78	29.67	119,3591	121,958.42	24,391.68
2044	0.2	Lowland Open Forest	1,009.14	29.67	119,3591	120,449.80	24,089.96
2045	0.2	Lowland Open Forest	996.65	29.67	119,3591	118,959.83	23,791.97
2046	0.2	Lowland Open Forest	984.33	29.67	119,3591	117,488.30	23,497.66
2047	0.2	Lowland Open Forest	972.15	29.67	119,3591	116,034.97	23,206.99

2048	0.2	Lowland Open Forest	960.12	29.67	119,3591	114,599.62	22,919.92
2049	0.2	Lowland Open Forest	948.25	29.67	119,3591	113,182.02	22,636.40
2050	0.2	Lowland Open Forest	936.52	29.67	119.3591	111,781.96	22,356.39
2051	0.2	Lowland Open Forest	924.93	29.67	119.3591	110,399.21	22,079.84

Avoided planned deforestation component

Year	LF	Stratum	Hectares	VBSL	CBSL (tCO2)	CBSL (tCO2/ha)	ALT*LF
2022	0.2	Lowland Open Forest	4.194,57	29,67	119,3591	500.660,00	100.132,00
2023	0.2	Lowland Open Forest	4.194,57	29,67	119,3591	500.660,00	100.132,00
2024	0.2	Lowland Open Forest	4.194,57	29,67	119,3591	500.660,00	100.132,00
2025	0.2	Lowland Open Forest	4.194,57	29,67	119,3591	500.660,00	100.132,00
2026	0.2	Lowland Open Forest	4.194,57	29,67	119,3591	500.660,00	100.132,00
2027	0.2	Lowland Open Forest	3.407,29	29,67	119,3591	406.690,92	81.338,18
2027	0.2	Alluvial Open Forest	787,28	41,47	166,8426	131.351,87	26.270,37
2028	0.2	Alluvial Open Open Forest	2.208,71	41,47	166,8426	368.506,06	73.701,21

4.4 Net GHG Emission Reductions and Removals

For estimating total net greenhouse gas emissions reductions, the equation below was used:

$$NER_{REDD} = \Delta C_{BSL-REDD} - \Delta C_{WPS-REDD} - \Delta C_{LK-REDD}$$

Where:

NER_{REDD} Total net GHG emission reductions of the REDD project activity up to year t* (t CO2e)

$\Delta C_{BSL-REDD}$ Net GHG emissions in the REDD baseline scenario up to year t* (t CO2e)

$\Delta C_{WPS-REDD}$ Net GHG emissions in the REDD project scenario up to year t* – from Module M-REDD (t CO2e)

$\Delta C_{LK-REDD}$ Net GHG emissions due to leakage from the REDD project activity up to year t* (t CO2e)

Whereby:

$$\Delta C_{BSL,REDD} = \Delta C_{BSL,planned} + \Delta C_{BSL,unplanned} + \Delta C_{BSL,\mathrm{deg}rad-FW/C}$$

Where:

$\Delta C_{BSL-REDD}$ Net GHG emissions in the REDD baseline scenario up to year t* (t CO2e)

$\Delta C_{BSL,planned}$ Net GHG emissions in the baseline scenario from planned deforestation up to year t* – from Module BL-PL (t CO2e)

$\Delta C_{BSL,unplanned}$ Net GHG emissions in the baseline scenario from unplanned deforestation up to year t* – from Module BL-UP (t CO2e)

$\Delta C_{BSL,degrad-FW/C}$ Net GHG emissions in the baseline scenario from degradation caused by fuelwood collection and charcoal making up to year t* – from Module BL-DFW (t CO2e)

And:

$$\Delta C_{LK-REDD} = \Delta C_{LK-AS,planned} + \Delta C_{LK-AS,unplanned} + \Delta C_{LK,AS,\mathrm{deg}rad-FW/C} + \Delta C_{LK-ME}$$

Where:

$\Delta C_{LK-REDD}$ Net GHG emissions due to leakage from the REDD project activity up to year t* (t CO2e)

$\Delta C_{LK-AS,planned}$ Net GHG emissions due to activity shifting leakage for projects preventing planned deforestation up to year t* – from Module LK-ASP (t CO2e)

$\Delta C_{LK-AS,unplanned}$ Net GHG emissions due to activity shifting leakage for projects preventing unplanned deforestation up to year t* – from Module LK-ASU (t CO2e)

ΔC_{LK-ME} Net GHG emissions due to market-effects leakage up to year t* – from Module LK-ME (t CO2e)

$\Delta C_{LK-AS,degrad-FW/C}$ Net GHG emissions due to activity shifting leakage for degradation caused by extraction of wood for fuel up to year t* – from Module LK-DFW (t CO2e)

The final result for estimated NET GHG Emissions Reductions and Removals, by AUD and APD components, are presented in the **Table 23** below:

Table 23 - IACO Carbon Project NET GHG emissions reductions and removals

Avoided unplanned deforestation component			
Year	Gross emissions reductions (tCO2e)	Leakege (tCO2e)	NET GHG emissions reductions (tCO2e)
2022	521.395,56	33.447,88	487.947,68
2023	526.743,03	34.803,70	491.939,32
2024	532.024,34	36.142,75	495.881,59
2025	537.240,33	37.465,23	499.775,10
2026	542.391,80	38.771,36	503.620,44
2027	547.479,54	40.061,32	507.418,21
2028	552.504,34	41.335,34	511.169,01
2029	557.466,99	42.593,59	514.873,41
2030	562.368,26	43.836,27	518.531,98
2031	567.208,89	45.063,59	522.145,30
2032	561.449,12	44.694,64	516.754,48
2033	555.760,60	44.330,26	511.430,34
2034	550.142,44	43.970,38	506.172,06
2035	544.593,78	43.614,96	500.978,82
2036	539.224,67	43.280,57	495.944,10
2037	533.812,43	42.933,89	490.878,55
2038	528.467,15	42.591,49	485.875,66
2039	523.187,98	42.253,33	480.934,65
2040	517.974,12	41.919,35	476.054,77
2041	512.824,76	41.589,51	471.235,25
2042	506.482,49	41.075,25	465.407,24
2043	500.218,67	40.567,35	459.651,32
2044	494.032,34	40.065,74	453.966,60
2045	488.033,50	39.586,98	448.446,52
2046	481.888,37	39.081,07	442.807,30
2047	475.928,78	38.597,84	437.330,94
2048	470.042,91	38.120,59	431.922,33
2049	464.229,86	37.649,24	426.580,61
2050	458.488,71	37.183,73	421.304,98
2051	452.818,57	36.723,97	416.094,60
	15.606.424,32	**1.213.351,17**	**14.393.073,15**

Avoided planned deforestation component			
Year	Gross emissions reductions (tCO2e)	Leakege (tCO2e)	NET GHG emissions reductions (tCO2e)
2022	1.491.986,81	105.725,43	1.386.261,38
2023	1.529.276,36	111.318,86	1.417.957,49
2024	1.566.565,91	116.912,30	1.449.653,61
2025	1.603.855,46	122.505,73	1.481.349,73
2026	1.641.145,01	128.099,16	1.513.045,85
2027	1.798.543,64	141.586,80	1.656.956,84
2028	1.349.111,36	111.796,45	1.237.314,92
2029	253.968,22	38.095,23	215.872,99
2030	253.968,22	38.095,23	215.872,99
2031	253.968,22	38.095,23	215.872,99
2032	220.650,67	33.097,60	187.553,07
2033	187.333,12	28.099,97	159.233,15
2034	154.015,57	23.102,33	130.913,23
2035	120.698,01	18.104,70	102.593,31
2036	87.380,46	13.107,07	74.273,39
2037	51.575,18	7.736,28	43.838,91
2038	27.052,11	4.057,82	22.994,30
2039	27.052,11	4.057,82	22.994,30
2040	27.052,11	4.057,82	22.994,30
2041	27.052,11	4.057,82	22.994,30
2042	23.080,12	3.462,02	19.618,10
2043	19.108,12	2.866,22	16.241,90
2044	15.136,12	2.270,42	12.865,70
2045	11.164,12	1.674,62	9.489,50
2046	7.192,13	1.078,82	6.113,31
2047	2.923,55	438,53	2.485,02
2048	-	-	-
2049	-	-	-
2050	-	-	-
2051	-		-
	12.750.854,84	1.103.500,28	11.647.354,56

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$\Delta C_{BSL,unplanned}$
Data unit	t CO_2e
Description	Net greenhouse gas emissions in the baseline from unplanned deforestation
Source of data	Remote sensing data provided by MapBiomas Parameters of the VM0007 Methodology
Value applied	12,832,40
Justification of choice of data or description of measurement methods and procedures applied	*Baseline estimate to determine net GHG emissions from unplanned deforestation.* As indicated in module BL-UP.
Purpose of Data	*Calculation of baseline emissions*
Comments	-

Data / Parameter	AAi
Data unit	ha
Description	Annual area of baseline planned deforestation for stratum i in year t.
Source of data	Calculated based on VMD0006 by proxy areas
Value applied	See Table 22.
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on total area of planned deforestation over the baseline period for stratum ($A_{planned,i}$), the projected annual proportion of land that will be deforested in stratum i during year t ($D\%_{planned,i,t}$) and the Likelihood of deforestation for stratum I (L-Di) according to VMD0006 v1.3
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	D%planned,i,t
Data unit	% year-1
Description	Projected annual proportion of land that will be deforested in stratum i at year t.
Source of data	Calculated based on VMD0006 by proxy areas
Value applied	15,32% $year^{-1}$
Justification of choice of data or description of measurement methods and procedures applied	If no verifiable plan exists, the rate must be established by examining proxy areas. Proxy areas may or may not be under the management of the project area's baseline agent of deforestation or class of deforestation agents8. A minimum of 6 proxy areas must be included
Purpose of Data	Determination of baseline scenario.
Comments	-

Data / Parameter	L-Di
Data unit	%
Description	Likelihood of deforestation in stratum i.
Source of data	Analysis of Land Tenure.
Value applied	100%
Justification of choice of data or description of measurement methods and procedures applied	L-Di is equal to 100% for all planned deforestation areas that are not both under Government control and zoned for deforestation, according to VMD0006
Purpose of Data	Determination of baseline scenario.
Comments	-

Data / Parameter	$\Delta C_{BSL,planned}$
Data unit	t CO_2e
Description	Net greenhouse gas emissions in the baseline from planned deforestation

Source of data	Remote sensing data provided by MapBiomas Parameters of the VM0007 Methodology
Value applied	10,372,269
Justification of choice of data or description of measurement methods and procedures applied	*Baseline estimate to determine net GHG emissions from planned deforestation.* As indicated in module BL-PL.
Purpose of Data	*Calculation of baseline emissions*
Comments	-

Data / Parameter	$A_{BSL,PA\text{-}unplanned,t}$
Data unit	*hectares*
Description	Projected area of unplanned baseline deforestation in the project area in year *t*
Source of data	Remote sensing data provided by MapBiomas
Value applied	108,987.57
Justification of choice of data or description of measurement methods and procedures applied	Baseline projection of the area of unplanned deforestation. As indicated in module BL-UP.
Purpose of Data	*Calculation of baseline emissions*
Comments	-

Data / Parameter	C_{ab_tree}
Data unit	t CO_2e ha^{-1}
Description	Carbon stock in aboveground biomass in trees in stratum i
Source of data	The value is the result of forest inventory
Value applied	A preliminary value was used. Field inventory is being finalized and final values will be available for VVB audit.
Justification of choice of data or description of	Carbon stock in Aboveground biomass in the Project area estimates by forest inventory data.

measurement methods and procedures applied	As indicated in module CP-AB
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	C_{bb_tree}
Data unit	t CO_2e ha^{-1}
Description	Carbon stock in belowground biomass in trees in stratum i
Source of data	The value is the result of forest inventory
Value applied	79,4 t CO_2e ha-1
Justification of choice of data or description of measurement methods and procedures applied	Carbon stock in Belowground biomass in the Project Area estimated by forest inventory data. As indicated in module CP-AB
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Ctot
Data unit	t CO_2e ha^{-1}
Description	Average carbon stock per hectare in all carbon pools in the forest class used in the baseline scenario
Source of data	A preliminary value was used. Field inventory is being finalized and final values will be available for VVB.
Value applied	Aboveground carbon stocks: Lowland: 397.2 CO_2e ha^{-1} . *Alluvial: 555.1* CO_2e ha^{-1} . Belowground carbon stocks Lowland: 79.4 CO_2e ha^{-1} . *Alluvial: 111.0* CO_2e ha^{-1} .

Justification of choice of data or description of measurement methods and procedures applied	Above and below ground biomass estimates were made using forest inventory data
Purpose of Data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	-

Data / Parameter	*CF*
Data unit	tCt/td.m^{-1}
Description	Carbon fraction of dry matter in t Ct-1 d.m
Source of data	Values from the literature (e.g. IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3) shall be used if available, otherwise default value of 0.47 t C t-1 d.m. can be used
Value applied	*0,47* t C t-1 d.m
Justification of choice of data or description of measurement methods and procedures applied	Data used for conservativeness purposes
Purpose of Data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	-

Data / Parameter	*44/12*
Data unit	*Dimensionless*
Description	Conversion factor between Carbon mass to CO_2e mass
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 AFOLU (literature)
Value applied	*44/12*

Justification of choice of data or description of measurement methods and procedures applied	Conversion from tC to tCO_2 based on molecular weights, IPCC reference value. Conversion factor from tC to tCO_2
Purpose of Data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	A_{BSLPAt}
Data unit	hectares
Description	Annual area of baseline deforestation in the project area at year t
Source of data	*Remote sensing data*
Description of measurement methods and procedures to be applied	*Forest cover change due to deforestation in Project Area through will be monitored through assessment of classified satellite images.*
Frequency of monitoring/recording	Annual
Value applied	Counted after the start of the Project. It varies annually
Monitoring equipment	Remote sensing imagens and geographic information system
QA/QC procedures to be applied	Spatial data provided from recognized databases and t*he minimum accuracy of the land use and land cover classification map of the methodology will be respected.*
Purpose of data	Calculation of project scenario emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	-

Data / Parameter	$\Delta C_{WPS\text{-}REDD}$
Data unit	*t* CO_2-*e*
Description	Net GHG emissions in the REDD project scenario up to year t
Source of data	Remote sensing data
Description of measurement methods and procedures to be applied	For the project area, the net GHG emissions in the project case is equal to the sum of stock changes due to deforestation and forest degradation plus the total GHG emissions minus any eligible forest carbon stock enhancement. As described in module M-REDD
Frequency of monitoring/recording	Annual
Value applied	Counted after the start of the Project. It varies annually
Monitoring equipment	Remote sensing imagens and geographic information system
QA/QC procedures to be applied	Good practices in the calculation, Spatial data provided from recognized databases, verifying data entry and analysis
Purpose of data	Calculation of project scenario emissions
Calculation method	$$\Delta C_{WPS-REDD} = \sum\sum(\Delta C_{P,DefPA,i,t} + \Delta C_{P,Deg,i,t} + \Delta C_{P,DistPA,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t})$$ Where: $\Delta C_{WPS\text{-}REDD}$ Net GHG emissions in the REDD project scenario up to year t*; t CO2-e $\Delta C_{P,DefPA,i,t}$ Net carbon stock change as a result of deforestation in the project area in the project case in stratum *i* in year *t;* t CO_2-e $\Delta C_{P,Deg,i,t}$ Net carbon stock change as a result of degradation in the project area in the project case in stratum *i* in year *t;* t CO_2-e $\Delta C_{P,DistPA,i,t}$ Net carbon stock change as a result of natural disturbance in the project area in the project case in stratum *i* in year *t;* t CO_2-e $GHG_{P\text{-}E,i,t}$ Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum *i* in year *t;* t CO_2-e ΔCP,Enh,i,t Net carbon stock change as a result of forest growth and sequestration during the project in areas projected to be deforested in the baseline2 in stratum *i* in year *t;* t CO_2-e *i* 1, 2, 3, ...M strata

	t 1, 2, 3, … t* years elapsed since the start of the project activity
Comments	-

Data / Parameter	$A_{DefPA,i,u,t}$
Data unit	hectares
Description	*Area of recorded deforestation in the project area in stratum i converted to land use u in year t*
Source of data	*Remote sensing imagery*
Description of measurement methods and procedures to be applied	Satellite imagery analysis provided by MapBiomas As indicated in module M-REDD.
Frequency of monitoring/recording	Annual
Value applied	Counted after the start of the Project. It varies annually
Monitoring equipment	Remote sensing imagens and geographic information system
QA/QC procedures to be applied	Spatial data provided from recognized databases
Purpose of data	Calculation of project scenario emissions
Calculation method	-
Comments	-

Data / Parameter	$A_{DefLB,i,u,t}$
Data unit	hectares
Description	Area of recorded deforestation in the leakage belt in stratum i converted to land use u in year t
Source of data	Remote sensing imagery
Description of measurement methods and procedures to be applied	Satellite imagery analysis provided by MapBiomas As indicated in module M-REDD.

Frequency of monitoring/recording	Annual
Value applied	Counted after the start of the Project. It varies annually
Monitoring equipment	Remote sensing imagens and geographic information system
QA/QC procedures to be applied	Spatial data provided from recognized databases
Purpose of data	Calculation of project scenario emissions Calculation of leakage
Calculation method	-
Comments	-

Data / Parameter	$\Delta C_{P,LB}$
Data unit	tCO_2e
Description	Net greenhouse gas emissions within the leakage belt in the project case
Source of data	Remote sensing imagery, detecting areas of forest loss in the leakage belt
Description of measurement methods and procedures to be applied	As per Module LK-ASU (VMD0010).
Frequency of monitoring/recording	Annual
Value applied	Provide an estimated value for the data/parameter
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Good practices in the calculation, Spatial data provided from recognized databases, verifying data entry and analysis
Purpose of data	Calculation of leakage
Calculation method	-
Comments	-

Data / Parameter	RFt
Data unit	%
Description	Risk factor used to calculate VCS buffer credits
Source of data	VCS Non-Permanence Risk Report AFOLU Non-Permanence Risk Tool Remote sensing data and geographic information system
Description of measurement methods and procedures to be applied	The latest version of AFOLU Non-Permanence Risk Tool will be used to measure risk factor.
Frequency of monitoring/recording	Annual
Value applied	10%, this value will be updated after the start of the Project every monitoring event.
Monitoring equipment	AFOLU Non-Permanence Risk Tool
QA/QC procedures to be applied	Literature references data will be used, and good practices applied using AFOLU Non-Permanence Risk Tool
Purpose of data	Calculation of project emissions Number of credits that must be deposited in buffer account
Calculation method	Risk factor will be calculated using the latest version of the AFOLU Non-Permanence Risk Tool
Comments	-

5.3 Monitoring Plan

The Monitoring Plan consists of two key aspects:

- TASK 1. Monitoring according to monitoring plan
- TASK 2. Revising the baseline for future project crediting periods

The procedures contained in the Monitoring Plan for the IACO REDD+ Project were developed using the VM0007 methodology, version 1.6.

TASK 1. Monitoring according to monitoring plan

The monitoring plan address the following monitoring tasks, according to the VM0007 methodology:

1. Monitoring of project implementation
2. Monitoring of actual carbon stock changes and greenhouse gas emissions
3. Monitoring of leakage carbon stock changes and greenhouse gas emissions
4. Estimation of ex post net carbon stock changes and greenhouse gas emissions.

The procedures applied to the monitoring plan of the IACO REDD+ Project take into consideration what is developed and applied within the context of the project. In this sense, the details of the monitoring plan for the four scopes cited above are presented.

Monitoring of project implementation

Technical description of the monitoring task;

In order to guarantee the effective implementation of the activities and the achievement of the objectives expected by the project, monitoring will be performed in project zone to verify the implementation of the proposed activities. With this, it will be possible to identify possible failures for continuous improvement and ensure consistency with the monitoring plans for each scope.

Data to be collected

The implementation of the proposed Project activities will be monitored by means of financial reports/demonstrations, monitoring reports, meeting minutes, land use and land cover maps, and any other documents that may be relevant. All documents collected should be filed and made available to VCS verifiers at each verification event.

Overview of data collection procedures;

Project implementation will be monitored through timelines, indicators, reports of activities performed, among other relevant documents.

Quality control and quality assurance procedure;

Both implementing and monitoring a project requires Quality Assurance (QA) and Quality Control (QC) to be implemented. The QA/QC plan covers the procedures described below:

- Collecting reliable field measurement: Collecting reliable field measurement data is an important step in plan quality assurance. As the project proponent does not have the technical capacity to develop these activities in a desirable way, qualified and experienced companies will be hired. However, the project proponent will ensure that those responsible for measurement work are trained in all aspects of field data collection and data analysis. A standard procedure was developed so that each step to be performed in the field is guided. These standards detail all the steps to be taken in the field measurement and contain the necessary documentary support so that activities can be consistently repeated in the future.

  To ensure reliable field data collection and maintenance training will be given so that all field staff members are fully aware of all procedures and the importance of collecting data as accurately as possible. In addition, pilot plots will be made to ensure plot installation and measurement of all parameters consistently. Within document management, there will be all the names of the field team and the project leader will certify that the team is trained.

Collecting reliable remote sensing: Medium resolution remotely sensed spatial data will be used (30m x 30m resolution or less, such as Landsat, Resourcesat-1 or Spot sensor data). Image processing and possible corrections will be carried out as following the GOFC-GOLD 2008 Sourcebook for REDD[82]. The selection of optical satellite images with less cloud cover and data collection close to the dry season in Amazonia will be preferable. The same methods used to estimate the baseline will be used for monitoring.

Verifying data entry and analysis: Proper data entry into data analysis worksheets is imperative for reliable carbon estimates. Possible errors in this process will be minimized if field data entry is done correctly. Tabulating or organizing information from several questionnaires into a single spreadsheet allows for better visualization and data analysis, as well as facilitating the finding of errors. In addition to clear and direct communication between all personnel involved in measuring and analyzing data, training and double internal verification will be guaranteed. For remote sensing data verification

If any inconsistency of information is identified at the field form level, this information must be verified in the field. If the inconsistency is found in the digitized information, it must be corroborated in the field forms and if the inconsistency persists, it must be corroborated in the field.

To ensure quality control in the monitoring of project implementation, the products generated by monitoring will be accompanied by evaluation processes, thus enabling improvements, incorporation of lessons learned, and ensuring project quality and achievement of objectives.

Data archiving

Due the relatively long-term nature of these project activities, data archiving (maintenance and storage) is an important component of the work. IACO Ambiental is responsible for storing all data and products generated by the IACO REDD+ Project in digital and, if pertinent, physical files, for the duration of the Project. In the case of physical files, IACO Ambiental will make digital copies for storage. All project records are secure and retrievable. All is remotely saved to an external hard drive and in the cloud via Google-drive. Data archived will be maintained through at least five years beyond the end of the project crediting period. To avoid any loss due to updates, electronic files will be periodically updated or converted to a format accessible to future software applications as needed.

All documents relating to Project monitoring will be made available to the VVB team at each verification event.

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

All the procedures described above will be the responsibility of IACO Ambiental.

Monitoring of actual carbon stock changes and greenhouse gas emissions

Technical description of the monitoring task

[82] GOFC-GOLD, 2008, Reducing greenhouse gas emissions from deforestation and degradation in developing countries: a sourcebook of methods and procedures for monitoring, measuring and reporting, GOFC-GOLD Report version COP13-2, (GOFC-GOLD Project Office, Natural Resources Canada, Alberta, Canada) – available at: http://www.gofc-gold.uni-jena.de/redd/sourcebook/Sourcebook_Version_June_2008_COP13.pdf

In the Project Area, the monitoring of carbon stock changes and GHG emissions will be carried out through analysis of avoided deforestation. The monitoring of changes in carbon stocks and greenhouse gas emissions will be carried out with the support of the proposed activities in line with the use of high-resolution spatial images and remote sensing, for the monitoring of forest cover and biodiversity conservation. In addition, the physical patrols of the Project area will assist in the monitoring of forest cover, as well as the prevention of forest fires and the establishment of road signs. For more details of the activities, see section 1.11.

Data to be collected (the list of data and parameters to be collected must be given in PD);

The results of the proposed activities for monitoring GHG stock changes and emissions will be based on the parameters collected, listed in the following table:

Parameter	Unit	Description	Frequency	Source
$APDPA_{icl,t}$	Hectare (ha)	Areas of planned deforestation in forest class in the Project Area	Annual	Calculated through remote sensing images, technical maps and data and field information
$AUDPA_{icl,t}$	Hectare (ha)	Areas of unplanned deforestation in forest class in the Project Area	Annual	Calculated through remote sensing images, technical maps and data and field information
ΔC_t	t CO_2-e ha^{-1}	Baseline carbon stock change in all carbon pools considered in forest class	Collected in periods of up to 6 years	Calculated according to allometric equations and data measured in the field

Overview of data collection procedures;

The monitoring of carbon stock change and greenhouse gas emissions will be developed by mapping the forest cover of the Project Area through scientifically recognized data sources, such as PRODES and MapBiomas, not limited to these two. The data collection of forest cover loss will be compared with the baseline scenario, so that it is possible to compare the values of emissions reduction in the monitored period between what was expected and the actual.

The data collected and analysed will cover the entire project area. Medium resolution remotely sensed spatial data will be used (30m x 30m resolution or less). Image processing and possible corrections will

be carried out as following the GOFC-GOLD 2008 Sourcebook for REDD. If the MapBiomas and PRODES have any update, the minimum accuracy of the map will be maintained at 90% for forest/non-forest classification in remote sensing images.

It is hoped that the *ex ante* estimate of carbon stock for forest class will not change during the baseline period. Then, the carbon stocks will be quantified every 6 years, that is, at each renewal of the baseline. For targeting the purpose of this project, the monitoring parameters will be monitored through forest inventory with stratified random sampling of two-stage conglomerate transects 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. Measurements of at least three tree heights in each of the sampling units will be included. Height should be measured in trees with a minimum diameter of 20 cm and the maximum diameter should reflect the largest trees present.

Estimates will be considered within a 90% confidence interval. All forest inventory standard operational procedures will be available for VVB.

Quality control and quality assurance procedure;

As described in the previous item, the monitoring of carbon stock change and greenhouse gas emissions will be conducted through the mapping of forest cover using scientifically recognized data sources. Also, as a methodological requirement, the data will be submitted to accuracy analysis and the deforestation occurrence will be checked against other data source.

Data archiving

Due the relatively long-term nature of these project activities, data archiving (maintenance and storage) is an important component of the work. IACO Ambiental is responsible for storing all data and products generated by the IACO REDD+ Project in digital and, if pertinent, physical files, for the duration of the Project. In the case of physical files, IACO Ambiental will make digital copies for storage. All project records are secure and retrievable. All is remotely saved to an external hard drive and in the cloud via Google-drive. Data archived will be maintained through at least five years beyond the end of the project crediting period. To avoid any loss due to updates, electronic files will be periodically updated or converted to a format accessible to future software applications as needed.

All documents relating to Project monitoring will be made available to the VVB team at each verification event.

Organisation and responsibilities of the parties involved in all of the above

IACO Ambiental will be responsible for all the procedures described above.

Monitoring of leakage carbon stock changes and greenhouse gas emissions

Technical description of the monitoring task;

The IACO REDD+ Project does not expect any change in carbon stocks and GHG emissions associated with leakage, since no activity is forecasted to alter GHG emissions compared to the Project's baseline

scenario. However, should leakage-associated activities be required throughout the Project, ex-post changes in carbon stocks and GHG emissions will be estimated based on the methodology applied to the Project (VM0007, version 1.6) and monitored through remote sensing and mapping data, as well as for changes in carbon stocks due to forest cover conversion.

Data to be collected

Parameter	Unit	Description
$\Delta C_{P,DefLB,i,t}$	t CO_2-e	Net carbon stock change as a result of deforestation in the leakage belt the project case in stratum i in year t
$LK_{Aplanned,i,t}$	ha	The area of activity shifting leakage in stratum i at time t
$\Delta C_{LK\text{-}AS,planned}$	t CO_2-e	Net greenhouse gas emissions due to activity shifting leakage for projects preventing planned deforestation; t CO2-e
$A_{DefLK,i,t}$	ha	The total area of deforestation by the baseline agent of the planned deforestation in stratum I at time, t

Overview of data collection procedures;

Two sources of leakage can be monitored: activity leakage and market leakage.

Activity-Shifting Leakage

Activity displacement leakage will be monitored by tracking all areas outside the boundaries of the project area owned or managed by the baseline agent (see setion 3.4). The monitoring will be done through remote sensing and satellite images, with the most recent official data in the monitored period, MapBiomas, as well as legal data and other documents that may be necessary. In case of deforestation events, an assessment will be made with the proponent to verify.

Market Leakage

The Project does not foresee the extraction of timber for commercial purposes, wood for charcoal or fuel. In this sense, market leakage values calculated ex-ante are also used ex-post. Section 4.3 details the estimates for market leakage.

Quality control and quality assurance procedure;

As for the monitoring of carbon stock change and greenhouse gas emissions, if necessary, monitoring will be carried out by mapping the forest cover using scientifically recognized data sources. Also, as a methodological requirement, the data will be submitted to accuracy analysis.

Data archiving

Due the relatively long-term nature of these project activities, data archiving (maintenance and storage) is an important component of the work. IACO Ambiental is responsible for storing all data and products generated by the IACO REDD+ Project in digital and, if pertinent, physical files, for the duration of the Project. In the case of physical files, IACO Ambiental will make digital copies for storage. All project records are secure and retrievable. All is remotely saved to an external hard drive and in the cloud via Google-drive. Data archived will be maintained through at least five years beyond the end of the project crediting period. To avoid any loss due to updates, electronic files will be periodically updated or converted to a format accessible to future software applications as needed.

All documents relating to Project monitoring will be made available to the VVB team at each verification event.

Organisation and responsibilities of the parties involved in all of the above

IACO Ambiental will be responsible for all the procedures described above.

Estimation of ex post net carbon stock changes and greenhouse gas emissions.

Technical description of the monitoring task;

The ex-post net estimates of changes in carbon stocks and greenhouse gas emissions (GHG), will be presented in each verification event, based on the rules and requirements presented by VM0007, always in its most updated version.

As described in section 1.11, IACO Ambiental will undertake five activities to track changes in carbon stocks and greenhouse gas (GHG) emissions:

- High resolution satellite imagery for monitoring forest cover and biodiversity conservation
- Installation of signboards to inform the presence of the REDD+ project
- Forest patrols
- Fire Prevention and Extinguishing
- High resolution satellite imagery for monitoring forest cover and biodiversity conservation

Data to be collected

Parameter	Unit	Description
$A_{DefPA,u,i,t}$	ha	Area of recorded deforestation in the project

		area stratum i converted to land use u at time t
$\Delta C_{WPS-REDD}$	t CO_2-e	Net GHG emissions in the REDD project scenario up to year t*
$\Delta C_{P,DefPA,i,t}$	t CO_2-e	Net carbon stock change as a result of deforestation in the project case in the project area in stratum i in year t

Overview of data collection procedures;

The calculations of ex-post net changes in carbon stocks, greenhouse gas emissions and, consequently, the generation of Verified Carbon Units (VCU's) produced by the Project's activities, in each verification event, will be made from the VM0007 methodology, module VMD0015 (M-REDD), always in its most updated versions.

The monitoring of carbon stock change and greenhouse gas emissions will be developed by mapping the forest cover of the Project Area through scientifically recognized data sources, such as MapBiomas, not restricted to these two. The data collection of forest cover loss will be compared with the baseline scenario, so that it is possible to compare the values of emissions reduction in the monitored period between what was expected and the actual.

Quality control and quality assurance procedure;

To ensure control and quality procedures, all the procedures of the VM0007 methodology and its modules will be used, always in their most updated versions, as needed, thus ensuring that the calculations are adequate and the number of VCU's generated is reliable.

Data archiving

Due the relatively long-term nature of these project activities, data archiving (maintenance and storage) is an important component of the work. IACO Ambiental is responsible for storing all data and products generated by the IACO REDD+ Project in digital and, if pertinent, physical files, for the duration of the Project. In the case of physical files, IACO Ambiental will make digital copies for storage. All project records are secure and retrievable. All is remotely saved to an external hard drive and in the cloud via Google-drive. Data archived will be maintained through at least five years beyond the end of the project crediting period. To avoid any loss due to updates, electronic files will be periodically updated or converted to a format accessible to future software applications as needed.

All documents relating to Project monitoring will be made available to the VVB team at each verification event.

Organisation and responsibilities of the parties involved in all of the above

IACO Ambiental will be responsible for all the procedures described above.

TASK 2. Revising the baseline for future project crediting periods

According to VM0007, the requirements of VCS Standard, the baseline will be revisited every 6 years. Thus, the first revision of the baseline is scheduled for 2031. For this purpose, if necessary, the following tasks will be carried out:

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

  If necessary, it will be updated and used to revisit the baseline after 6 years of the fixed period, in this sense, information will be collected on the change in the local context of the Project for understanding the agents, vectors and underlying causes of deforestation, restructuring of step 3 of the ex-ante last version of the methodology and recalibrating of the model for projection of future deforestation, for the subsequent fixed baseline period.

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

  For the Adjustment of the Land-Use and Land-Cover change component of the baseline, the annual area of deforestation from the baseline will be reassessed, as well as the location of the annual deforestation areas from the baseline, according to the most updated version of the methodology VM0007.

- Adjustment of the carbon component of the baseline

  This component will be revisited if more accurate methods of estimating carbon stocks are available at the time of the baseline review.

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.

APPENDIX

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.