RESEX RIO PRETO-JACUNDÁ REDD+ PROJECT

Document Prepared by
Biofílica Investimentos Ambientais SA

Project Title:	Resex Rio Preto-Jacundá REDD+ Project
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Date of issue	May 15th 2016
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Project Title	Resex Rio Preto-Jacundá REDD+ Project
Project Location	Brazil, Estate of Rondônia, Municipality of Machadinho d'Oeste and Cujubim
Project Proponents	• Biofílica Investimentos Ambientais (primary project proponent): Plínio Ribeiro, plinio@biofílica.com.br, +55 11 3073-0430 • Associação dos Moradores de Reserva Extrativista Rio Preto- Jacundá e Ribeirinhos do Rio Machado – Asmorex: José Pinheiro Borges, jpinheiroborges@gmail.com, +55 69 3581-2084
Auditor	• Rainforest Alliance: Lawson Henderson, lhenderson@ra.org, +1 (202) 903-0717 • IMAFLORA – Instituto de Manejo e Certificação Florestal e Agrícola: Bruno Brazil de Souza, bruno@imaflora.org, +55 19 3429-0848
Project Start Date	October 1st, 2012
Project Lifetime	30 years
GHG Accounting Period	From 1 October2012 to 30September 2042
Full validation or gap validation	Full Validation
History of CCB Status	Validation initiated in October 19th, 2015
Edition of CCB Standards	CCBA. 2013. Climate, Community & Biodiversity Standards Third Edition. CCBA, Arlington, VA, USA. December, 2013. At: www.climate standards.org.
Brief Description of the Expected Benefits for Climate, Community and Biodiversity	• **Expected Climate Benefits**: It is expected a total of 12,428,713 tCO2eq avoided emissions by the Project, opposing a baseline scenario of 14,727,148 tCO2eq emitted under an unplanned deforestation context. In the Project scenario, deforestation of 35,398 hectares is avoided and 414,290 tCO2eq are reduced yearly over a 30-year period. • **Expected Benefits to the Community**: Promoting the welfare of the 130 residents of Resex and enhancement of extractive way of life through activities developed and promoted by REDD +, some of them: Social organization: ➢ monthly workshops with the board of Asmorex related to management and finance; ➢ Structuring of internal committees formed by residents in the following subjects: health and education, infrastructure and land tenure security. Health: ➢ Training of at least one health worker per community; ➢ Providing courses on hygiene, health and family planning for at least 20 families; Income generation: ➢ Installation of a processing center for açaí and bazillian nut;

	Education: ➢ implementation and maintenance of an educational center for youth and adults; ➢ Facilitating access to distance learning courses for residents of three communities present in Resex. Infrastructure: ➢ Improvement of sanitary conditions in houses of families living in Resex; ➢ future implementation of 3 new communities, seating about 12 families. Empowerment of young people and women: ➢ Promotion of workshops on empowerment and leadership focus on the most vulnerable of public at Resex. Environment ➢ workshops and quarterly training for interested residents on the following topics: agroecology, waste disposal and composting • Expected Biodiversity Benefits: Maintenance of forest cover in the Project Area ensures the protection of habitats, provision of natural resources and ecosystem services, enabling the continued provision of timber and non-timber forest products and favoring socio-economic stability in the region. The area is categorized as of "Very High" priority for conservation, as it contains several species in some degree of threat (according to IUCN) and for being located in the Endemism Center of Rondônia, one of the most important areas of bird endemism in South America. There are 16 species of flora with some degree of threat and restricted use, and 14 species of fauna, especially the bird *Rhegmatorhina hoffmannsi* (endemic of Rondonia) and the primate *Ateles chamek* which is Endangered.
Attendance to Gold Level Criteria	The project meets the criteria: • GL2. Exceptional benefits for communities. The project is Community-led and implemented on a specific Brazilian category of Protected Area of which traditional communities own the rights of managing its resources. The project will generate short-term and long-term net positive well-being for community members and empowerment of community members. • GL3. Exceptional benefits for Biodiversity. The Project zone includes a site of high conservation priority. It meets the vulnerability criteria, due to regular occurrence of threatened species, such as the Endangered (EN) Black-faced Black Spider Monkey (*Ateles chamek),* according to IUCN Red List.
Date and Version of PDD	May 15th 2016, version 2.2
Expected Verification Schedule	First Verification on CCBS two years after Validation and verification consequently every two years during the Project life-cycle. VCS verification is expected to occur on every two years.

"ARTE MATUTA"
por Patativa do Assaré

Eu nasci ouvindo os cantos
das aves de minha serra
e vendo os belos encantos
que a mata bonita encerra
foi ali que eu fui crescendo
fui vendo e fui aprendendo
no livro da natureza
onde Deus é mais visível
o coração mais sensível
e a vida tem mais pureza.

Sem poder fazer escolhas
de livro artificial
estudei nas lindas folhas
do meu livro natural
e, assim, longe da cidade
lendo nessa faculdade
que tem todos os sinais
com esses estudos meus
aprendi amar a Deus
na vida dos animais.

Quando canta o sabiá
Sem nunca ter tido estudo
eu vejo que Deus está
por dentro daquilo tudo
aquele pássaro amado
no seu gorgeio sagrado
nunca uma nota falhou
na sua canção amena
só canta o que Deus ordena
só diz o que Deus mandou.

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1 GENERAL

1.1. Summary Description of the Project

Jacundá REDD+ Project is a partnership between Biofílica and residents of Resex Rio Preto-Jacundá, represented by the Community Association of the Extractive Reserve Rio Preto-Jacundá and Ribeirinhos do Rio Machado (ASMOREX). Center of Studies Rioterra (CES Rioterra) and the Executive Board of the Extractive Reserves of Valley of Anari (CDREX) are partners for planning and implementation of activities.

Located in the municipalities of Machadinho D'Oeste and Cujubim, northeastern of the State of Rondônia, the Protected Area Resex Rio Preto-Jacundá has a territory of 95 thousand hectares. It was created in 1996 by the State Decree 7,336 and has a history of struggle of rubber tappers for their rights. The occupation started with the establishment of two rubber zones (Jatuarana and Vera Cruz) over 70 years ago. Thereafter, the rubber cycle in the Amazon declined and deepened the vulnerability of traditional communities. Currently facing difficulties, residents of Resex Rio Preto-Jacundá source their livelihoods from a highly biodiverse territory but scarce in basic public services.

In this challenging scenario, it is highlighted the pioneering attitude of the community, as the initiative of income generation from the sale of environmental credits came from the rubber tappers themselves. The agreement for the project development emerged from an extensive and wide-range dialogue between the parties involved, which culminated in several meetings mediated by CES Rioterra, in Resex and in the office of the Environmental Development Secretariat of the state of Rondônia (SEDAM) in the municipality of Machadinho D'Oeste. In these meetings, the Prior, Free and Informed Consent (FPIC) of the community residing in the Resex was sought, from the exhibition of concepts, benefits and conditions for carrying out such project.

In these early meetings, the main goal of the Project was defined as setting the extractive community sustainability by reducing forest degradation and unplanned and illegal deforestation and consequent emission of greenhouse gases (GHG). The project main goal for climate is to avoid deforestation of 35,398 hectares, corresponding to a total of 12,428,713 tons of CO2e that will have their emission to the atmosphere avoided, to be achieved by the following activities: political engagement with environmental State bodies, monitoring deforestation through satellite images, on-the-ground patrolling, strategic physical occupation of territory, improvement of forest management practices and multiple and sustainable use of forest products.

There are 29 families living in Resex Rio Preto-Jacunda, approximately 130 residents, composed mostly of a very young population with very low perspective of staying in the area and maintaining the extractive traditions. Still, the potential of extractive production and an almost extinct way of life leads to the

conclusion that a project of forest conservation has a lot to offer to the people who live there, due to the synergies present in the economic, social and environmental spheres. Thus, the main objective in the category community is raising the local empowerment to a population and life quality that sought the reward for being as they call themselves, “forest guardians”.

Biodiversity in line with the presence of extractive population deserves attention due to the presence of threatened and endemic species in the region, such as Rhegmatorhina hoffmannsi (the white-breasted antbird), and for being in the “Endemism Center Rondônia", considered one of the most important areas of bird endemism in South America, and the whole complexity brought by Madeira River. The project will seek, in this sense, the monitoring of species in situations of vulnerability and the monitoring of project interventions, creating arrangements for state research and educational institutions to access the area and have an ongoing process of understanding and monitoring of local biodiversity.

Community involvement will be covered in the activities related to biodiversity, since from forest resources are extracted almost the entire income of the families, as well as the fauna (hunting and fishing) is important for food security.

In analysis from Araújo et al. (2015) on conservation and deforestation units, Resex Rio Preto-Jacundá appears among those in critical situation of deforestation, supporting the thesis that the area needs priority conservation actions associated with the generation of income for the population that characterizes is as Extractive Reserve.

1.2. Project Location

The project is located in the Extractive Reserve Rio Preto-Jacundá located in the municipalities of Machadinho d’Oeste and Cujubim (Figure 1) approximately 350km from Porto Velho, capital of the state of Rondônia. Limits:

- North – Amazonas State,
- South – Valley of Anari,
- East – state of Mato Grosso;
- West - River Crespo and Ariquemes,
- between the coordinates 62°16'5,63"W 8°58'15,71"S

The Resex can be accessed either by land, using the route from Porto Velho, BR-364 (to Cuiabá), RO 257 and RO 133 (Ariquemes to Machadinho do Oeste and river Machado) and other vicinal roads in the municipality of Machadinho d’Oeste, and by boat across the River Rio Machado, one of the main tributaries of the river basin of the Madeira river.

The total area of Resex Rio Preto-Jacundá has some controversy. The State Decree creating property has a limit of 95,300 hectares. However, the official shape provided by the state has an area of 102,808 hectares. The state of Rondônia is seeking to demarcate more precisely based on the official area

of the decree, not having yet a set date to occur. Justified, thus, the use of the official shape of the state in socioeconomic and environmental diagnostics, in carbon studies and modeling of deforestation and in the planning and development of conservation activities in the area.

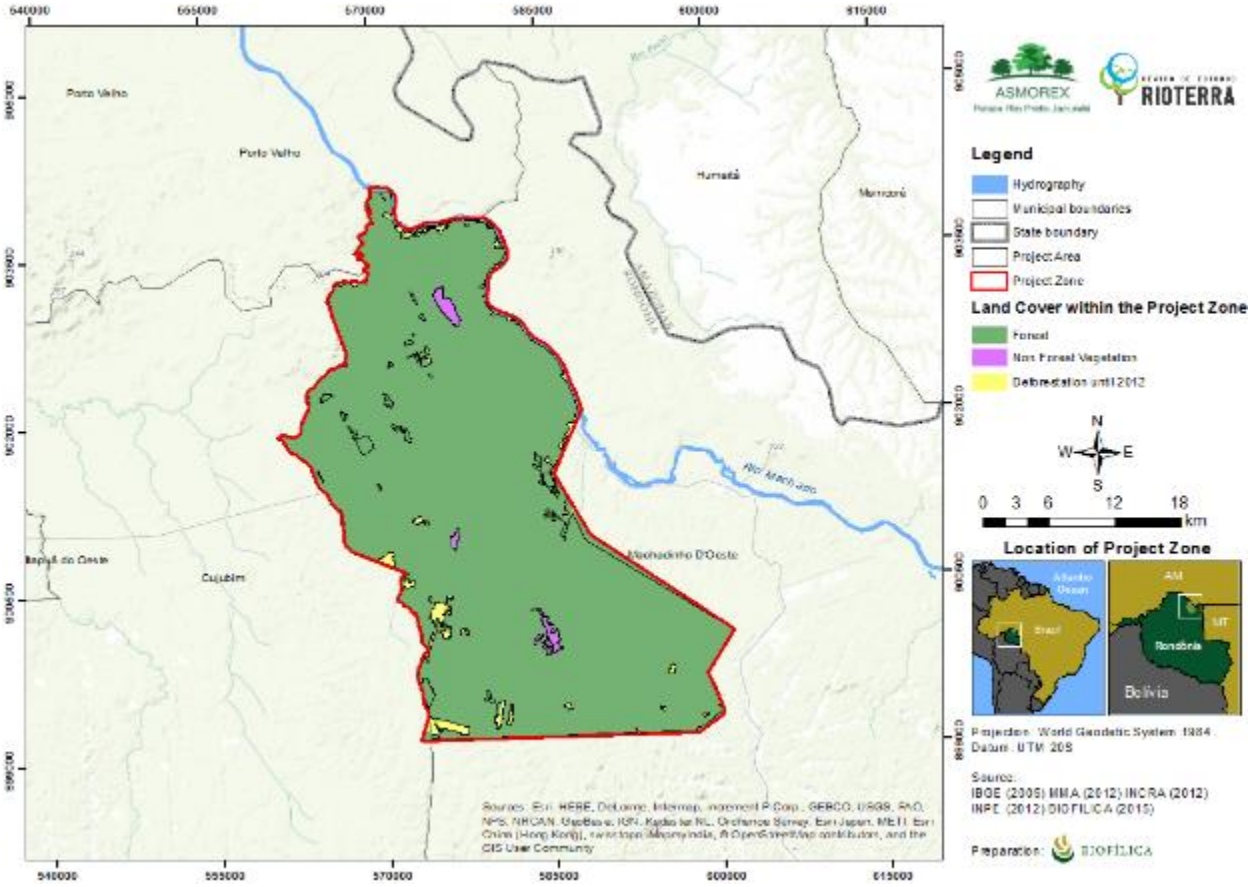


Figure 1. Extractive Reserve Rio Preto- Jacundá Project Area/ Project Zone

The project area comprises the whole forest area in Resex that will generate greenhouse gas emission reduction or, in other words, net climate benefits, comprising an area of 94,289 ha.

The project zone comprises the entire area demarcated as Resex, including communal areas, where activities, including the ones for community development, will be implemented. Therefore, the reference region in this case does not correspond to the project zone.

1.3. Conditions Prior to Project Initiation

The state Extractive Reserve Rio Preto-Jacundá, is located in the northeastern part of the state of Rondônia at an altitude of 102 meters above sea level. It owns approximately 3.8% of vegetation altered by human activities. The Preto river, the most important in the area, is a tributary of the Machado River.

Resex is covered by dense and open rainforest vegetation, with small patches of non-forest type of vegetation (savanna, meadow and/ or campinarana).

By the time of the production of this project, Resex lacks Multiple Use Management Plan and proper zone of the territory.

Contextualization of occupation and social characteristics

The Project area belonged to two old rubber plantations, Jatuarana and Vera Cruz, installed for over 70 years in the region. The region of Machadinho d'Oeste and Cujubim until the mid-nineteenth century was populated by several indigenous groups vying for territory, especially with hunting and fishing activities. But it is unsure of how many ethnic groups inhabited the space of today's municipalities, being, however, pointed the presence of the Arikem, Boca-Negras, among others. Studies show that in the late nineteenth century and early twentieth century, the Indians went through a process of drastic changes in their way of life, which resulted in ethnocide. On the other land, the extraction of rubber (Hevea brasiliensis) to meet the needs of was, provided the rubber tappers and traders in general great riches.

From the 1970s, with the improvement of access to the region, particularly through the BR-364, it was inaugurated the official colonization of the State, first in the Ariquemes area with the installation of two Directed Settlements Projects (PADs) of INCRA "Marechal Dutra" and "Burareiro", and then in the next decade the Settlement Projects (PA) Machadinho, Cujubim, both of which are municipalities originated by these settlement projects of the National Institute of Colonization and Agrarian Reform – INCRA.

Its population is now estimated in 46,989 inhabitants (IBGE/Censo 2010), distributed between rural and urban zone, of which 27,216 (57.92%) inhabit the urban sector and 19,773 (42.08%) in the rural zone. The population density of the area is of 3.79 hab/km², and the overall average Human Development Index – HDI of 0.693 (PNUD/2000)[1], therefore less than the state HDI located at 0.776 (PNUD/2005)[2].

Cujubim is economically sustained by agriculture, livestock and timber industry, often of illegal origin. The timber sector has been going through severe crisis in the last few years as a result of monitoring actions of public bodies that restrict the illegality of predatory activity in industries and consequently the closure of businesses and the mass dismissal of workers.

1 Decreasing ranking HDI of municipalities in Brazil. Atlas of Human Development. PNUD (2000).

2 HDI ranking of the states of Brazil in 2015. PNUD (2005).

The territory of Machadinho d'Oeste in the past was composed by rubber plantations. Subsequently, a portion was allocated to mining and nowadays predominant agricultural areas.

Ribeiro et al. (2005) shows that 54% of the protected areas in Rondônia were created between 1993 and 2002, during the term of the PLANAFORO Program, an initiative from the World Bank to offset the environmental impacts caused by POLONOROESTE, financed by the World Bank in the 1980s by expanding the agriculture in the state.

In a state where approximately a third of the original vegetation is already deforested, protected areas play a key role (Imazon, 2005), totaling 106,617 km, 45% of the state territory. In a total of 84 decreed protected areas, 58% are Sustainable Use Protected Areas, category that fits Resex Rio Preto-Jacundá.

According to Article 18 of the SNUC Law, "the extractive reserve is an area used by traditional extractive populations, whose livelihood is based on the extraction and, in addition, in subsistence agriculture and creation of small animals, as its basic goals is to protect the way of life and culture of these populations, and to ensure the sustainable use of natural resources of the unit".

In the municipality of Machadinho d'Oeste there are 13 Extractive Reserves. According to Martins (2008), these reserves originate from ancient Reservations Block of colonization projects in Machadinho and Cujubim.

Vegetation

According to the classification of the vegetation of the Brazilian Institute of Geography and Statistics – IBGE, the predominant vegetation type in Resex Rio Preto-Jacundá is typical humid tropical forest. Within the Resex there are the following forest types (Figure 2):

- Open Sub montane Ombrophilous forest;
- Open Lowland Ombrophilous forest;
- Dense Ombrophilous forest;
- Campos (Campinarana)

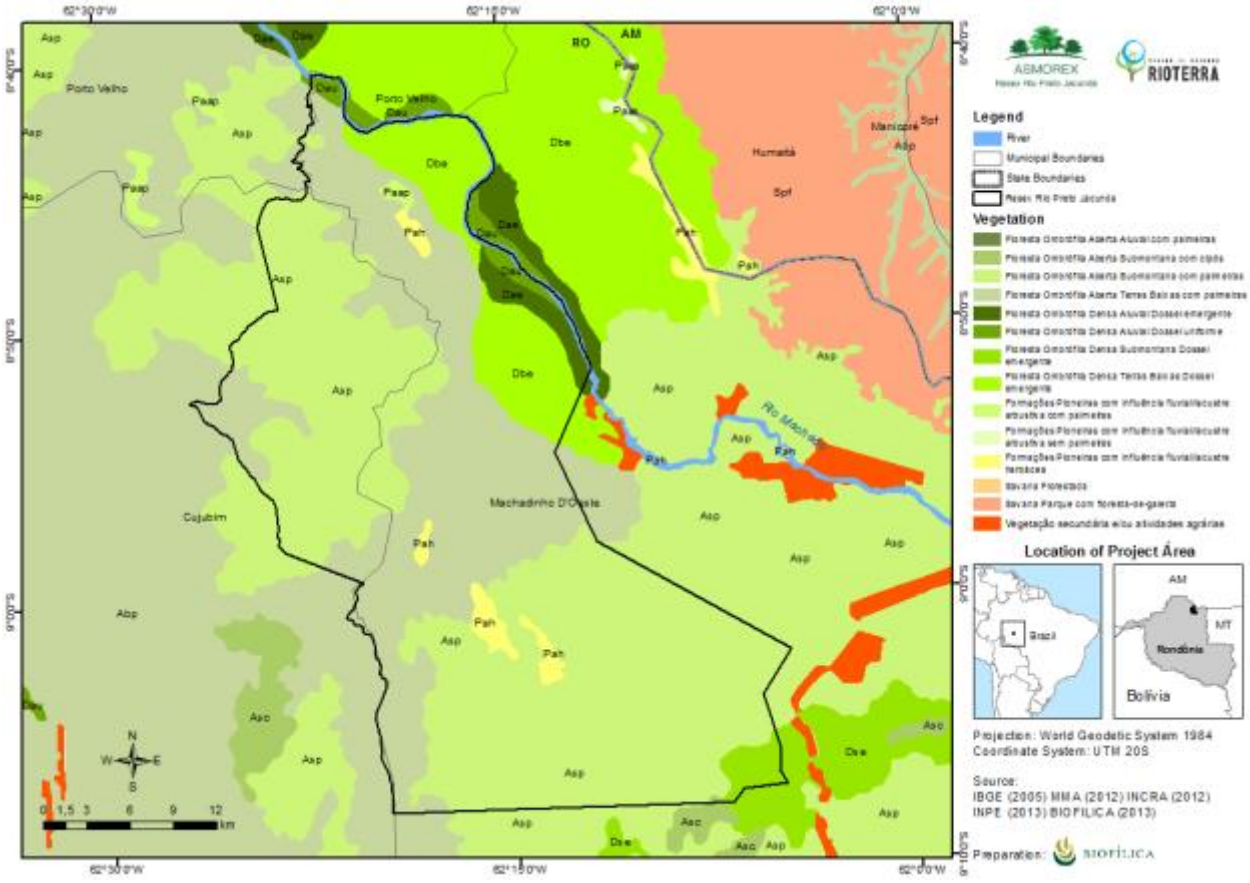


Figure 2. Vegetation classification of Resex Rio Preto-Jacundá

Climate

According to Köppen, the climate type of the region is Aw – Tropical Rainy Climate (hot and humid), with high rainfall (GAMA, 2002). In the region RESEX Rio Preto-Jacundá, the average annual precipitation occurs in three different tracks ranging from 2300 to 2500 mm/year, as shown in Figure **3**.

The largest water deficits can be registered in the months of July, August and September. In this period also occurs the highest monthly and daily average temperatures. The greatest precipitations focus in the months of December, January, February and March, averaging above 2700 mm/year (MIRANDA, MANGABEIRA, MATTOS, & DORADO, 1997).

Thus, as well as in most of the state of Rondônia, Machadinho d'Oeste and Cujubim are located at low latitudes, with medium altitudes around 100m, with few occurrences of higher altitudes, being this feature one of the determinants of high temperatures, recording average temperatures between 24°C and 26 °C (Figure **4**).

Still regarding the temperature, occurs in the region the phenomenon of "friagem", which consists in the sudden and short temperature drop. This phenomenon is the consequence of the penetration of air

masses coming from Patagonia, which invade the equatorial region through the depression of the Valley of the Guaporé river (GAMA, 2002).

The annual average air humidity ranges from 75% to 90% in the state. The potential evapotranspiration (ETP) is high throughout the year, with values greater than 100 mm/month. The main atmospheric phenomena or dynamic mechanisms that operate in Rondônia state rainfalls are high daytime convection (evaporated water on site and the evapotranspiration resulting from the heating of surfaces of water, forest and vegetation) associated with large-scale atmospheric phenomena.

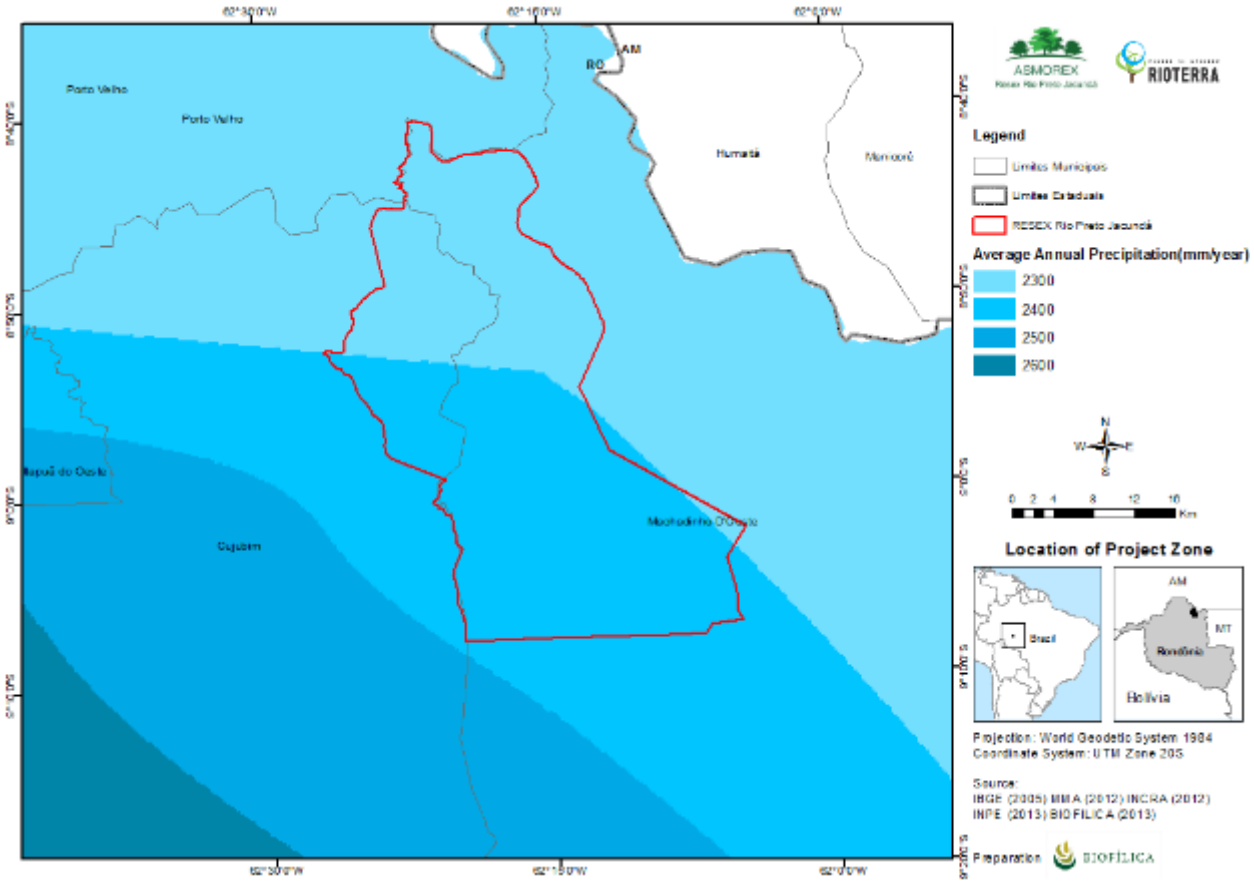


Figure 3. Map of the area of precipitation in the area of Resex Rio Preto- Jacundá.

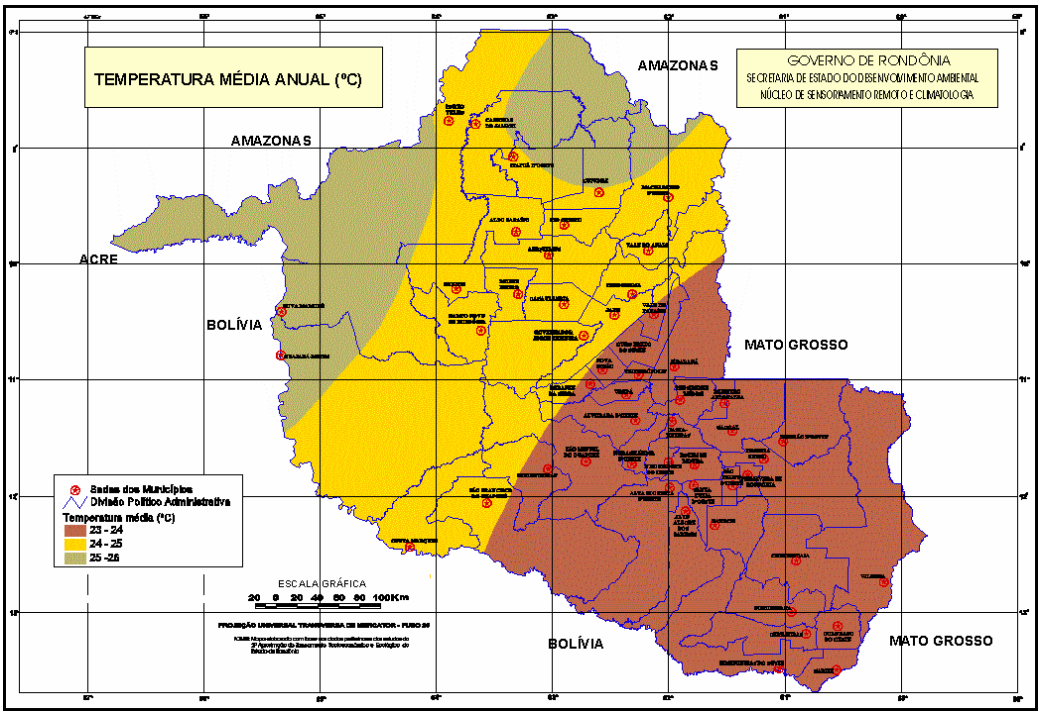


Figure 4. Distribution of temperatures in the state of Rondônia.

Hydrography

The waters drained by streams and their tributaries shape in Rondônia seven major river watersheds, as shown in Table 1.

Table 1. Watersheds of Rondônia

WATERSHED	EXTENSION (km²)
Guaporé River	59,339.3805
Mamoré River	22,790.6631
Abunã River	4,792.2105
Madeira River	31,422.1525
Jamari River	29,102.7078
Machado River	80,630.5663
Roosevelt River	15,538.1922

Source: (SILVA & ZUFFO, 2002)

The Machado or Ji-Paraná river (Figure **5**) is formed by the confluence of the rivers Pimenta Bueno and Comemoração, and drains the most populated area of the state, due to the proximity to BR 364. Its main tributaries are Urupá, Jaru, Machadinho and Preto rivers, which are located to its left bank.

The river Machado or Ji-Paraná launches its waters on River Madeira, at the locality of Calama, north of Porto Velho. With an average width of 300 meters, it is navigable all year round bearing midsize vessels. From its spring to its fall on river Madeira, river Machado has 1,243 Km. This river rises and flows into soil of the state of Rondônia. It is the largest river in extension in the state of Rondônia.

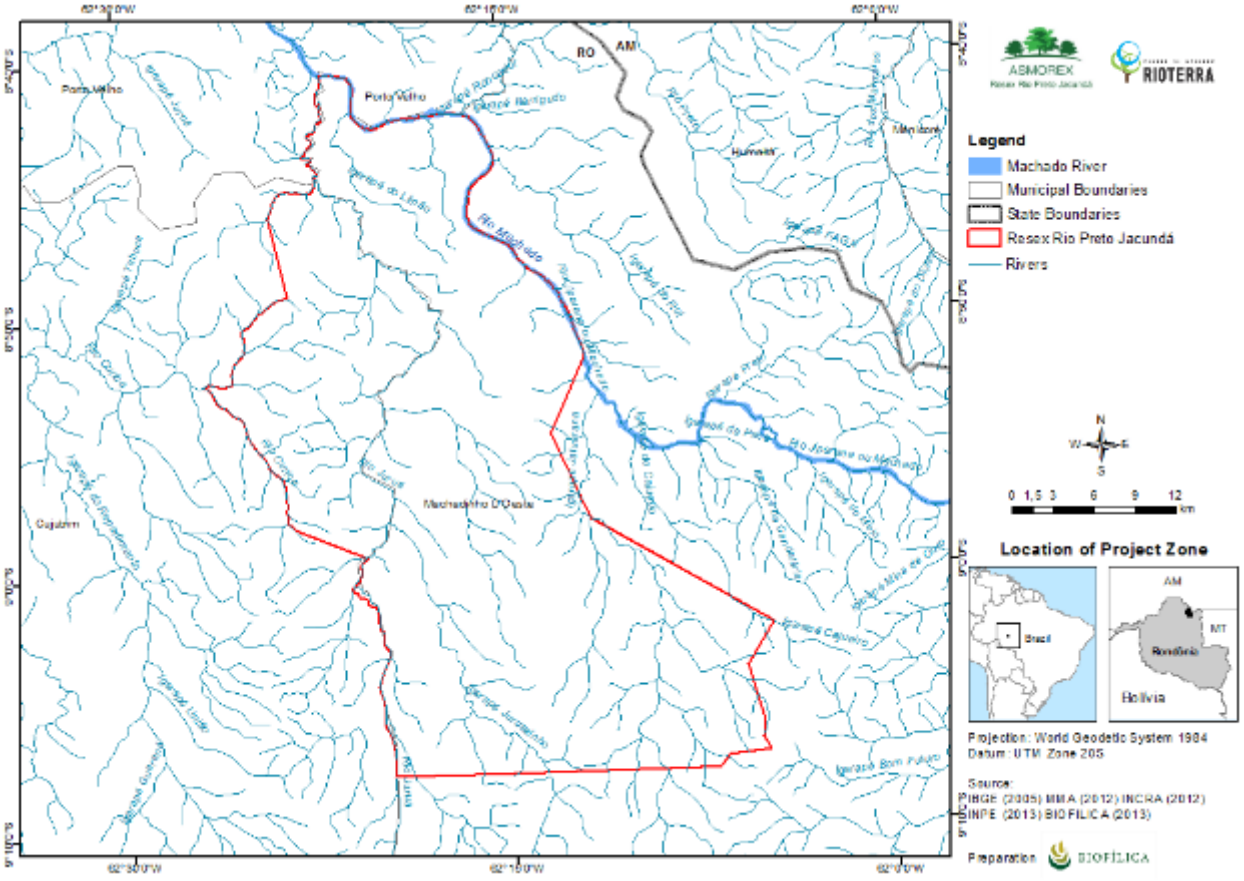


Figure 5. Map of the hydrographic network of Resex Rio Preto- Jacundá area

The north-northeast part of the Extractive Reserve Rio Preto- Jacundá has its limits marked by the presence of River Machado. Resex Rio Preto- Jacundá is inserted in the Watershed of River Machado, which represents the longest among the seven river watershed, possessing the second largest hydroelectric potential, with 1,666 Mw of the total of the watershed in the state, which reach 16,120 Mw (SILVA & ZUFFO, 2002). The main tributaries of the river Machado, in the region of Resex, are the river Jurua and the streams Limão, Outra Vida, Madureira and Jatuarana (RONDÔNIA, 2002 (b)).

In the category of sub-watershed, Resex is present in the area of sub-watershed of the Lower river Machado, with an area of 5,495,3178 km2 and in a smaller part in the sub-watershed in river Preto-, with an area of 11,037,1047 km2 (Figure 6).

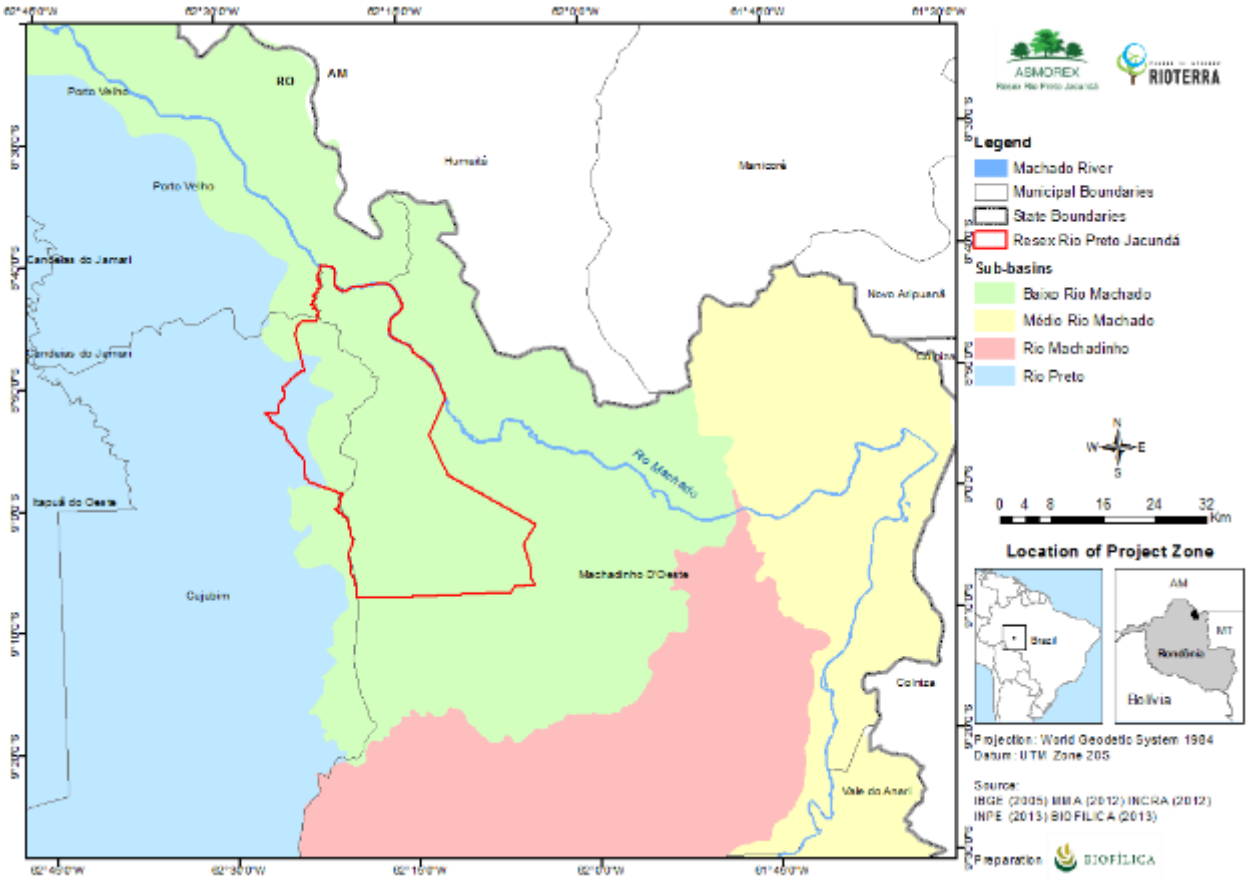


Figure 6. Map of sub-watershed in Resex Rio Preto- Jacundá area

Geology

The geological setting where Resex Rio Preto- Jacundá is located is represented by crustal segments of geological stories respectively distinct and that interact since the Paleoproterozoic times, according to the tectonic-stratigraphic subdivision of Rondônia, defined by Scandolara et al. (1999). They are named Jamari Land (Central Domain) and Roosevelt (North portion).

In the Jamari Land are grouped rock types belonging to the Southwest regional basis of the Amazonian Craton, which is located in the state of Rondônia. These are metamorphosed rocks with overlapping structures in minimum metamorphic conditions of high amphibolite, characterized as gneissic banding with strong shear component. They are predominantly ortoderivated rocks, being identified in local mode.

The Roosevelt Land consists of the regional foundation fragments represented by metavolcanosedimentary rocks and granitoid (Intrusive Suite Serra da Providência), mafic bodies (Suite

Basic/ Ultrabasic Cacoal), as Scandolara et al., 1997 and undisturbed sedimentary covers (Formação Palmeiral). Associated with the Land Roosevelt, outcrop irregular lenses from the regional basis, being strongly migmatized, and amphibolitic portions.

In terms of evolution, the region of Resex covers units in different eras and periods of history in geological time, dating back from the Paleoproterozoic to the most recent (Figure 7).

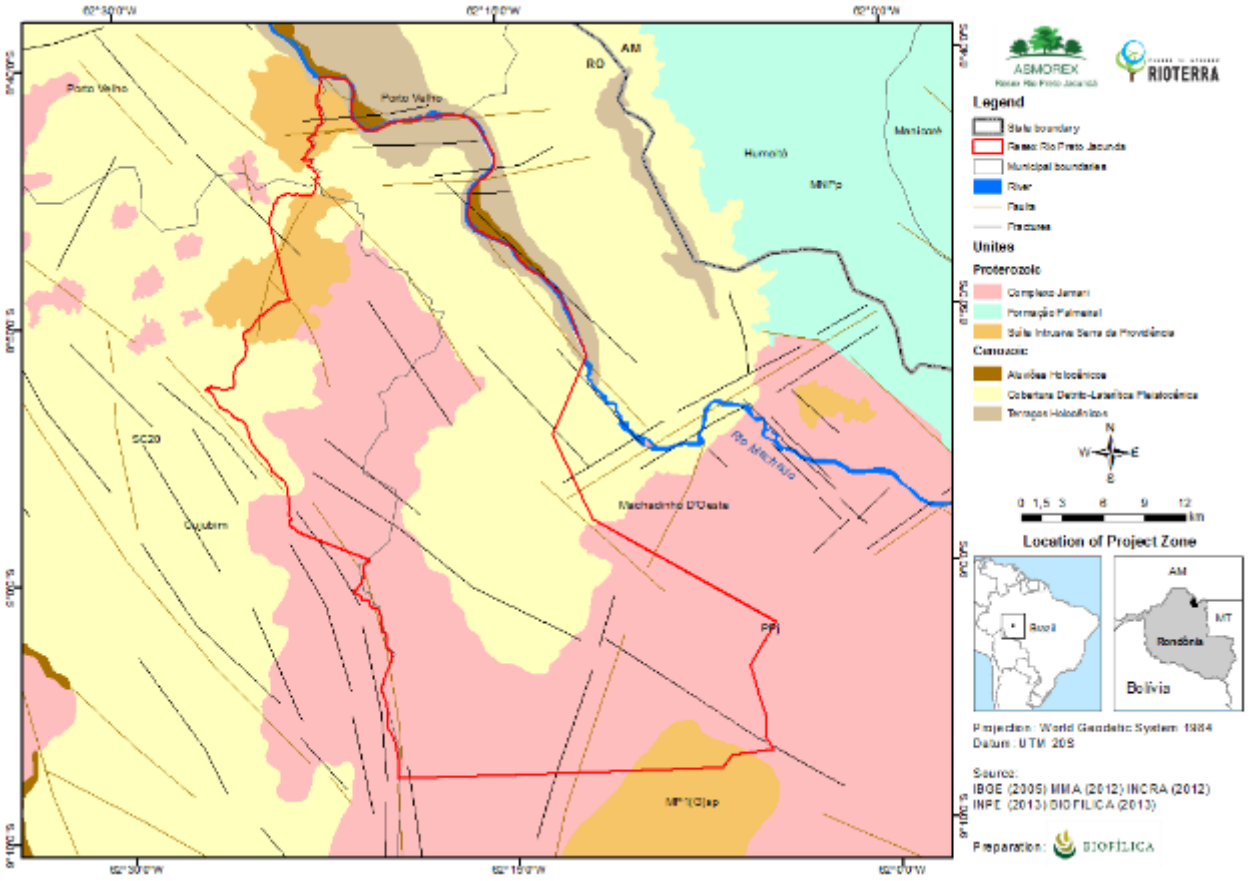


Figure 7. Map of geology of Resex Rio Preto- Jacundá area

Geomorphology

The terrain of Rondônia has 96% of the state area above 100m altitude while only 2% lies with altitudes ranging between 600m and 1200m. This feature is due to the geological structure and the absence of tertiary folding of the state.

The topography of the Region of Resex Rio Preto-Jacundá is regionally diverse, consisting of a dendritic drainage network, with long flat or gently waive to areas of a stronger terrain, such as hill. It is, however, the peneplained area of altitude of 100m, in that occupies almost the entire Resex. The process of pleneplanation is more advanced in the proximities of River Machado, which seems to have worked as basis for the relegation of the terrain. The rock outcrops are more common in hill areas than in peneplain.

The hills, which are particularly widespread in southern Resex region, form the most pronounced terrain amid peneplained surface with altitude between 150 and 230m of vertentes de inclicacao superior a 20% materializing one geomorphological feature known as inselberg *(RONDÔNIA, 2002 (b))*.

The regional geomorphological context of Resex Rio Preto-Jacundá (*Figure 8*) interpreted in the state of Rondônia by Adamy *(2002)* reveals morphological characteristics related to the categories of aggradation (depositional or agradational units) and degradation (denudational units).

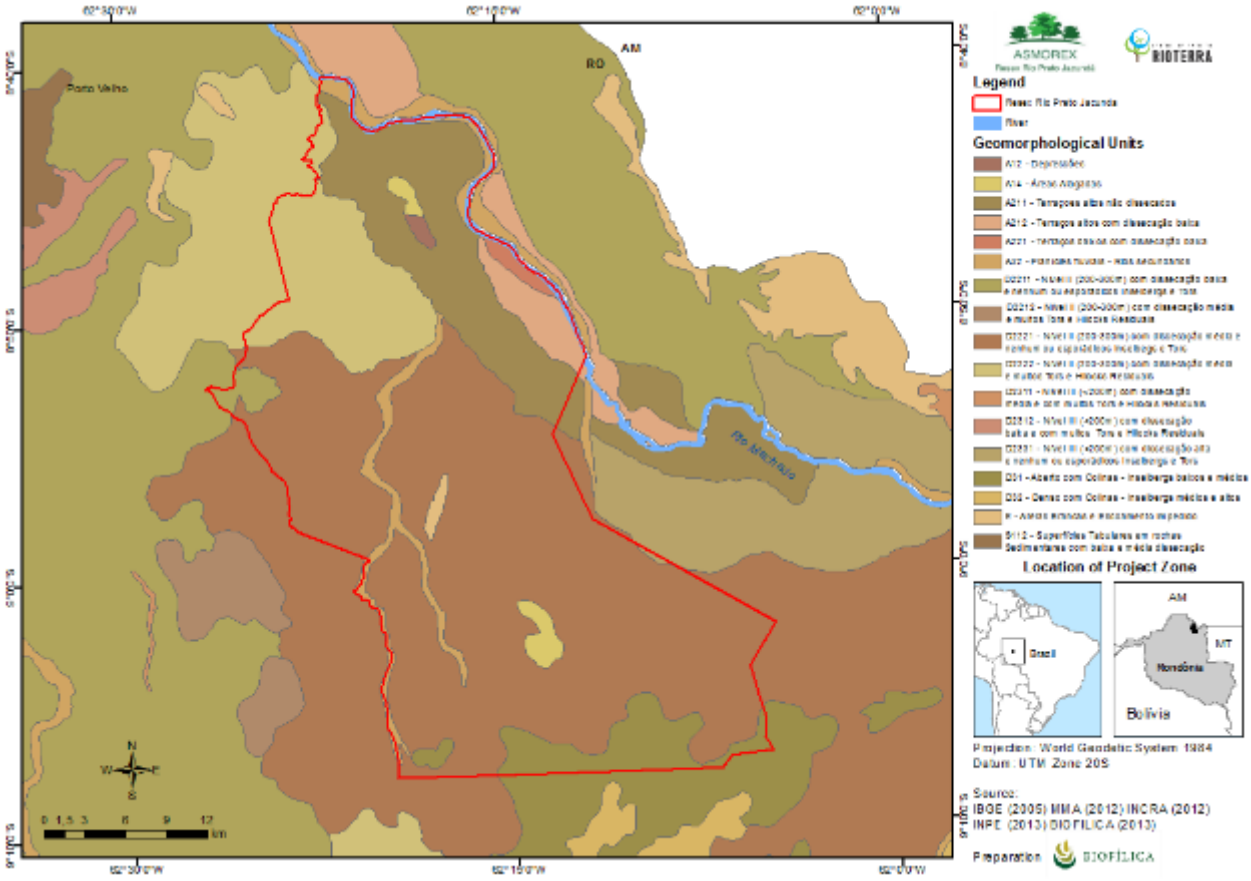


Figure 8. Map of geomorphology of Resex Rio Preto- Jacundá area

Soil

In Rondônia occurs the predominance of latosols, representing approximately 58% of soils mapped in the state. However, due to the lithological diversity and terrain, soils of Resex Rio Preto-Jacundá vary widely in their morphological, physical and chemical and mineralogical properties (Figure 9).

In the region predominate low fertility soils, poorly drained and occur in flat terrain, close to areas of the large rivers. In Resex Rio Preto- Jacundá these soils are distributed along the limit of the north area, by river Machado.

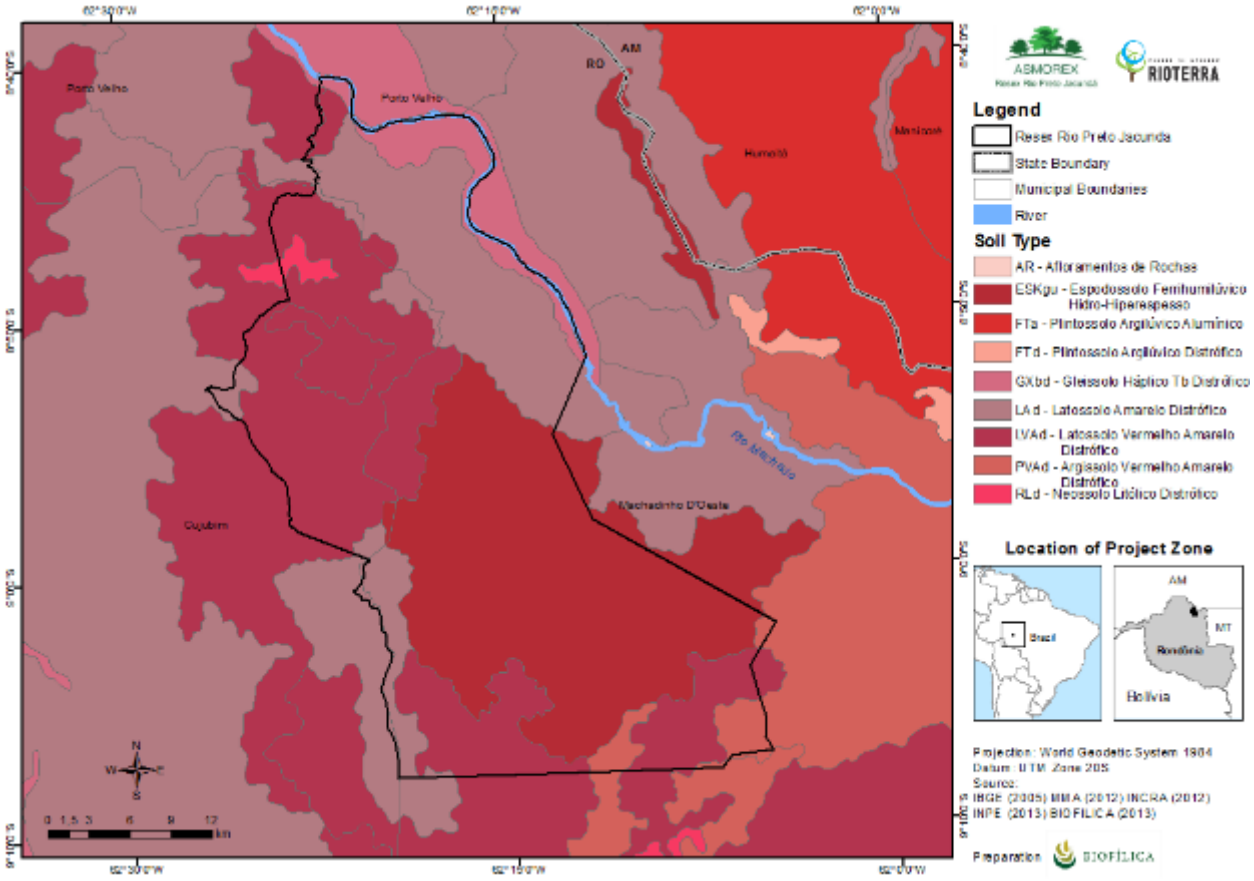


Figure 9. Map of soil conditions of Resex Rio Preto- Jacundá

1.4. Project Proponent

Table 2. Identification and responsibilities of Project proponents

ORGANIZATION	DESCRIPTION
Biofílica Investimentos Ambientais S.A. (Primary Project Proponent)	Biofílica Investimentos Ambientais is a Brazilian Company that promotes the management of forest areas in the Amazon biome. The company was created in 2008 aiming to create pioneering alternatives and to turn environmental preservation into an economically attractive activity for forest owners, communities and investors. Biofilica's mission is to reduce deforestation and carbon emissions into the atmosphere, to preserve biodiversity and hydric resources, to promote social inclusion and the

ORGANIZATION	DESCRIPTION
	development of the communities living in the Amazon biome through the trade of environmental services credits and to promote and finance scientific researches. **Responsibilities in the Project:** general coordination of the socioeconomic and environmental assessment (DSEA) and baseline studies and carbon stock; PD (Project document) development and financing; credits validation/checking and trading; Project co-management throughout the Project lifetime and implementation of conservation activities. **Contact:** Plínio Ribeiro **Phone:** +55 11 3073-0430 **E-mail:** plinio@biofilica.com.br **Website:** www.biofilica.com.br
Associação dos moradores da reserva extrativista Rio Preto-Jacundá e riberinhos do Rio Machado– ASMOREX	ASMOREX is a civil non-profit association, headquarter in the municipality of Machadinho do Oeste, state of Rondônia, which aims to manage the Resex Rio Preto-Jacundá in conjunction with the Environmental Development Secretariat of the State of Rondônia – SEDAM. Thus, ASMOREX represents the extractive, their families and other inhabitants' residents in Resex. **Responsibilities in the Project:** ASMOREX is responsible for developing and implementing, in a participatory manner, REDD+ Project, and to ensure execution of the project and maintain all documentation needed for the project to happen; monitoring and co-management of the REDD+ Project. **Contact:** José Pinheiro Borges **Phone**: +55 69 35812084 **E-mail:** jpinheiroborges@gmail.com

1.5. Other entities involved in the project

Table 3. Identification and responsibilities of partners in the execution of the Project

ORGANIZATION	DESCRIPTION
CDREX – Advisory Board of the Extractive State Reservation of Machadinho D'Oeste and Valley of Anari	It aims to manage the Resex of the municipalities of Machadinho D'Oeste and Valley of Anari; deliberate in social, economic and environmental interest of the reserves and its communities; search through agreements and other means of self-sustaining of the units; establish guidelines for the preparation of programs, plans and projects directed to the reserves; track project actions and make cost-benefit analysis and results. Responsibilities in the Project: Area Manager. Follow and evaluate the project activities implementation. **Contact:** Ataíde de Jesus Santos **Phone:** +55 69 3581-2786 **E-mail**: sedammdo@yahoo.com.br
Center of Studies of Culture and the Environment of the Amazon - CES Rioterra	OSCIP created in 1999 to contribute to the formation of a critical society, conscious of its socioeconomically and environmental, able to propose the development model for the Amazon region that combines conservation and sustainability to improve the quality of life of local population, with respect to their cultural differences, needs and natural potential of natural environments that use them. It has as mission to defend the Amazon identity, value culture and sustainable use of the environment and contribute to a just, democratic and participatory society. **Responsibilities in the Project:** coordination of socio-economic and environmental studies; planning of conservation activities; support in the validation/verification of the project; implementation and monitoring of REDD + Project activities. **Contact**: Alexis Bastos

	Phone: +55 69 3223-6191 **E-mail**: alexis@rioterra.org.br **Website**: www.rioterra.org.br

Table 4. Identification and responsibilities of technical partners

ORGANIZATION	DESCRIPTION
Technical Partners	**IPÊ – The Institute of Ecological Research** is considered one of the biggest environmental NGO's in Brazil and it takes on an integrated action model developed over years of experience combining research, environmental education, habitats restoration, social involvement and sustainable development, preservation and preparation of policies. Responsibilities in the Project**:** development of baseline scenarios of deforestation. **Contact Information** **Name of representative:** Dr. Alexandre Uezu **Phone**: +55 11 4597-3525 **E-mail:** aleuezu@ipe.org.br **Website:** www.ipe.org.br **Hdom – Hdom Engineering and Environmental Projects** was founded in 2008 with the goal of bringing all the experiences and knowledge of the Forest Management Laboratory (LMF) of the National Institute of Amazonian Research (INPA) to the private sector. Hdom is incubated at INPA and integrates the research group Forest Management of CNPq, led by Dr. Niro Higuchi. Responsibilities in the Project: development of forest carbon estimate for the Resex area. **Contact Information** **Name of representative:** Mateus Bonadiman **Phone:** + 55 11 33027249 **E-mail**: mateus.bonadiman@hdom.com.br **Website**: www.hdom.com.br

1.6. Project Management and Governance

As described in items 1.4 and 1.5 the project proponents are Asmorex and Biofílica, relying directly with CES Rioterra in the planning and execution of activities. For a participatory and transparent management of the project, the resident community in RRPJ chose to create an instance of management/resolution entitled “Management Board”.

The entities that make up the Board have been set at an appropriate workshop in order to diversify the group and balance public entities, private entities and third sector (Figure 10). The most representative part is Resex, which will include a representative from each community (Cabeça-de-Boi, Jatuarana and Jatobá) plus a member of the board of Asmorex.

The following institutions are part of the Management Board, represented by an individual and an alternate:

- Biofílica;
- CES Rioterra;
- CDREX;
- Environmental Development Secretariat of the State (SEDAM);
- Federal University of Rondônia (UNIR);
- Resex Rio Preto-Jacundá: a representative of each community (Jatobá, Jatuarana and Cabeça-de-Boi) and a representative of Asmorex, which is not the director.

As detailed ahead on item 2.6 Stakeholders, the following principals have been defined in a participatory manner to the governance of the project:

- Management Board, representative and committed;
- Transparency in all its actions;
- Credibility and reliability;
- Member rotation;
- Training/Capacity building for members, especially residents of Resex;
- Including youth, women and the elderly;

The Management Board is directly related to the system of governance of the Fund Resex Rio Preto-Jacundá, thus having among its many tasks:

1 Monitor the targets, outcomes and impacts of project activities;

2 Manage the resources of RESEX Rio Preto-Jacundá Fund in accordance with the principles, with the planning and priorities established collectively;

3 Making public data, information, reports, deliberations and rendering of accounts in accessible language;

4 Mediate unresolved conflicts with the first instance among the community.

It must be said that the Resex Rio Preto-Jacundá Fund will have its accounts and financial transactions audited by a third party every two years.

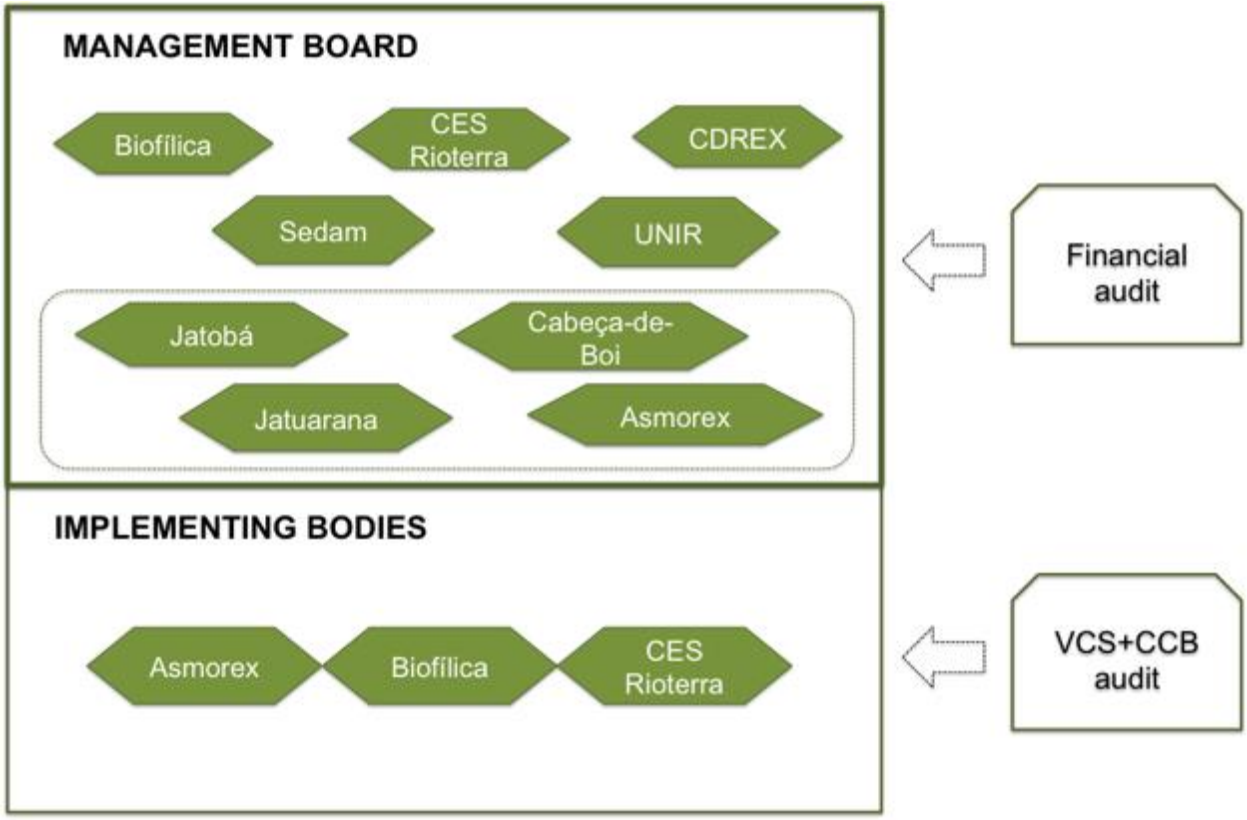


Figure 10. Governance system of RRPJ Project

The execution and implementation of conservation activities are under the scope of Asmorex, Biofílica and CES Rioterra, having these organizations the following assignments:

1. Implement conservation activities along the lines defined by the community;
2. Perform the accountability of the project;
3. To respect the decisions of the deliberative body and follow the instructions of the Fund.

Regarding the implementing body of the Project, Biofílica is a Corporation governed by the Law of Corporations n. 6,404 of 1976. From 2012, the company is subject to annual independent audit, in which are examined its financial statements and accounting practices. Since then, the opinion of the audit team is that the performance of operations in the company are in accordance with Brazilian accounting practices.

CES Rioterra, a civil nonprofit organization, is respected for its performance in the state of Rondônia developing projects for sustainable use with traditional communities. It is governed by specific legislation and statutes, which cites the respect of the activities of Rioterra to the principles of legality,

impersonality, morality, publicity, economy and efficiency, as well as non-discrimination by race, color, gender or religion. It has also an Audit Committee, which audits the CES Rioterra accounts at the end of each fiscal year. Currently the BNDES, through the Amazon Fund, granted a non-refundable financial support to CES Rioterra for it to carry out the project Quintais Amazônicos (Amazon Backyards), subject to various governance obligations, including external financial audit.

Asmorex, governed under the statute of 2007. Has rules for its operation including the non-discrimination of political, social, racial or religious matters, as well as the rights and duties of its members. The number of members is unlimited, as the maximum cannot be less than 10 individuals and no more than 70% of the same gender. It is expected the Audit Committee acting in the supervision over operations, activities and services of the association.

An additional comment to better define these criteria and explicit clearer proceedings, both of the fund and the governance system, will be drawn after the event of validation/verification together with the community and entities representative of the Collegiate.

1.7. Project Starting Date

October 1st 2012, date set by the signing of the partnership agreement between Biofílica and Asmorex.

1.8. Project Crediting Period

The crediting period is 1 October 2012. The termination will take place on 30 September 2042, completing the 30-year period.

The activities will be developed throughout the project-crediting period, as detailed in item 2.2 Description of Project Activities.

2 DESIGN

2.1. Sectorial Scope and Project Type

- Sectorial Scope: 14 – Agriculture, Forestry and Other Land Use (AFOLU)
- Reducing Emissions from Deforestation and Forest Degradation (REDD)
- Methodology for Avoided Unplanned Deforestation (AUD)
- This is not a grouped Project.

2.2. Description of the Project Activity

In order to ensure the benefits to the climate, communities and biodiversity beyond project duration, long-term activities were planned and some already executed. The elaboration of the Resex Rio Preto-Jacundá Action Plan was an important milestone for the project in terms of application of construction methodologies of community protocols and defining activities.

Because it's a community project, the activities divided into three sectors mentioned above have a strong social bias, always seeking the involvement and increase capacitation of the community in all activities.

Climate

According to the Project Description, section 1.1, the project objective for the climate is to avoid the deforestation of 35,398 hectares, representing a total of 12,428,713 tons of CO2 eq that will have their emission to the atmosphere avoided through the following activities:

- Policy Articulation with environmental governmental institutions: Due to Resex be located in a large pressure area from deforestation and it is a public area, the institutions responsible for changing the outdated framework of public policies and generate a favorable political context to the effective and systemic control of deforestation are the environmental government institutions and supervisory. In this sense the project provides joint by the proposers and project partners with public bodies such as Sedam (State Department of Environmental Development - Rondônia) and in the last resort, the MMA (Ministry of Environment) through letters, crafts and in-person meetings whenever extreme cases of illegal deforestation and invasions are imminent or occurring within the limits of design and RESEX. These joints will seek political support in resolving the issues in order to avoid risks to the climate benefits provided by the scenario with the project.

- Deforestation monitoring by satellite images: Regular quarterly monitoring of deforestation will be conducted by satellite images within the Resex by Biofílica. This monitoring result reports with deforestation points that will be forwarded to the other proposers and partners and to Sedam, since

surveillance in related field to illegal invasions and deforestation can only be performed by the environmental body, thereby safeguarding the physical integrity of residents RESEX. This action is directly related to the containment of deforestation and invasions, maintaining forest cover and thus maintaining the climate benefits provided by the scenario with the project.

- Physical Patrolling: surveillance activities now run by Sedam but give unsystematically and by complaints. The project aims to strengthen and improve the efficiency of patrolling through the provision of quarterly reports of deforestation and costing of logistics items of operations. In addition to the quarterly inspection operations will also occur inspections in cases of complaints. This action is also directly related to the containment of deforestation and invasions, maintaining forest cover and thus maintaining the climate benefits provided by the scenario with the project.

- Strategic physical occupation of territory: Some actions initially intended for social project scope should also contribute to the reduction of illegal deforestation. One is precisely the implementation of three new communities in areas largely pressed by the action of illegal loggers and squatters, the western portion of RESEX. This strategy ensures through physical presence in the area the inhibition of external agents actions, fact proven in the creation of Cabeça-de-Boi community, previously input invaders. This action should be further discussed between the Community and ASMOREX to decide if, when and how it should take place.

- Improving forest management practices: As described in Section 6 of PDD, although it occurs sustainable forest management in the project area, the relationship between the community, the ASMOREX and operator is still distant in a certain way. This gap is due in part to the low technical and managerial empowerment of management of activities by the Community and ASMOREX. The project proposes as an activity of medium / long term community empowerment through courses and training in technical and managerial improvement of timber forest management conducted in the area, with reference to the best practices of the principles and criteria of the Forest Stewardship Council (FSC). The specific work plan for this activity will be planned according to the Community schedule and receipt of funds from the sale of reduced emissions but, in general, it will initially only with technical and managerial training on good management practices and in sequence, if the community so decide, specific certifications for sustainable forest management may be pursued, such as the FSC itself. These capabilities, and eventual certification of management, will allow the Community and ASMOREX have greater influence and management in the sustainable forest management activities enabling the control and reduction of environmental impacts of this activity in the forest and, consequently, in carbon stocks aligned with the main objectives of the project for climate.

- Multiple and sustainable use of forest products: sustainable management of non-timber products, as well as being extremely linked the resumption of extractivism culture, also one of the project's income-generating activities. These activities are geared towards value chain structure, including skills and training ranging from harvesting techniques to marketing, with emphasis on improving the processing of products practices. The main product chains non-timber to be developed are the latex and its by-products, acai, brazilian nut and copal. The multiple and sustainable use of forest products is linked to reducing emissions from deforestation and forest degradation as it creates value in the forest standing encouraging the maintenance of forest cover in the project area and the physical presence of the community in the forest.

- Leakage management activities: the project proponents have no authority, interference or domination over activities conducted outside the RESEX limits, particularly with regard to illegal activities. Some social activities for income generation, especially the provision of technical and health care in the production of cassava flour and fruit pulp and mechanization of clearings will be developed the leakage management areas. In addition, satellite image monitoring of the areas where are allocated the leakage belts (Figure 18) and other protected areas of sustainable use close to Resex limits will be made generating information in the Quarterly Bulletin about possible points of deforestation.

Community

Residents of RRPJ, as legitimate beneficiaries of forest products and their services, face many challenges to remain on their land continue extractive traditions. Focusing on this premise, the social benefits derived from the sale of credits, at first, will come in collective investments, a decision taken by the residents themselves, who still lack basic social and community structures.

Prior to defining activities, a socioeconomic survey was applied to Resex in order to point main strengths, weakness, threats and opportunities of Resex RPJ to identify the focal issues. From that, themes were defined having as content activities proposed in appropriate community workshop called “Plan of Life”:

The main themes are:

- Health;
- Income generation;
- Education;
- Social Organization;
- Communication;
- Environment;
- Empowerment of young people and women;

- Infrastructure.

The activities contained in each axis will have their implementation schedule created from each verification of VCS credits, defining the priority investments according to community needs.

The results and impacts of such activities aim to maintain long-term project benefits beyond the duration of the Project by establishing a collective spirit of responsibility and empowerment in the community.

Biodiversity

The role played by biodiversity in the context of the project becomes more evident in the extent that it identifies the endemic and/or threatened species present in the area of Resex, also considering its importance in the traditional way of life of extractive and riverside communities. Hunting and fishing are the main source of animal protein for the families and plant species are closely related to income generation and regional traditions of popular medicine.

In this aspect, a first definition was the demarcation of proper areas for fishing, hunting, forest management and full protection, respecting the internal dynamics already undertaken by residents and defining proper spaces to each activity, which will soon be in the Multiple Use Management Plan to be built.

The monitoring of relevant species will be performed accompanying the real impacts of interventions of REDD+ Project and of forest logging. Such monitoring must be carried out, preferably, by educational institutions and local research in a participatory way in partnership with residents of RRPJ.

The disclosure of this monitoring is not only allowed but it is encouraged by the project, since it should disseminate scientific knowledge still little accessed.

Table 5. Project Activities and their processes, results and impacts

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
x	x	x	Initial Articulation	Identification of actors and choice of research institutions	□Number of meetings held □ Hiring and establishing partnerships	□Institutions and actors initially aligned about the project □Diversification and integration of a multidisciplinary team	□Continuation and maintenance of relationships throughout the project □Generation of knowledge on issues related to conservation and REDD+	Held in October/2012
x			Technical Studies	Conduction of stock estimation study of forest carbon	□Technical report generation □Team involved □Participation of a community team	□Knowledge generation on carbon storage, including differentiation between managed and unmanaged area □Contribution to the accounting of emissions	□Generating inputs for future monitoring □Improvements in the timber forest management system □Reduction of deforestation in the project area	Held in October/2013
x				Conduction of study to determine the baseline of deforestation	□Generation of technical report □Team involved □Modeling of future deforestation	□Generating knowledge about the dynamics of deforestation in the region □Contribution in accounting for reduced emissions	□ Generating inputs for future monitoring □Reduction of deforestation in the project area	Held in May/2014
	x	x		Realization of socioeconomic and environmental study	□Generation of technical report □Academic team involved □Participation of a communitary team	□Definition of base line for the communities □Providing inputs for design of interventions,	□Improved social conditions of the residents □Reduction of deforestation in the project area	Held in April/2014

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
						positive and negative impacts		
x	x	x		Workshops with researchers and proponents for delivering the results	□Number of meetings held □Number of participants	□Knowledge sharing □Alignment of core issues of the project	□Continuity of partnership throughout the project □Deepening of scientific knowledge in the area	Held between December/2012 and January/2014
	x		Activities planning	Return the results of studies to the community	□Number of participating partners □Number of participants from the community	□Sharing of knowledge and facilitation of appropriate language □Constant and growing involvement of community members □Empowerment of socioeconomic and environmental data to define the investments	□Dissemination and perpetuation of knowledge □More sustainable use of natural resources	Held in February/2014
	x			Community workshop to present the promotion terms related to REDD+, regulations and steps	□Human and Financial resources invested □Number of participants from the community	□Sharing of knowledge and facilitation of appropriate language □Constant and growing involvement of community members □Increase the sense of	□Increase of awareness of the value of forest resources and community role □More sustainable use of natural resources	Held in October/2013

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
						belonging		
x	x	x		Participatory development of Resex zoning and Plan of use	□ Human and Financial resources invested □Number of participants from the community Definition of eight zones: social interest, fishing, hunting, sacred, full protection, ecotourism and forest management.	□Sensitization of the residents in relation to their territory □Providing inputs for creation of multiple use management plan □Land management and use plan according to its skills and community access	□ More sustainable use of natural resources □Better distribution of resources in the forest □Improved quality of life □Perpetuation of riverside and extractive culture	Held in February/2014
x	x	x		Participatory development of the "Life Plan", that is, the activities to be implemented in the project	□ Human and Financial resources invested □ Number of participants from the community □Definition of theme axis and activities	□ Sensitization of the residents in relation to their needs and role of the project □Providing inputs for creation of multiple use management plan □Planning priorities	□More sustainable use of natural resources □Equitable distribution of resources □Improved quality of life □Perpetuation of riverside and extractive culture	Held in March/2014

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
	x			Participatory development of benefit-sharing mechanism	□Human and Financial resources invested □Number of participants from the community □Document with the general line of the benefit-sharing mechanism	□Empowerment of the project of governance □Definition of guiding principles for transparency □Planning priorities □Decrease of risks from corruption and misappropriation of funds	□Continuation of benefits beyond the project time □Increased income diversification □Strengthened community organization	Held in May/2014
	x			Participatory development of the procedure for conflict resolution	□ Human and Financial resources invested □ Number of participants from the community □Procedures for conflict resolution ready	□Resolved conflicts / managed efficiently □Active community participation at all levels □Opening of space for open dialogue	□Aligned and empowered actors on project issues □ Increased income diversification □Strengthened community organization	Held in May/2014
	x			Community workshop to build concepts about the project, including avoided deforestation, public consultation, validation and verification, audit and papers	□ Human and Financial resources invested □ Number of participants from the community	□Growing understanding of the concepts related to REDD + and forest value □Skill and knowledge growth	□Increase of awareness of the value of forest resources and community role □ More sustainable use of natural resources	Held in July/2014

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
						□Empowerment of carbon rights		
x	x	x	Validation/verification	Choice of standards and methodologies applicable to the Project	□Standard VCS and chosen CCB □Methodology VM0015 chosen	□Project technical adequacy of these standards and methodologies	□Proper design, generating benefits to climate, community and biodiversity	Held in November/2013
x	x	x		Consolidation of Project Design Document	□ Human and Financial resources invested □DCP ready and updated	□PDD working as a business plan and community life	□Proper design, generating benefits to climate, community and biodiversity □PDD as management toll and subject to continuous improvement	Held in July/2015
x	x	x		Choosing the validation/verification body	□Financial resources invested □Selection and hiring of VVB	□VVB auditing the project and pointing out the improvement points	□ Proper design, generating benefits to climate, community and biodiversity	Planned for second semester/2015. Subsequent verification every 2 years
x	x	x		Monitoring of validation / verification process according to VCS and CCBA standards	□ Human and Financial resources invested □Validated and verified project	□VVB project entirely appropriated according to the referred standards	□ Proper design, generating benefits to climate, community and biodiversity	Planned (from the first harvest verification)

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
						□Available verified credits		
	x		Governance and adaptive management	Conducting quarterly meetings of the Management Board	□ Human and Financial resources invested □Meetings taking place systematically	□Board aligned and informed on the project □Community gaining voice and represented in a diversified manner	□Continuous improvement of the project □Improvement of project management	Planned (from the first harvest verification and continuously every 6 months)
x	x	x		Meetings with the residents collecting feedback on the effectiveness of activities	□ Human and Financial resources invested □ Number of participants from the community	□Adaptive management in course □Empowered Community □Opening of a space for feedbacks	□Continuous improvement of the project □Reduction of communal conflicts	Planned at the beginning of each verification event
	x			Meetings to prioritize community investments	□ Human and Financial resources invested □Number of participants from the community □Meetings held periodically	□Adaptive management in course □Empowered Community □Prioritized activities in view of the community life plan	□Continuous improvement of the project □Improvement of management	Planning according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
	x	x	Health	Rescue of traditional medicine through training and booklets	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Rescue of the popular forest medicine □Natural solutions for low complexity diseases □Increased availability of herbal medicine	□Perpetuating beliefs and customs □Sustainable use of natural resources □Improvement of the health of the community	Planning according to community schedule
	x			Training and maintenance of at least one health worker per community	□ Human and Financial resources invested □Number of health workers trained and maintained	□Agility in the routing of diseases □Maintenance of preventive and family health □Instruction for residents	□Increase of life expectancy of the community members □Improvement of the health of the community	Planned according to community schedule
	x			Monitoring of water quality consumed in Resex	□Number of monitoring performed	□Water qualified for human consumption □Reduction in the incidence of diseases related to the water consumption	□Increase of life quality □Improvement in the health of residents	Planned according to community schedule
	x			Offering courses on disease prevention and family planning	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Decrease in the incidence of easily treated diseases in Resex □Couples with more planning regarding the number of children and birth control	□ Increase of life quality □Improvement in the health of residents □Empowering women for functions beyond housewife work	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
	x			Acquisition and maintenance of ambulance and water ambulance	□ Financial resources invested	□Agility in referring diseases to hospitals and stations in the region	□ Increased life expectancy of the community members □ Improvement health of residents	Planned according to community schedule
	x			Training and maintenance of a microscopist	□ Human and Financial resources invested □Trained microscopis	□Agility in the detection of malaria	□ Increased life expectancy of the community members □Improved health of residents	Planned according to community schedule
	x	x	Income generation	Implementation and operation of an agribusiness of fruit pulp (including infrastructure, training and market access)	□ Human and Financial resources invested □Number of participants from the community	□Increase in jobs within the Resex □Increase in income diversification □Recovery of extractive culture allied to technological aspects □Increase in diversification and availability of food	□Increased household income □Perpetuation of extractive culture □Responsible use of biodiversity resource □Increased food security	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
	x	x		Adequacy of Sustainable Forest Management according to the FSC standards	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Timber explored selectively and responsibly □Community empowered and trained in all aspects of forest management	□Increased household income □Perpetuation of extractive culture □Responsible use of biodiversity resource □Gradual reduction of dependence on external agents	Planned according to community schedule
	x			Implementation and woodworking operation to commercialization of furniture	□ Human and Financial resources invested □Number of participants from the community □Raw material involved	□Increase in jobs within the Resex □Increase in income diversification □Waste recovery operation of forest management	□ Increased household income □Promotion of economic activities in the region □Gradual reduction of dependence on external agents	Planned according to community schedule
	x			Training and adjustments in relation to health and safety at work	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Residents aware of their rights and duties in relation to current regulations, use of PPE, risk of accidents etc.	□Decrease in the number of workplace accidents □Improved quality of life for residents	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
	x			Technical and health care delivery in the production of cassava flour and fruit pulp	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Adjustment of production to health rules □Obtaining quality and inspection seals	□ Increased household income □Access to more demanding markets	Planned according to community schedule
x	x			Purchase of a tractor for mechanization of scuffed	□ Financial resources invested □ Number of participants from the community	□Riverside residents more empowered by mechanization □More efficient use of cleared areas and capoeira	□ Increased household income □Termination of the use of fire □Responsible use of biodiversity resource	Planned according to community schedule
	x		Education	Implementation of an educational center for youth and adults	□ Human and Financial resources invested □Implemented educational center	□Literacy of youth and adults	□Decreased illiteracy rate among residents □Community with higher self-esteem	Planned according to community schedule
	x			Computer equipment acquisition	□ Financial resources invested □Computers and equipment acquired	□Easier access to communication and learning tools	□More contact with the current issues that may favor the project □More capable residents	Planned according to community schedule

Climate Community Biodiversity	Theme	Activity	Process	Results	Impacts	Date
x		Facilitation of access to courses and distance learning	□ Financial resources invested □ Number of participants from the community	□Residents being trained in issues of interest for the community □Creation and maintenance of skilled labor within Resex	□Encourage the upkeep of young people in Resex, reducing the exodus to urban centers □Skilled labor among residents □Residents with different skills and abilities	Planned according to community schedule
x	Youth and women	Promotion of workshops for leadership training, focusing on youth and women	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Women empowered and in leadership roles and management in the family and community levels □Young people with leadership and management skills □Minorities gaining voice and participation	□Gender equality in management and production positions Diversification of roles Residents with different skills and abilities	Planned according to community schedule
x		Organization of internal commission formed by women for access to public policies and guarantee of rights	□ Human and Financial resources invested □Commission effectively structured and active	□Women empowered and in leadership roles and management in the family and community levels □Community having access to public policies	□Gender equality in management and production positions □Diversification of roles □Residents with different skills and abilities □Reduction and	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
							management of social conflicts	
	x	x	Environment	Workshops and preparation of booklets on environmental education (solid waste, composting, recycling and agro-ecology and organic farming)	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in the first verification period	□Increase of soil conservation and soil fertility in rocados □Correct disposal and waste recovery	□Reduction of household waste generated □Access to organic products market □Residents with different skills and abilities	Planned according to community schedule
	x		Social Organization	Promotion of workshops for training in management and finance to the members of the board of Asmorex and Cooperex	□ Human and Financial resources invested □Number of participants from the community □Number of courses offered in each verification period	□Increased skill and knowledge in management and finance □More organized and strengthened community	□Best managed resources □Residents with different skills and capabilities aimed at managing benefits the community □Gradual reduction of dependence on external agents □Reduction and management of social conflicts	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
	x			Structuring of internal committees for empowerment of all residents and decentralization of the Association	□ Human and Financial resources invested □Number of participants from the community □Effectively structured and active committees	□Collectively taken decisions □Residents empowered and actively participating of issues of interest for the community, in partnership with Asmorex	□Diversification of roles □Residents with different skills and abilities □Reduction and management of social conflicts	Planned according to community schedule
	x		Communication	Acquisition of 4 amateur radios (one for each community and one in the urban headquarters of the Association)	□ Financial resources invested □Number of acquired radios	□Agility in communication	□Improved quality of life for residents	Planned according to community schedule
	x			Acquisition of two antennas with internet and phone	□ Financial resources invested □Acquired antennas and fully operational	□Agility in communication □Make possible activities that require internet	□More contact with the current issues that may favor the project □More capable residents	Planned according to community schedule
	x		Infrastructure	Housing construction serving housing needs of communities and improving health conditions in existing homes	□ Human and Financial resources invested □Number of participants from the community	□Residents with bathroom in their homes □Houses with minimal sanitary conditions □All families with standard housing	□Improved quality of life for residents □Encourage the upkeep of the residents in Resex,	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
							reducing the exodus to urban centers Improved health of residents	
	x			Building of a community space in the riverside part of Resex and improve the structure in the space on the mainland	Human and Financial resources invested Community quality spaces serving their community function	Improvement of a space for moments of community interaction Riverside community with more moments of interaction	Reduction and management of social conflicts Improved decision - making processes Organized occupation of the territory Greater social participation	Planned according to community schedule
x	x			Implementation of 3 communities in strategic locations, settling a total of 12 families	Human and Financial resources invested Opening of areas and building infrastructure to allocate families	Greater physical presence within the limits of today unprotected Resex Decentralization of the most populous communities Better use of forest	Reducing deforestation Organized occupation of the territory Improvement in quality of life	Planned according to community schedule

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
						products in places still inhabited		
x	x			Maintenance of roads and branches within Resex	□ Financial resources invested □Branches serving corporate interests of internal community Resex	□Facilitating the flow of goods □Improvement of logistics in the community, in cases of emergency, access to schools, urban area and community center	□Income and market access diversification □ Organized occupation of the territory □Improvement in quality of life	Planned according to community schedule
	x		Resex Rio Preto-Jacundá Fund	Financial / accounting audit services contract	□ Financial resources invested □Fund audited every 2 years	□Tool for improving management □Transparency and verification of the correct use of Fund resources	□Reduction of project risks	Planned (every 2 years from the first inflow of funds in the Fund)
	x			Structuring, implementation and monitoring of the Fund	□ Human and Financial resources invested □Fund effectively implemented with a structured governance	□Tool for allocation of funds □Space to demonstrate transparency	□Maintenance of project benefits for beyond its duration □Improvement and development of social and environmental aspects of Resex	Planned (from the first verification and continuous throughout the project lifetime)

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
		x	Monitoring	Realization of monitoring of the project impact in key taxa/species conservation indicators in the area	□Number of conducted campaigns □Generated and available reports	□Knowledge generated on local biodiversity and disseminated □Local staff trained and generating knowledge in the area	□Increase of species and individual threated locally and globally □Community empowered and making responsible use of plant and animal species	Planned (every year from the first verification)
		x		Realization of monitoring of natural pits in the area of Resex	□Number of conducted campaigns □Generated and available reports	□Knowledge generated on the role of natural pits □Local staff trained and generating knowledge in the area	□Conservation and maintenance of these habitats □Locally preserved species	Planned (every 2 years from the first verification)
		x		Realization of monitoring of Ateles *Chameck* (spider monkey), comparing areas with and without forest management	Number of conducted campaigns Generated and available reports	Knowledge generated and disseminated on species Local staff trained and generating knowledge in the area	□Preservation and population growth of the spider monkey in regional terms	Planned (every year from the first verification)
x				Monitoring of deforestation through satellite images and generation of quarterly newsletters to SEDAM and Asmorex	• Number of generated reports • Detected points of deforestation • Sedam informed on potentially detected points	Number of generated reports Improving knowledge about the dynamics of deforestation in the region Combating invasions and illegal activities in	Maintaining and increasing forest cover □Mitigation of global climate change □Maintenance of	Initiated in October/2012 and continuously during project lifetime

Climate	Community	Biodiversity	Theme	Activity	Process	Results	Impacts	Date
					of deforestation	the area Resex doing its job by keeping only sustainable activities within the limits of its territory	timber and non-timber resources for community purposes	
	x	x	Zoning	Implementation of hunting and fishing zones	Human and Financial resources invested Areas effectively implemented and with a plan of use	Sustainable use of species Increase of diversification and availability of food	□Increasing food security □Conservation of species	Planned according community schedule

2.3. Management of Risk to Project Benefits

The risks to climate benefits, both natural and human-induced, were measured by the tool "AFOLU Non-Permanence Risk Tool v3.2", reported in the "Report on risk of non-permanence of Resex Rio Preto-Jacundá REDD+ Project", as summary table below (Table 6).

Table 6. Final score of the risk of non-permanence

Category	Score
a) Internal Risk	0
b) External Risk	10
c) Natural Risk	0
Overall Score (a + b + c)	10

The risks to the benefits of climate, community and biodiversity and mitigating measures are listed in Table 7.

Table 7. Risks to the benefits of the project and mitigating measures

Risk	Mitigation
Illegal activities such as invasion and timber theft occurring in Resex causing degradation, loss of forest cover and expulsion of communities.	Mitigation of risk should involve the effort of all stakeholders and interaction between the proponents and the supervisory institutions. Specifically facing illegal activities inside Resex, we intend to conduct a more effective monitoring of the area with quarterly newsletters deforestation made with satellite images, and intensify and agility in field patrolling with defined procedure and frequency. The patrols will have the financial support of the project and will occur quarterly and / or through complaints. It is also expected that the strengthening of governance and greater physical presence throughout the project prevent the existence of illegal and predatory activities.
Non-involvement of the timber management in REDD+ Project and their planning and execution activities causing negative impacts to the project benefits.	Early in the project design the involvement of timber management was discreet and touch the indirectly issues as Community zoning of Resex and estimating

Risk	Mitigation
	carbon stocks. During the project that will be training and capacity building activities related to managerial empowerment of the community about this activity in addition to the improvement of the same through the adoption of best practices in management, both in the planning and harvest phases. Such training and eventual certification of management will allow the Community and ASMOREX have greater influence and management in the activities of sustainable forest management enabling the control and reduction of environmental impacts and, consequently, in carbon stocks in order to maintain the main objectives of the project for the climate.
Problems in the commercialization of carbon credits, due to price floatation of the credits and the absence of a regulated market, and a consequent lack of resources to finance the proposed activities.	Biofílica has, as one of the roles in the project, to provide funds to commercialization of credits, publishing outreach materials and maintaining constant contact with key market players and potential buyers, establishing a network of contacts essential to the commercial sales effort. In addition, alternative funding, such as donations and partnerships for direct implementation of project activities (not necessarily linked to credit sales), will be sought by proponents, including Asmorex, which already has experience in access to funds, as in the project “Protected Areas from the Amazon (ARPA)”.
Non-involvement and empowerment of the community maintaining the current lack of technical capacity in managing the project and financial resources, and inadequate governance.	There will be significant and constant investment in training activities in management and finance to internally strengthen the governance of the area and capacity the community. In addition, community committees will be installed in pursuit of sharing the responsibilities in areas of common interest, focusing on women and youth. Meetings are expected to gather feedback about the project, which aims to make adaptive management in line with the results of monitoring. Asmorex will be monitoring by Management Board in the management of financial resources from the sale of

Risk	Mitigation
	GHG credits, which provide credibility and confidence in the institution in pursuit of transparency and equitable sharing of benefits.
Non-involvement of public institutions responsible for monitoring.	These instances are present in the Management Board, which seek to organize and bring the demands by making the connection between the parties involved in the project. It is possible that CDREX, is unique to Resex Rio Preto-Jacundá, which would facilitate dialogue and decision-making.

2.4. Project Financing

The initial activities of Resex Rio Preto-Jacundá REDD+ Project developed between 2012 and 2015 were financed with private investment from Biofílica. Annual investments with resources from Biofílica are expected from the first generation of credits, aiming the costs of subsequent checks and monitoring of deforestation.

To ensure the remaining activities and the generation of positive net impacts on climate, community and biodiversity, the financing will be made through the sale of carbon credits in the voluntary marketing, avoiding the emission of 3,306,521 t CO2 in the first 10 years of the project and a total of 11,051,209 t CO2 until 2042. Thus, the total amount of credits allocated to Asmorex will be invested in project activities and in the Community Life Plan. With verified credits, it will be possible to keep the financial flow that supports the activities proposed and that provides sustainability to those in progress.

In addition, the financial mechanism for the allocation of benefits chosen was the Resex Rio Preto-Jacundá Fund, which will host the resource from the sale of carbon credits. In every verification, expected to be carried out every two years, annual implementation plans will be carried out with the community, led by the Steering Committee. In such plans, there will be the prioritization of activities according to the financial resources known to be available.

The budget provisioned with the activities and the inflow of funds from the sale of carbon credits are available as “commercially sensitive information” to auditors.

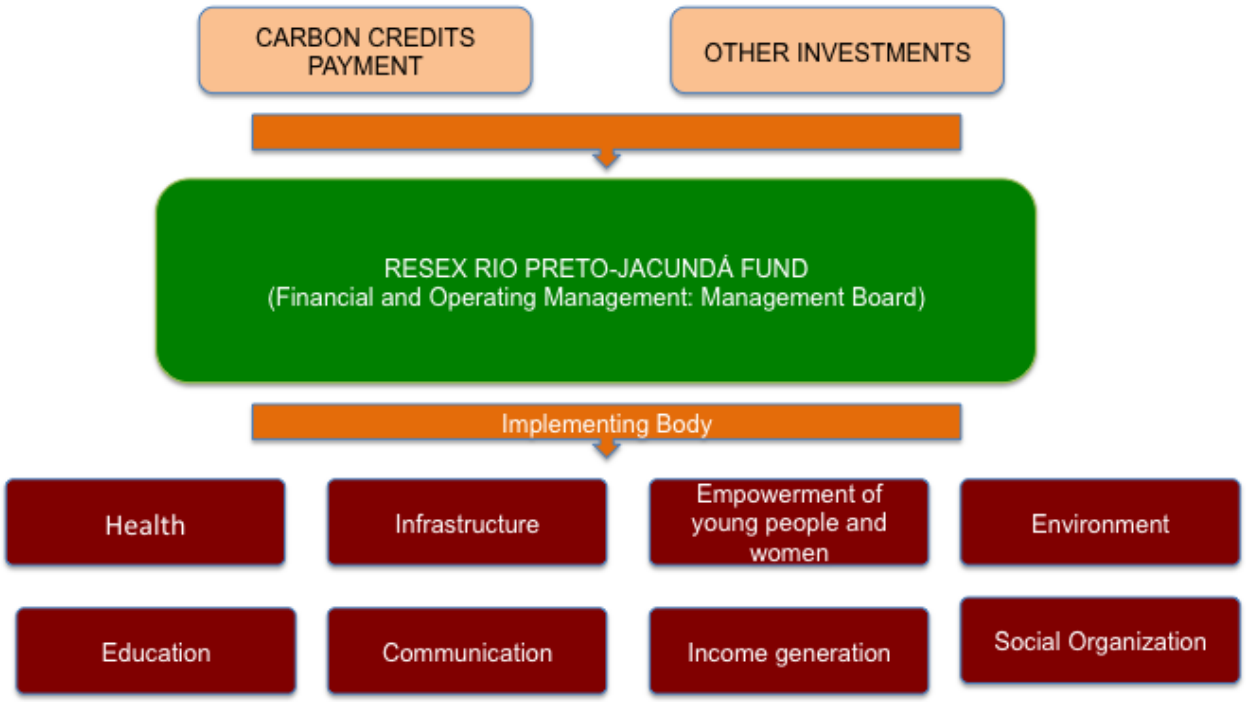


Figure 11. Structure of the Fund of Resex Rio Preto-Jacundá

2.5. Employment Opportunities and Worker Safety

2.5.1 Training of workers in the project

Among the activities listed in Table 5, many are intended for training of RRPJ aimed at the creation or improvement of skills in relation to the extractive and riverside way of life and governance of the area.

According to the community demand, special attention will be given to women and youth, being a public with great potential for development in the community, and yet, little representative in positions of direction and management in Asmorex and Cooperex.

For carrying out such training, the implementing institutions may hold partnerships with expert organizations in the fields, and a schedule of training sessions will be held seeking to meet all these front in the first design verification period, keeping updates and bringing new participants annually.

O delineamento dos treinamentos será realizado nas seguintes frentes:

- Human capital: the issues related to health and basic education will have the investments in specific training, such as family planning, health workers training and microscopist to detect malaria. Many adults are illiterate or have limited training in basic education, and it is also a focal problem to be worked on the project through education aimed at young people and adults. Still in warranty rights,

residents engaged in activities in the timber and non-timber forest management will undergo training on health and safety at work, aiming at improving the quality of life and reducing accidents.

- Share capital: training and capacity building focused on leadership training and management with emphasis on women and young people, currently under-represented groups in leadership positions in associations and cooperatives. Board members of Asmorex and Cooperex will feature training workshops in management and finance and can apply this knowledge in the common good of the management and the empowerment of Governance of Resex.
- Financial Capital: are listed the skills related to income generation, as operation and pulp agribusiness management, production and sanitary conditions of manioc flour and extractive products, training in carpentry and rural technical assistance geared to clearings made in family plots by stimulating entrepreneurship.
- Natural capital: the axis "environment" has a number of demands regarding the allocation and utilization of waste and agroecology. In addition, the institution responsible for monitoring biodiversity provide a specific training to residents in order to have a team in place empowered and involved in the process.

2.5.2. Equal employment opportunities

The implementing agencies have among its principles the non-discrimination of any kind. However, it is clear that some issues related to the representation of groups end up finding the reproduction of outdated models of society and that such changes are induced gradually. For this reason, women and young people will have different opportunities that will foster gender equality in the long-term in the community and the maintenance of young people who both yearn for opportunities that link the modern and the traditional in that territory.

Such changes will begin by specific training to these groups, starting with the training in management and leadership skills. Parallel to this, there is an urgent need to disseminate basic education among adults and young people, especially women who have historically had fewer opportunities to attend school, and therefore feel unsafe to occupy positions in the Association, for example.

So far, the residents of Resex had the opportunity to participate in three major studies that make up this document: the diagnosis of fauna, the socioencomic study and estimating carbon stocks. Contributed thus with the activities and field of expertise.

2.5.3. Laws and regulations applicable to the project

Legislation and Federal regulation

- Decree-Law n5, 452, from 05/01/1943: Approves the Consolidation of Labor Laws.

- Law 6,514, from 12/22/1977: Amends Chapter V of Title II of the Consolidation of Labor Laws on safety and occupational medicine and other measures.

International Agreements Ratified by Brazil

- Convention of the International Labor Organization No. 29 of 1930, ratified by Brazil in 04/25/1957: Disposes on the abolition of forced labor.
- Convention of the International Labor Organization No. 87 of 1940: Provides for freedom of association.
- Convention of the International Labor Organization No. 97 of 1949, ratified by Brazil on June 18th, 1965: provides on migrant workers.
- Convention of the International Labor Organization No. 98 of 1949, ratified by Brazil on November 18th, 1952: provides on the right to organize and collective negotiation.
- Convention of the International Labor Organization No. 100 of 1951, ratified by Brazil on April, 25th of 1957: provides for equal pay for men and women.
- Convention of the International Labor Organization No105, ratified by Brazil on June 18th, 1965: provides for the abolition of forced labor.
- Convention of the International Labor Organization No 111 of 1958, ratified by Brazil on March 1st of 1965: provides for discrimination in respect of employment and occupation.
- Convention of the International Labor Organization No 131 of 1970, ratified by Brazil on May 4th, 1983: provides for the fixing of the minimum wage, especially in developing countries.
- Convention of the International Labor Organization No 138 of 1973, ratified by Brazil on June 28th of 2001: Provides for the minimum age for admission.
- Convention of the International Labor Organization No 142 of 1975, ratified by Brazil on November 24th of 1981. It provides for the development of human resources.
- Convention of the International Labor Organization No 143 of 1975: provides for immigration made in abusive conditions and the promotion of equal opportunities for migrant workers.
- Convention of the International Labor Organization No 155 de 1981, ratified by Brazil on May 18th, 1992: provide for health and security of workers.
- Convention of the International Labor Organization No 169 de 1989, ratified by Brazil on July 25th of 2002. Provides on indigenous and tribal rights.
- Convention of the International Labor Organization No 182, ratified by Brazil on February 2nd of 2000: It provides for the prohibition of the worst forms of child labor and immediate action for their elimination.

2.5.4. Security risks of the project worker

According to Nogueira et al. (2010), forest activities along with agriculture and hunting have highlighted in the generation of accidents in the Amazon. Currently the potential risks and actual forestry activities carried out by the residents have not been identified, so there is low level of knowledge about such risks, and the activities are conducted in a traditional manner.

Based on the proposed project activities the main occupations and situations that can lead to exposure to health and safety risks would be agroextractive activities, technical extension and forest management.

According to Goes (2013) there are few studies aimed at measuring and mitigating risks to workers' health in family farming by several factors, and fewer studies are still focused on the health and safety of the agroextractive community. Based on studies of Goes (2013) and making an extrapolation for agroextractive activities in RESEX Rio Preto-Jacundá it can be considered that the main occupational risks are linked to chemical, physical, biological and ergonomic risks. These risks are also applicable to field workers who may work in project activities in workshops, field days and other activities.

- chemical risks: are related to the use of possible chemical products such as fertilizers and herbicides, although the use of this type of product is not yet observed among residents of RESEX with improvement activities and intensification of agriculture through technical assistance and rural extension.
- physical risks: are connected to the energy flux, such as noise, vibration, high temperatures and radiation.
- biological hazards are life forms or products derived from animals' substances such as insects, pollens, viruses, bacteria, fungi, protozoa, and poisons the animals, the last risk is very present in the Amazon region.
- ergonomic risks: are linked to inappropriate posture during the execution of tasks, improper securities, inappropriate or excessive working hours, storage products and equipment unsafely and improperly and other unsafe or incorrect actions.

The Non-Timber Forest Products Management Guide (Machado, 2008) states that the main variable to ensure the safety of people in these activities is the use of personal protective equipment (PPE) for all activities, but especially those involving collections. And that all concerned should receive appropriate training and be provided with all appropriate equipment in good repair. Basic equipment for individual protection highlighted by Machado (2008) in extractive activities in the Amazon are suitable boots with leggings and helmets, and the presence of a first aid kit suitable and prepared to deal with physical and biological injuries.

Both risks and the preventive measures and mitigation necessary to carry out the activities will be communicated before the start of project specific activities (eg, workshops) and through specific workshops

focused on the subject as described in section 2.2. and 2.5.1. Risks related activities and protocols can be built in the community in order to minimize the risks more effectively and efficiently and introduce accident prevention culture in productive activities.

About work safety in sustainable forest management timber activities, which presents various risks depending on the stage of the operation (Nogueira et al, 2010), the community will be trained within the training scope of activities for management techniques to gradually develop the technical capacity and culture requiring the management of operator compliance with the rules and safety.

2.6. Stakeholders

2.6.1. Identification of actors

The identification of actors is premised on the distinction between those living within the project area and those living outside, but that some relate to Resex Rio Preto-Jacundá and hence the project.

The actors directly affected are the residents of RRPJ divided, at this time, in three main locations: Cabeça-de-boi, Jatuarana and Jatobá. It is common for residents to identify the three areas as " placement " Cabeça-de-boi and Jatuarana are in the land division of Resex (no wetlands), identify themselves as rubber tappers but currently has strong influence of the activities of forest management timber and direct road access to the city infrastructure and communication which consequently causes a certain centralization in decision-making and community infrastructure. The Jatobá community, on the other hand, is characterized by a riverside culture (the banks of the Rio Machado) fishing and production of cassava flour, more distanced the activities of timber forest management

Table 8. Distribution of the population between the sectors Riverside (Jatobá) and Mainland (Cabeça-de-boi e Jatuarana)

Gender	Riverside Sector	Mainland Sector
Male	22	42
Female	25	41
Total	47	83
	130	

Residents are formally represented by Asmorex (neighborhood association) and in, commercial matters, since 2013 by the Cooperex (cooperative), which have separate boards. The REDD + Project respects the existing structure of governance Resex linked to greater empowerment of all the groups in the territory (see planned activities in the project). Members of the Asmorex board are elected by the General Assembly with all voting residents every three years.

The Sedam (Secretary of State for Environmental Development) is the environmental agency of the state of Rondônia and manager of UC, and allow forest management in the area. The department responsible for protected areas within the Sedam is the CUC (Coordination of Protected Areas).

Resex also has, in the its governance system, a Governing Council (CDREX), whose function is to decide on the social, economic, political and environmental interests of the reserves and their communities and to establish guidelines for developing programs, plans and projects directed to the reserve. These are part of CDREX:

- State Department of Environmental Development (SEDAM);
- Technical Assistance and Rural Extension Association of Rondônia (EMATER);
- Association of Rubber Tappers Extractive do Anari Valley (Asva);
- Association of Rubber Tappers of Machadinho (ASM);
- Association of Residents of Maracatiara Reservation (ASMOREMA);
- Association of Residents of the Extractive Reserve Rio Preto- Jacundá and Bordering the Rio Machado (ASMOREX);
- Organization of Rubber Tappers of Rondônia (OSR);
- Municipality of Machadinho;
- Municipality of Anari Valley;
- Representatives of the local community;
- National Institute of Colonization and Agrarian Reform (INCRA).

The Study Center of Culture and the Environment of the Amazon - CES Rioterra is one of the central actors from the beginning of the project, maintaining its mission to harness conservation to an improvement in the quality of life of local communities. In the project, it coordinated the local diagnostic and provided advice to Asmorex.

In academia, the Federal University of Rondônia (UNIR) with teachers of the Department of Geography, conducted studies on the socio-economic area and actively participated in all the workshops of drawing up the project.

A private actor very active in the project area is the Woodshopping company, current operator of timber forest management in Resex, possessing agreement signed with Cooperex for production and sale of wood. Currently the company is considered by the locals its main trading partner.

Surrounding the Resex, there are three main communities that have close relationship with the residents of extractive reserves, them being Estrela Azul (120 families), 2 de Novembro (9 families) and Tabajara (80 families). The first has easier access to communities in the mainland, and the last two with the riverine community. Relations happen mainly by small businesses, schools and means of access.

Table 9. Relative influence and interest of the project's key players

Actor	Project Interest	Influence	Importance
Mainland Communities (Cabeça-de-boi and Jatuarana)	Forest conservation combined with social and economic development of the population	High. It has the power to make project interventions be successful or not.	Critical. They are the project proponents and implementers of activities.
Riverside Community (Jatobá)	Forest conservation combined with social and economic development of the population	High. It has the power to make project interventions be successful or not.	Critical. They are the project proponents and implementers of activities.
SEDAM	Participate in decision-making processes of land management and planning and execution of activities	High. Project activities rely on their agreement and support.	Significant. Manager of the area and formulator of policy.
CDREX	Collaborate in land management and participate in the implementation of project activities, safeguarding the proper use and occupation of the territory	High. Project activities rely on their agreement and support.	Significant. Manager of the area in partnership with Asmorex.
CES Rioterra	Coordinate the implementation of project activities and provide technical advice to Asmorex	High. Facilitator and implementer of project activities, influencing the institutional relations of the project.	Significant. Performer of activities plays a key role in achieving the objectives.
UNIR	Monitor the project and monitor the social and environmental aspects of its implementation	Moderate. Put an academic insight into the project interventions.	Moderate. Can provide useful data about monitoring project impact.
Woodshopping	Keep its timber forest management activities in Resex	Moderate. Does not directly participate in the decision making process but influences the quality of forest cover	Moderate. May prove to be a more active partner in the project.
Surrounding Communities (2 de Novembro, Tabajara and Estrela Azul)	Have no direct interest in the project. Continuity of relationships with the inhabitants of Resex	Low. Does not participate in decision-making processes and project activities.	Low. Does not directly participate in project activities.

2.6.2. Engagement structure and decision-making

From the Prior, Free and Informed consent to the moment of preparation of the activities and public consultation, the critical stakeholders in the Project have been widely and closely involved. It is fair to say that the involvement of Resex residents has been increasing over time, with great engagement efforts been needed, natural fact since the REDD+ and its concepts are complex issues and require a period of adjustment of all stakeholders.

Local engagement is done by Asmorex, which in its turn, performs the communication with other residents and government actors. Residents of the Community Jatobá, who live in the coastal sector also actively participate, however, they need more logistics in relation to upland communities, as the community center is in this sector and Project meetings remained there, keeping the local custom. The agendas are prepared jointly by Asmorex, Biofílica and Rioterra CES, which has a local team in the municipality of Machadinho d'Oeste.

The steps leading up to the signing of the contract to initiate the Project are detailed in item 3.2 Evidence of Right of Use. After this time, the project construction workshops were intensely participatory relying on community members, CDREX, SEDAM and UNIR, which printed its own characteristics to the Project, such as the creation of the Steering Committee and the activities to be benefited from the sale of credits, for example. These moments were also of constant clarification and provision of information relying, as possible, with a facilitator who led the workshops in an appropriate and accessible language.

I Workshop: REDD+ Resex Rio Preto-Jacundá Project

Date: 12 and 13 of September of 2013

Local: Community Jatuarana

Objective: start and engagement strategy of extractive and Riverside people in the conception of the REDD + Project.

II Workshop: Zoning and Plano f Use in Resex Rio Preto-Jacundá

Date: 21 and 22 of February of 2014

Local: Community Jatuarana

Objective: Build in a participatory way the Zoning and the use Plan of Resex Rio Preto-Jacundá.

Gathered in four working groups, participants were encouraged to draw up the map of Resex Rio Preto- Jacundá through memory and experiences of the community.

This workshop can be cited as a highlight of its results encouraged the discovery of potential attributes of high conservation value (HCVs), best described in section 6.1.2 of this document, and the Multiple Use Management Plan in preparation RESEX by SEDAM. This latter aims to regulate and guide the development of different activities aimed RESEX the economic well-being, social and cultural life of its residents.

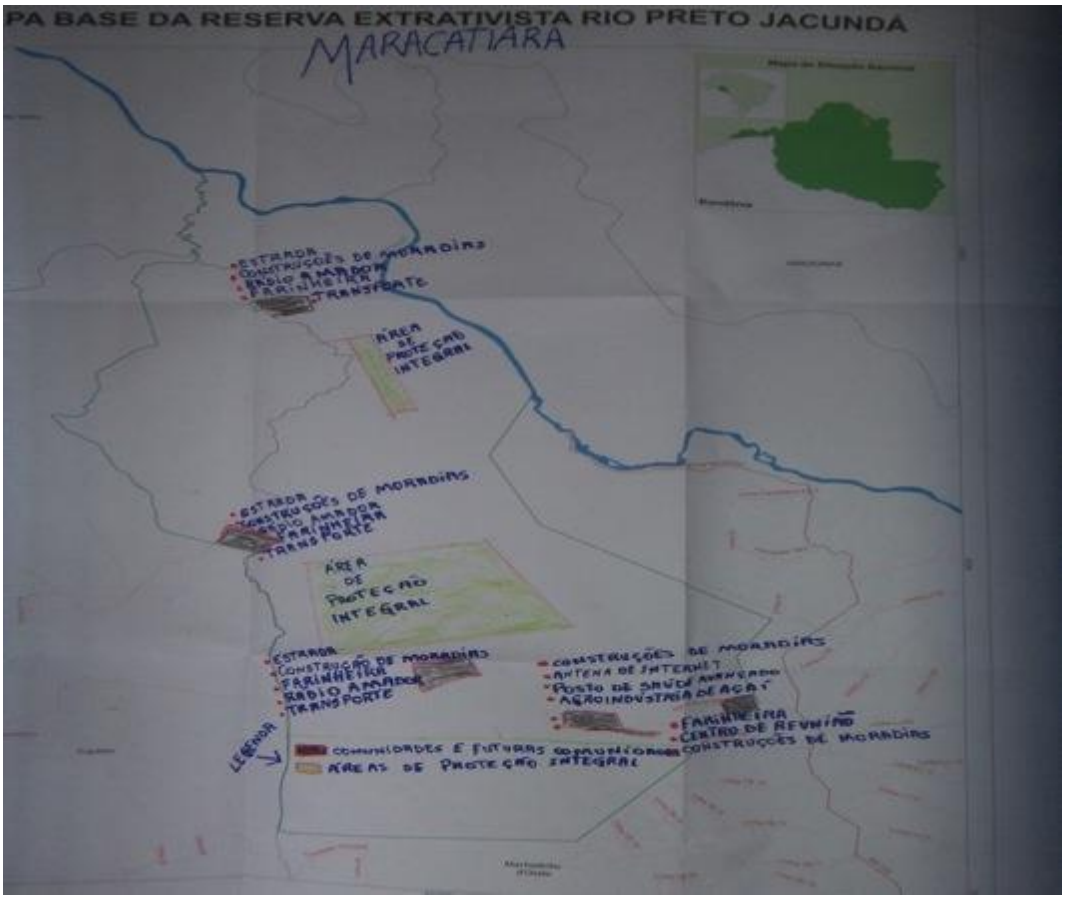


Figure 12. Photographic record of workshop II: zoning

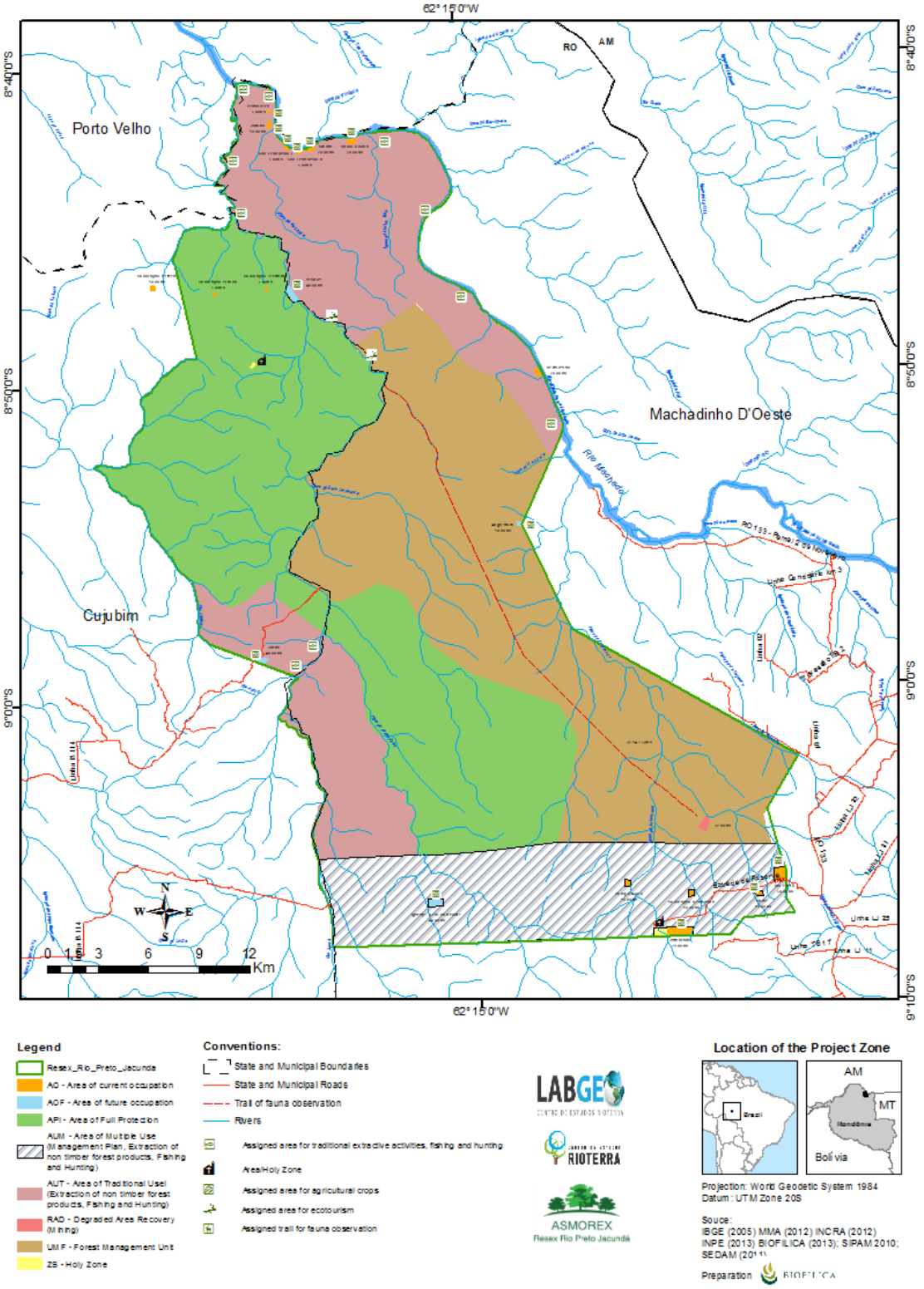


Figure 13. Participatory Zoning Resex RPJ

Workshop III: Construction of Life Plano f residents of Resex Rio Preto-Jacundá

Date: 20, 21 and 22 of march of 2014

Local: Community Cabeça-de-Boi

Objective: To collectively build the Life Plan of the residents of Resex Rio Preto- Jacundá from the local situation analysis and the definition of beliefs, values and principles to guide the development of a work plan that responds to community needs and aspirations.

Participants were divided into four groups for the preparation of the strengths, weaknesses, threats and opportunities of Resex Rio Preto- Jacundá. The most frequent results were as follows:

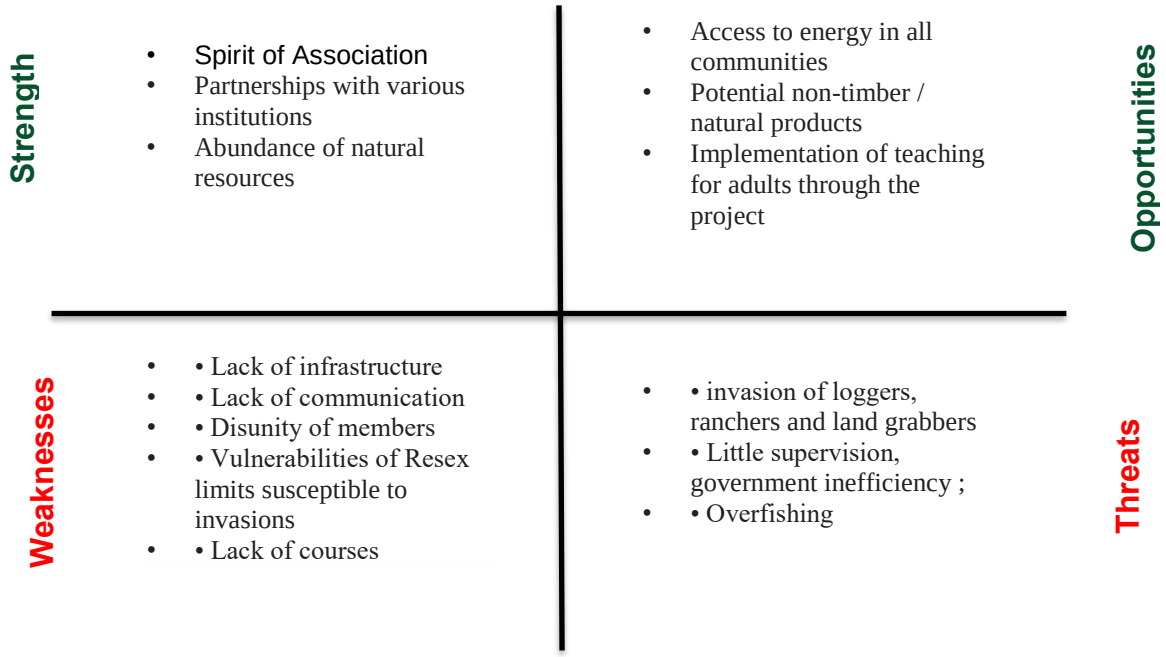


Figure 14. SWOT analysis performed by the residents of Resex Rio Preto-Jacundá

IV Workshop: Building of Distribution Mechanism and Conflict Resolution

Date: 22, 23 and 24 of May of 2014

Local: Community Cabeça-de-Boi

Objective: To build, in a participatory way, distribution mechanisms of benefits and the instances of fund management of conflict solutions in Extractive Reserve Rio Preto-Jacundá from the dialogue with the locals, exhibitions and group work to make cohesive, community and clear the decision-making processes relating to the sharing of the benefits of REDD + Project.

The final decision process took place with the presentation of systematized texts by the facilitator from all the contributions made by residents in the working groups on the previous day, followed by considerations and clarifications made by the Community and the vote to approve the final text, as follows:

"Bring benefits to RESEX Rio Preto- Jacundá, guided by the principles of transparency, participation, planning, access to knowledge and respect for differences of gender, generation, ethnicity, thought and belief, from a collegiate management, aimed at implementing sustainable projects in the social, culture, environmental and economical areas."

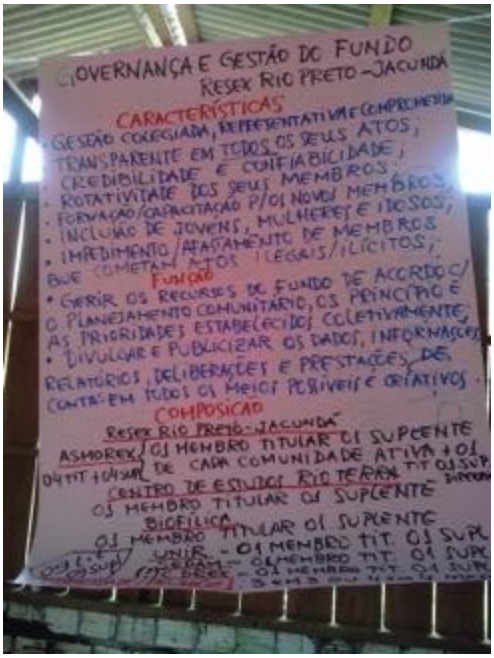


Figure 15. Photographic record of the IV Workshop: final results

V Workshop: Conceptual Understanding of Construction of the Project REDD +

Date: 25 and 26 of July of 2014

Local: Community Cabeça-de-Boi

Objective: Build as a community the understanding of the concepts of REDD+ project, its objectives, activities, partnerships and benefits for RESEX Rio Preto-Jacundá, qualifying the participation of residents in all stages of the process.

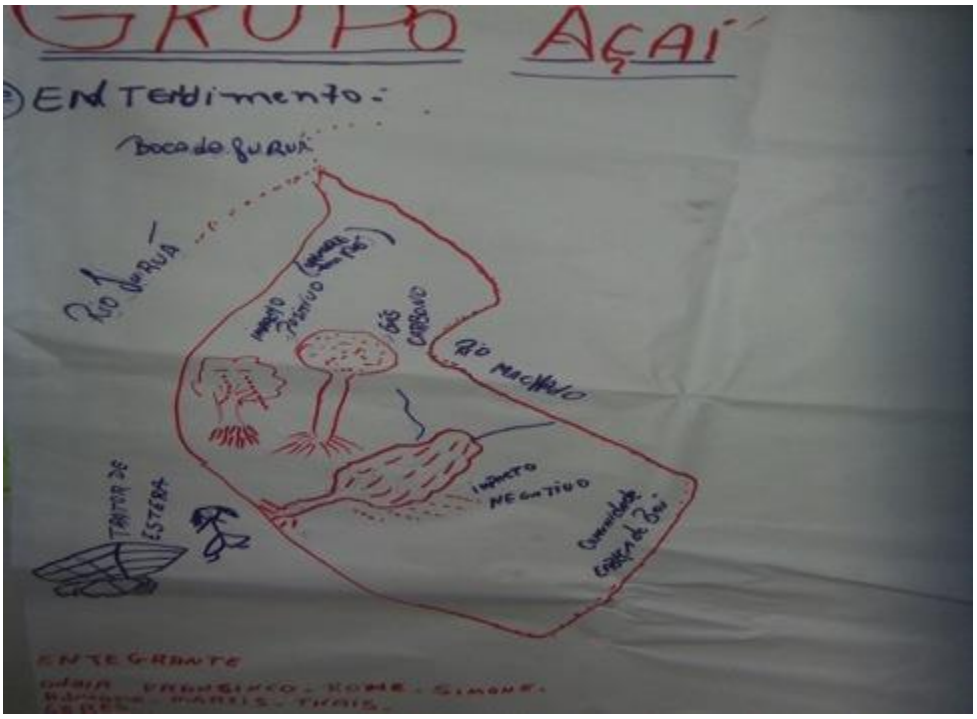


Figure 16. Photographic record of the V Workshop: Graphic understanding of one of the groups on REDD +

2.6.3. Consultation procedures and access to information

Access to project documentation

Printed copies of the original contract of the Project and the agreements that preceded it are in Asmorex headquarters and Cdrex in the city of Machadinho d'Oeste, and in CES Rioterra, in Porto Velho. Knowing the reading difficulties of some residents, in more than one workshop the contract items were exposed orally and as illustrative as possible, which will recur throughout the project.

Studies in Resex were presented orally at an appropriate workshop for the residents and the digital and full versions of these are available in Asmorex.

In addition to the workshops described in the previous section, meeting with only the community representatives were part of the process. The ordinary and extraordinary meetings of Cdrex were also important moments of alignment and contribution to the project, since it is a space that brings together various actors.

The Project Design Description and the monitoring report will be presented at appropriate time in the community space of the community Cabeça-de-Boi, between its end and the beginning of the audit, in order to validate their contents according to the processes of participatory construction of the

project, using the methodology applied in previous workshops considering the use of affordable and applicable language that meets local realities.

The other project actors will also participate in a pre-consultation at a regular meeting of Cdrex, in mid-August 2015, where the content of the reports will be presented, such as potentially generated carbon credits and status of activities, and there will be gathering suggesting if there is any. At that moment will also be formalized public consultation channels and probable date of arrival of independent auditors.

Public consultation process

After full completion of the Document of Project Description and Monitoring Report VCS 2013/2014, they will be available at Biofílica website and of VCS and CCB standards. A printed and digital version of these documents will be sent to Asmorex, to CES Rioterra and to CDREX.

The brief of the design, containing at least the criteria of G1.1-9 do CCBS, the potential for carbon credit generation and the means for sending comments to public consultation, will be sent to the same actors and stakeholders of the project in digital format, including governmental actors and other working institutions in the project area.

Community representatives of each location, as chosen to join the Steering Committee, will each receive one printed copy of the project summary, as agreed in alignment meeting with proponents and stakeholders in December 2014. Thus, they will have the mission to share this document with residents of the community where they live in a specific reunion. These spaces for dialogue, which will be monitored by the local CES Rioterra team, are options to a general assembly because, according to the residents, smaller groups allow a deeper interaction and a greater consideration for different opinions.

Facilitating the process, comments were collected at community meeting orally when the present had the opportunity to explain the positive and negative aspects of REDD+, as many residents have difficulty writing and the current form of submission of comments on the consultation public in the CCB site, in English, impedes access for community and partner organizations in general. Still, residents and partners were encouraged to make comments at any time, as residents feel more comfortable. The transcript of comments to the CCB site can be done in two ways:

1 Directly in the urban headquarters of Asmorex containing a computer connected to the internet and where any residents may submit, or
2 Being passed on to the Rioterra team, which in turn will forward the comments in full on the CCB website.

2.6.4 Procedure of Complaint and Dispute Resolution

In appropriate workshop, the residents of Resex Rio Preto-Jacundá deliberated on the procedure for resolving disputes, which is in line with the traditional methods practiced, in which the space of the Asmorex Assemblies serve for dialogue and display of dissatisfaction and accountability. After the implementation of REDD+ activities, emerged the need for more defined bodies and mediation while maintaining aspects of local customs in dealing with this issue. Thus, the community has decided that:

"The community of Resex Rio Preto-Jacundá ruled that the resolution of conflicts that may occur in the future and are related to REDD + Project must be mediated and settled first in the space of the community that gave rise to the situation. If the conflict is not resolved and overcome in the community, it shall be submitted to mediation and resolution of the Steering Committee of the Fund."

Continuously, the representatives chosen in each community members of the Steering Committee shall include the function of gathering complaints and or suggestions about the project and its activities, which does not relieve the other residents of contacting the channel with the Implementing Instance of the project directly. The information received must be documented, preferably in writing and brought to the Implementing Instance of the Project (Asmorex, CES Rioterra e Biofílica), by e-mail, telephone or in person, where it will be analyzed and have the appropriate response, also formally documented.

If it is not possible to find a solution in this first instance, the next step will be to take the complaint to the plenary session of the Steering Committee, which will also formally document the resolutions found. The records related to feedback processes and conflict resolution should be filed in the office of the member of the implementation bodies and will be available for review at any time.

The replies to feedback and complaints must be written, but also transmitted verbally. Demands for explanations and clarifications may have only written response. On the other hand, problems, critics and protests will face clarification, as well as written.

Regarding the time to reply from the receipt in the first instance:

- Information and clarification of doubts about processes, activities, impacts and roles will be answered within 5 working days.
- Complaints about coordination and implementing bodies, operation, planning and implementation of activities will be addresses within 7 working days;
- Complaints about the distribution of benefits and allocation of resources will be addressed within 15 working days and must pass through the Steering Committee of the Project;
- Land conflicts between families and/or communities within the area of design or impact on external actors will be first addressed to implementing instance within 30 working days;

- In cases of whistleblowing and misappropriation, they will be addressed to the Management Board obligatorily, where they will compile statistics facts and seek response within 45 days.

It is possible that in more extreme cases, the pendency has to be referred to an appropriate arbitration chamber or to the competent courts of their jurisdiction.

In addition, among the project activities (Table 5), every 6 months a general meeting with the community will be held for the following purposes:

- To collect feedbacks and suggestions for the project;
- To measure satisfaction of residents in relation to the project;
- To disseminate project documents, such as monitoring deforestation reports;
- To conduct joint adaptive management with all the locals and the Steering Committee in the long run.

One has to determine whether these semiannual meetings shall be separated by community or not, but the mediation of CES Rioterra in these spaces is certain.

2.7. Commercially Sensitive Information

The information below is considered commercially sensitive and will be bade available only to the validators/verifiers being threated confidentially and are not publicly available.

- Project budget;
- Financial projections;
- Financial statements of Cooperex and Asmorex;
- Financial statements of Biofílica;
- Agreements and contracts between the parties involved.

3 LEGAL STATUS

3.1. Compliance with Laws, Statutes, Property Rights and Other Regulatory Frameworks

The purpose of Resex Rio Preto-Jacundá REDD+ Project complies with the Constitution, with the objectives of ILO Convention 169 and Law 9985 (SNUC), as well as the National Climate Change Regime (Law 12,187). More information can be found in the "Legal Opinion on promotion of the sustainability of extractive community "Reserva Extrativista Rio Preto-Jacundá", made available to the audit team.

The Resex, constituted by State Decree 7336, of January 17 of 1996, does not have a Plan of Management of Multiple Use to date, having as current guide a Use Plan prepared in 2001, which defines the likely activities to be carried out with focus on traditional collection systems and extraction, and prohibitions and restrictions in the area of Resex, pointing up some conditions for it. Such manual is outdated and barely meets the community's desires.

The Plan of Management of Multiple Use will be prepared soon with resources from the Program of Protected Areas of the Amazon (ARPA), coordinated by the Ministry of Environment and run financially by FUNBIO, which is currently in the planning of the initial activities and will have as support the materials and studies prepared for REDD+ Project.

In mid-2014, the Rondônia state government expressed its formal support to REDD+ project to the extractive community and highlighted the inclusion of the reductions of emissions of the project in the future accounting of the state, adopting mechanisms to avoid double counting.

3.1.1. Extractive Reserves and Local Communities

The Extractive Reserves (Resex) are territorial spaces destined to sustainable use and conservation of renewable natural resources and aim the balance between ecological interests of environmental conservation and social interests of improving the life of local population. They are areas used by traditional extractive populations, whose livelihood is based on the extraction and, in addition, in subsistence agriculture and the creation of small animals. Its objectives are to protect the culture and livelihoods of these people and ensure the sustainable use of natural resources of the unit.

The establishment of traditional populations is one of the benefits of creating these reservations, as will ensure the sustenance of extractive people, through the management of natural resources, besides the economic growth, ensuring the right to citizenships and discouraging evasion to major centers.

The works of community development, made compatible with environmental and cultural preservation, when the environmental public policy instrument is properly used, applied in such protected areas, ensuring the maintenance of a healthy environment and the livelihood of future generations, going far beyond environmental protection, leading to empowerment.

Local communities are defined in various standards, among them the Decree of the State of Rondônia n. 1,144, of September 12 of 2001, which provides for the State System of Protected Areas of Nature of Rondônia - SEUC/RO, Law n. 11,284, of March 2nd of 2006, which provides for the Management of Public Forests, and the Decree n. 6,040 of February 7 of 2007, which institute the National Policy of Sustainable Development of Peoples and Traditional Communities. The definition that is presented as more complete and up to date is brought by article 3rd, item I, of Decree n. 6,040 of 2007, as follows:

> I - Traditional People and Communities: culturally differentiated groups and who recognize themselves as such, which have their own forms of social organization, which occupy and use territories and natural resources as a condition for their cultural, social, religious, ancestral and economical reproduction, using knowledge, innovations and practices generated and transmitted by tradition;

Convention n. 169 of the International Labor Organization (ILO) concerning Indigenous and Tribal Peoples, adopted in Geneva on June 27, 1989 and approved by the National Congress through Legislative Decree N. 143 of June 20,2002, was enacted by Decree n. 5051 of April 19, 2004, incorporating the Brazilian national law, valid as ordinary law.

The article 1 of the Convention n. 169 of ILO convening Indigenous and Tribal Peoples determines its application to all peoples *"whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations",* and establishes as fundamental criteria for determining these people a sense of their identity, that is, self-recognition. The definition and the self-recognition criteria imply the application of the Convention's rules to local communities, residents or not of extractive reserves.

3.1.2. Applicable Federal Legislation

- Protected Areas - **Law n 9,985, of July 18, 2000**, which established the National System of Conservation Areas (SNUC);
- Traditional Territories - **Decree n. 6,040, 2007 -** “the necessary spaces to culture, social and economic reproduction of the peoples and communities, whether used permanently or temporarily, observed, with regard to indigenous and quilombolas peoples, respectively, the provisions of articles 231 of the Constitution and 68 of the Temporary Constitutional Provisions and other regulations";

- Sustainable Forest Management - **Law n. 11,284, of 2006** - “management of the forest for achieving economic, social and environmental benefits, respecting the support mechanisms of the ecosystem object of the management and considering, cumulatively or alternatively, the use of multiple timber species, multiple non-timber products and the use of other goods and services of forest nature";
- Extraction and sustainable use - **Law n. 9,985, of 2000**;
- Protection of flora, fauna - **Decree n. 58.054, of 1966** - Promulgates the Convention for protection of flora, fauna and the scenic beauty of American countries.

3.1.3 Applicable State laws

- **Decree-Law n. 1,144, of 2002**, which provides for the State System of Protected Areas of Nature of Rondônia - SEUC/RO and other measures;
- **State Decree n. 7,336, of 1996** – creation of the Extractive Reserve Rio Preto-Jacundá;
- **State Decree n. 11,016, of 2004**, creates the Executive Board of the Extractive Reserve of Machadinho D’Oeste and Anari Valley.

3.1.4. The Law of Public Forest Management and the allocation to local communities

Law n. 11,284, of March 2, 2006, provides for the management of public forests for sustainable production and provides, between two others: *the allocation of public forests to local communities, in accordance with article 6 of this Law*.

The principles of public forest management, as specified in article 2nd of Law n. 11,284, 2006, are achieved through the promotion of forest conversation located inside the Resex Rio Preto-Jacundá, especially regarding the following:

- Respect for the right of the population, especially the local communities, of access to public forests and the benefits arising from their use and conservation;
- Promoting knowledge and the promotion of public awareness about the importance of conservation, recovery and sustainable management of forest resources;
- Ensuring stable and secure conditions that encourage long-term investment in the management, conservation and restoration of forests.

Thus, the sale of carbon credits generated on the basis of activities performed in the Extractive Reserve Rio Preto-Jacundá is fully in line with the Law n. 11,284, 2006.

3.2. Evidence of Right of Use

3.2.1. Freedom of choice of Local Communities

The article 18 of Law 9,985 of 2000, states that the livelihoods of traditional extractive populations is based on the extraction and in addition, in subsistence agriculture and the creation of small animals, and that the commercial exploitation of timber resources will only be permitted in sustainable basis and in special situations and complementary to other activities developed in the extractive reserve (§ 7º), mentioning nothing about the environmental services.

However, free enterprise, as foundation of Brazilian economy, is the freedom of enterprise in which is for the extractive communities to opt for the development of economic activities, which suits them, subject to the constitutional and legal limits imposed on them, particularly those relating to the environment and protected areas.

In this vein, any intervention in the context of extractive reserves, whether economic or environmental, cannot fail to involve the participation of the local community, especially when it affects, directly or indirectly, their way of life. Individually, the extractive people inhabiting the Extractive Reserves are the holders of rights to use the resources and environmental services. Thus, in the process of definition, implementation and execution of any acts of intervention, there must be community integration as a mean of strengthening participatory democracy and giving legitimacy to the decisions taken.

The free choice and the prior and informed consultation of the extractive people is a point also extensively covered in the Convention 169 of ILO concerning Indigenous and Tribal Peoples. In this sense, it is forbidden to private sector and the state, although the latter is the founder of protected areas and holders of the lands, which are in the public domain, to impose the means to be used for the maintenance and improvement of living conditions of populations residents within those lands. This is what appears from the literalness of Articles 7 and 8 of the Convention 169 concerning Indigenous and Tribal Peoples.

The respect for interests of community, to the participation and traditional livelihoods refers to the implementation of other transnational device: Convention on Biological Diversity - CDB1, which provides that each contracting party (signatory countries) should:

> j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices; (art. 8)

Thus, it is highlighted that it is not for others, the imposition, limitation or decision regarding the economic activities to be developed in extractive reserves, being imperative for any initiative that affects

the livelihoods of such communities to prior and informed consultation, observing their right to free enterprise and participation.

3.2.2. Process for Prior, Free and Informed Consent

The prior and informed consultation of the extractive people is treated both under international law, the Convention 169 of the ILO on Indigenous and Tribal Peoples, as in Brazilian Law, n. 9.985, of July 18 of 2000, which instituted the National System of Protected Areas (SNUC).

Is sought, in this way, a process of knowledge generation and demonstration about the project, from a transparent and independent process, seeking to reveal the real interest of the residents of Resex.

From the expressions of interest of Asmorex who voluntarily sought Biofílica, with the intermediation of CES Rioterra, several meetings to understanding and transfer of information about REDD + projects were made previously to the signing of the partnership agreement, with the first meeting with the entire community being held in September 2011. At the time, there was initial exposure about Biofílica and what a REDD + project would be (carbon in facilitating language).

Since then, Asmorex, backed by Cdrex and with the mediation of CES Rioterra, gave reasonable notice to the subject among residents of Resex, seeking the understanding and possible acceptance of the project. It is true, however, that after the signature of the partnership agreement, the understanding of REDD + project aspects have improved significantly among the Community residents, a process in which the project was guided and constructed.

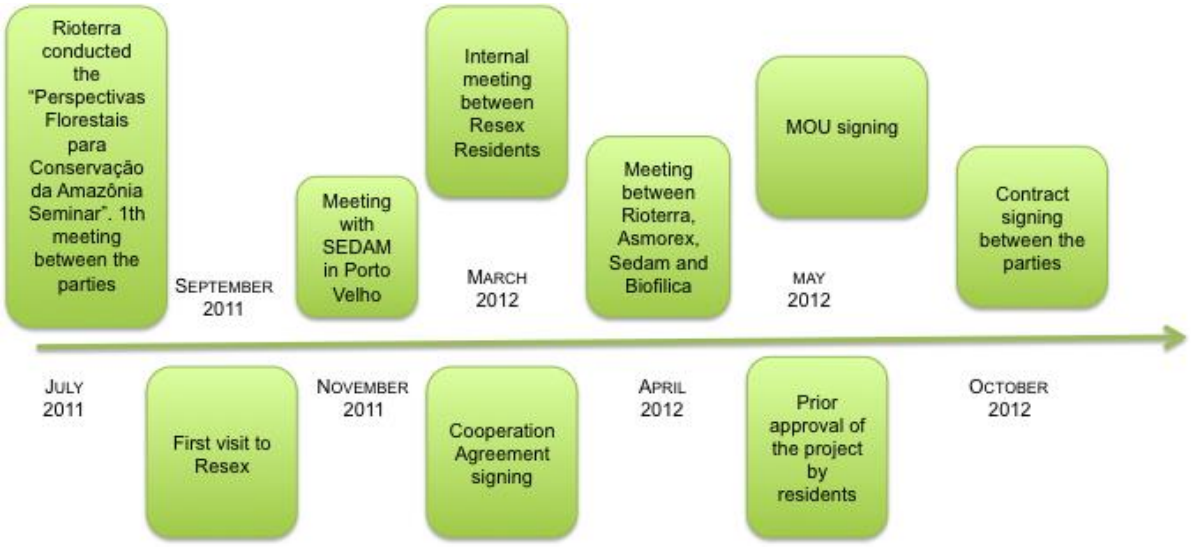


Figure 17. Timeline: steps leading up to formalize the partnership and consent of the actors involved.

A few moments prior to the contract signing were formalized by the following documents:

1 Cooperation agreement: aims to join efforts for the implementation of conservation and sustainable development actions in Resex Rio Preto-Jacundá;

2 Memorandum of understanding: aims to regulate the terms, the assumptions and conditions that will guide the development and implementation of the Carbon Project by the Parties;

3 On May 15, 2012, residents of Resex Rio Preto- Jacundá consented to participate in the partnership for the development of the carbon project in the area.

Subsequently, in October 2012, the contract between the parties was signed formalizing the partnership and regulating the various aspects of the project. After signing the contract, it was referred to the Public Ministry – Prosecution of Environment of the State of Rondônia, aiming to give maximum transparency to the process and inform the next steps.

3.2.3. The rights of local communities to the lands they inhabit

The rights to the lands they inhabit, guaranteed by the Convention 169 of the ILO, and by the SNUC Law, based on the Constitution, must be interpreted in conjunction with issues related to the fulfillment of the social function of property and dominion of the real estate that makes the Extractive Reserves. The allocation of the lands they traditionally inhabit by the extractive residents, gives them the right to practice activities aimed at sustainable development, including the sale of environmental services.

Individual and Collective Rights and Duties, provided in article 5 of the Constitution are the basis of the right to access to land of the local communities. The institution of Extractive Reserves seeks to contribute to the implementation of such rights, as well as the determination explicit in article 4 of the Convention 169 concerning Indigenous and Tribal Peoples, which states that "shall be adopted as appropriate for safeguarding the persons, institutions, property, labor, cultures and environment of the peoples concerned".

The institution and assignment of land use in sustainable use protected areas is highlighted as the dominion and possession on articles 14 and 15 of the Convention, as follows:

> Article 14
>
> 1. The rights of ownership and possession of the peoples concerned over the lands which they traditionally occupy shall be recognized. In addition, measures shall be taken in appropriate cases to safeguard the right of the peoples concerned to use lands not exclusively occupied by them, but to which they have traditionally had access for their subsistence and traditional activities. Particular attention shall be paid to the situation of nomadic peoples and shifting cultivators in this respect.
>
> 2. Governments shall take steps as necessary to identify the lands which the peoples concerned traditionally occupy, and to guarantee effective protection of their rights of ownership and possession.

> 3. Adequate procedures shall be established within the national legal system to resolve land claims by the peoples concerned.
>
> Article 15
>
> 1. The rights of the peoples concerned to the natural resources pertaining to their lands shall be specially safeguarded. These rights include the right of these peoples to participate in the use, management and conservation of these resources.

In relation to the land rights of extractive communities, Decree n. 6,040 of September 7, of 5007, which provides for the National Policy on Sustainable Development of Traditional Peoples and Communities (PNPCT) in article 3rd, establishes, among its objectives, to guarantee the traditional peoples and communities territories, and access to natural resources that traditionally use for their physical reproduction, cultural and economic.

The Property Law, except above and specified in article 5 of the Constitution, such as individual freedom, is limited by its social function. Such a limitation is imposed both to private owners and public. The Constitution dealt with the social function of the property as a fundamental right (item XXIII of article 5) as well as a fundamental principle of economic activity (Part III or article 170) to be fulfilled in urban and rural property (articles 182 and 184).

In the case of extractive reverses, social function will only be reached when the buildings that make up these protected areas are intended for sustainable development of the communities that inhabit them. In this sense, the fulfillment of the social function of land inserted in extractive reserves derives from its conception as a sustainable development tool for local communities.

The dominion of the extractive reserves is treated in article 18, § 1º, of Law n. 9,985, of 2000, it is provided that the Extractive Reserve is *"public domain, with use granted to traditional extractive populations pursuant to article 23 of this Act and in specific regulations, with the private areas included in its boundaries must be expropriated, according to what the law provides".*

The article 23 of said Law stipulates that the possession and use of the areas occupied by traditional populations in extractive reserves shall be governed by the contract, as it is disposed on the regulation of the Law. The management of extractive reserves for environmental purposes is also treated in article 23 of Law 9,9885 of 2000, in its § 1º, under which local communities "are obliged to participate in the preservation, restoration, protection and maintenance of the protected area." Similarly, its § 2, as well as prohibiting actions contrary to environmental conservation, states that the use of natural resources by local people obey the rules laid down in legislation, in the management plan of the protected area and in the contract of grant of right to real use.

Decree n. 4340 of August 22, 2002, which regulates Law n. 9,985 of 2000, but does not bring new or more information about the use of natural resources of the Extractive Reserves, and is restricted to establish, in its article 13, that the contract of concession of real use and the term of commitment

signed with traditional populations of the Extractive Reserves should be in accordance with the Management Plan.

The concession of use is a real right, which can be granted to local communities, in the following terms[3]:

> Is hereby established the concession of use of public or private land paid or free, for definite or indefinite period of time, as real resolvable right, for specific purposes of regularization of social interest, urbanization, industrialization, land cultivation, sustainable use of wetlands, preservation of traditional communities and their livelihoods or other forms of social interest in urban areas.

In the case of extractive reserves, it is an administrative contract for the transfer of ownership of the government, owner of the property to local communities, free of charge, limited to the use for which it was intended, with termination clauses for cases of (a) damage to the environment of (b) the transfer of the concession *inter* vivos.

As ownership[4], means the exercise, full or not, some of the powers of ownership, and such powers being use, enjoyment and disposition of the thing, linked to right to reclaim it from the power of anyone that unfairly has it (article 1228). In this sense, one can separate the dominion of the properties that compose the Extractive Reserves, which is public, of its use, which is guaranteed to local communities.

The term of the Agreement of Concession of Real Right of Use to be signed with the local community living in the Extractive Reserve was not regulated in the standard itself; which is why we must apply the term specified in similar standards.

In the case of the Resex Rio Preto-Jacundá, the Agreement of Concession of Real Right of Use has not been signing yet and its formalization is very important to the project implementation.

SEDAM, as governing body of the State Extractive Reserves, expressly recognizes the legitimacy of ASMOREX as a representative of the RESEX communities. Currently, its Management Plan is close completion according to statement issued on March 14, 2016 by CES Rioterra, responsible for their implementation, pursuant to the Agreement. 036/2015, signed by the Brazilian Biodiversity Fund - FUNBIO which provides its completion in June 2016. Once completed the Management Plan and considering that there is already a Plan of Use, it is expected that the completion of regularization of Real Contracts of Use for the community take place then. It is worth mentioning that the exploitation of environmental services and carbon have been widely discussed and are adequately covered in your text.

Regarding the dismissal of the Institute of Land Rondônia - ITERON in 2000 (Law No 882/2000), and the actual institution responsible for granting the concession contract of use, it is noteworthy that as certificate issued by National Institute of Colonization and Agrarian Reform - INCRA, in response to Official Letter No. 008/07/GAB/ASSEJUR/SEDAM of 16.05.2007, the Extractive Reserve Rio Preto

Jacundá created by Decree 7336/96, was using waived by the Federal Government, being assigned to the competence of SEDAM the right management of the lands that are part of that RESEX.

In addition, pursuant to Decree No. 8982 of January 31th, 2000 which *provides for the basic structure and the competencies of the State Environmental Development Secretariat - SEDAM,* it is responsible, among other things, *executing land policy* promoting discrimination of vacant land; implement land regularization projects and colonization, moreover, through the Conservation Unit Group (art.13): perform implementation activities, administration and management of protected areas.

Thus, as mentioned above, it is evident the SEDAM competence to hold the settlement of issues related to Resex Rio Preto Jacundá both environmental as land.

Both the rights of the community as the appropriate body to carry out its settlement are properly supported and safeguarded by law and only part of the formal procedures for its conclusion are pending.

3.2.4. Conflicts and disputes over land rights, territories and resources

In the territory of Resex Rio Preto-Jacundá there are two irregular occupations with extensive agricultural activity on the banks of Machado River, northeastern of territory, totaling approximately 23 hectares. Documents show that the prosecutor has acted in order to expedite action against the invaders, prompting the evacuation of the area in RESEX limits.

A land issue presented in Resex territory of RESEX are titles no indemnified so-called "Soldiers of rubber." The rubber soldiers were attracted to the region during II World War and after the decline of the rubber boom many remained in the old rubber fields. With the official policy of occupation and modernization of the Amazon from the 60s, the rubber soldiers were expelled from rubber fields, which were made available for official colonization projects. Later, after much claim, the rubber soldiers were recognized as "heroes of the country", and the settlement in rubber fields was part of the compensation policy aimed at this group, however, the area defined by INCRA had high incidence of malaria which caused the abandonment of the area and / or the sale of lots (Nobrega, 2008). According Planafloro data, these titles amount a total of 25,400 ha in Resex and are under the responsibility of the Rondônia state for regularization, because INCRA certificate the right of management of this area to Sedam.

It is up to project proponents closely monitor this fact and facilitate dialogue about land-regulating with the parties involved. The project has the support of the Rubber Tappers Organization of Rondônia (OSR), which advocates for the rubber soldiers and their descendant’s rights.

About potential conflicts, there are inconsistencies and lack of information regarding the distribution of net profits from the sale of timber management plan. Such financial resource shall be passed on to the families of Resex annually at the end of operation of the UPA cycle (annual production unit) by Cooperex. The rules for such distribution are not clear to the residents as well as the amount received against the cubic meter of wood sold. Investments by the Asmorex also cause community

questions since there is no agreement regarding the allocation of resources or prior consultations. There is a concern about the limited community involvement and participation in the association and cooperative issues, which are considered as provider of benefits.

3.3. Emissions Trading Programs and Other Binding Limits

Brazil is not part of Annex I of the Kyoto Protocol, so there is no national requirement to reduce emissions of greenhouse gases.

3.4. Participation under Other GHG Programs

The Resex Rio Preto-Jacundá REDD+ project was not and is not intended to be registered in other GHG programs in addition to the submission of project validation and verification standards in the Verified Carbon Standard (VCS) and Climate, Community and Biodiversity Standard (CCBS).

3.5. Other Forms of Environmental Credit

The Resex Rio Preto-Jacundá REDD+ project do not own or want to generate any other type of credit related to greenhouse gas emissions or removals indicated within the VCS program.

3.6. Projects Rejected by Other GHG Programs

The REDD+ Resex Rio Preto-Jacundá project has not been submitted to validation/verification formerly under any other GHG program and therefore, was not rejected by any other GHG program.

3.7. Respect for Rights and no Involuntary Relocation

The project does not aim involuntary relocation of families and communities. Formation of new communities are expected as activity of the project within Resex, this being a demand from the community itself even before the start of the REDD + project in the area.

3.8. Illegal Activities and Project Benefits

Illegal activities that occur in the project area are mainly illegal logging, invasions and overfishing by outsiders to communities.

The project aims precisely to strengthen the governance of extractive reserves, working against these illegal practices and engaging the community in search of a better quality of life and appreciation of the traditional way of life, obtained with forest products.

4 APPLICATION OF METHODOLOGY

4.1. Title and Reference of the Methodology

We use the Methodology for Avoided Unplanned Deforestation, VM0015 version 1.1, from December 3rd of 2012.

4.2. Applicability of Methodology

The VCS VM0015 methodology, version 1.1 is applicable to Rio Preto-Jacundá REDD+ project because it meets the following applicability criteria:

- Project baseline activities include unplanned deforestation as a result of agricultural activities and livestock, according to the latest version of VCS AFOLU Requirements.
- Project activities include forest protection with controlled and selectively logging, in accordance with the description of the scope "D" of the methodology used (details see page 12, Table 1 and Figure 2b document VCS VM0015)
- The project area has different types of forests, especially old-growth forests that are consistent with the definition of "forest".
- The project area includes only areas classified as "forest" for a minimum of 10 years before the project start date (see map 1).
- Forest types found in the project area include no rainforests in swampy areas ("forested wetlands") or common areas in forested peatlands ("peatswamp forests").

4.3. Methodology Deviations

No methodology deviation was used.

4.4. Project Boundary

Step 1.1 da VM0015 – Spatial boundaries of the project

Reference Region

The reference region is the largest space limit and includes the project area, leakage belt and leakage management areas (Figure 18). In this area were obtained information on rates, agents and causes of deforestation, and where future deforestation was projected.

For this REDD+ project, bounded reference area corresponds to an area of 734,158 hectares and has a deforestation rate of 11,204 ha/year (2% per year over the remaining forest cover in 2012).

Due to the absence of a national or sub-national delimitation for creating deforestation baselines, the definition of the reference region was defined mainly considering the historical context of the creation of the set of extractive reserves in the region of the municipalities of Machadinho D'Oeste and Anari

Valley. To set the reference region was considered the area located within the buffer zone (10 km radius) of the set of extractive reserves in the municipalities of Machadinho D'Oeste and Anari Valley and the criteria for applicability of VM0015 methodology in order to harmonize the conditions found in the reference region with those found within the project area, according to the criteria of Step 1.1.1 of VM0015 methodology, version 1.1, listed as follow:

- Agents and causes of deforestation: illegal loggers, invaders, squatters, small and medium farmers make up the main group of drivers of deforestation occurring in the region.
- Drivers of deforestation: infrastructure vectors that can increase the risk of deforestation are the official and unofficial roads (extensions and carriers). The reference region is undergoing feasibility studies for a hydroelectric plant construction.
- Configuration of the landscape and ecological conditions:

Vegetation types: 100% of project area has the same vegetation types that exist in 98.8% of the rest of the reference region; **Tipologia Florestal**	Reference Region		Project Area	
	Area (ha)	%	Area (ha)	%
FOA Aluvial	2,585	0.4%	-	0.0%
FOA Submontana	499,650	78.1%	51,235	54.3%
FOA Terras Baixas	55,120	8.6%	30,220	32.1%
FOD Aluvial	12,325	1.9%	2,171	2.3%
FOD Submontana	27,650	4.3%	812	0.9%
FOD Terras Baixas	34,443	5.4%	8,450	9.0%
Formações Pioneiras com influência fluvial e/ou lacustre	2,779	0.4%	1,402	1.5%
Vegetação Secundária	543	0.1%	-	0.0%
Hidrografia	4,774	0.7%	-	0.0%
TOTAL	639,868.60	98.8%	94,289.57	100.0%

- Slope: 100% of the project area is within the average slope that exist in 99.9% of the rest of the reference region.

Range		Reference Region		Project Area	
		Area (ha)	%	Area (ha)	%
0 a 3%	1 - Plano	50,177	7.8%	14,277	15.1%
3 a 8%	2 - Suave ondulado	300,870	47.0%	68,848	73.0%
8 a 20%	3 - Ondulado	257,978	40.3%	10,488	11.1%
20 a 45%	4 - Forte Ondulado	30,439	4.8%	677	0.7%
45 a 75%	5 - Montanhoso	405	0.1%	0	0.0%
	TOTAL	639,868.97	99.9%	94,289.64	100.0%

- Elevation: 100% of the project area is within the elevation range that exist in 98.3% of the rest of the reference region.

		Região de Referência		Área do Projeto	
Classes (m)		Area (ha)	%	Area (ha)	%
30 - 115	1	122,124	19.1%	59,393	63.0%
116 - 141	2	181,242	28.3%	33,729	35.8%
142 - 167	3	209,359	32.7%	995	1.1%
168 - 211	4	116,524	18.2%	166	0.2%
212 - 372	5	10,701	1.7%	6	0.0%
	TOTAL	639,950.85	98.3%	94,289.64	100.0%

- Socioeconomic and cultural conditions: legal land condition that prevails in the reference region are areas with conservation units of type extractive reserves, INCRA settlement projects, squatter sites and farms of private property (Figure 19). The ownership status of the project area (state conservation unit for sustainable use) can be found in other areas of reference region; the use of type classes and land cover, current and projected in the project area are the same over the whole reference region; the project area is governed by the same laws and regulations applied across the reference region.

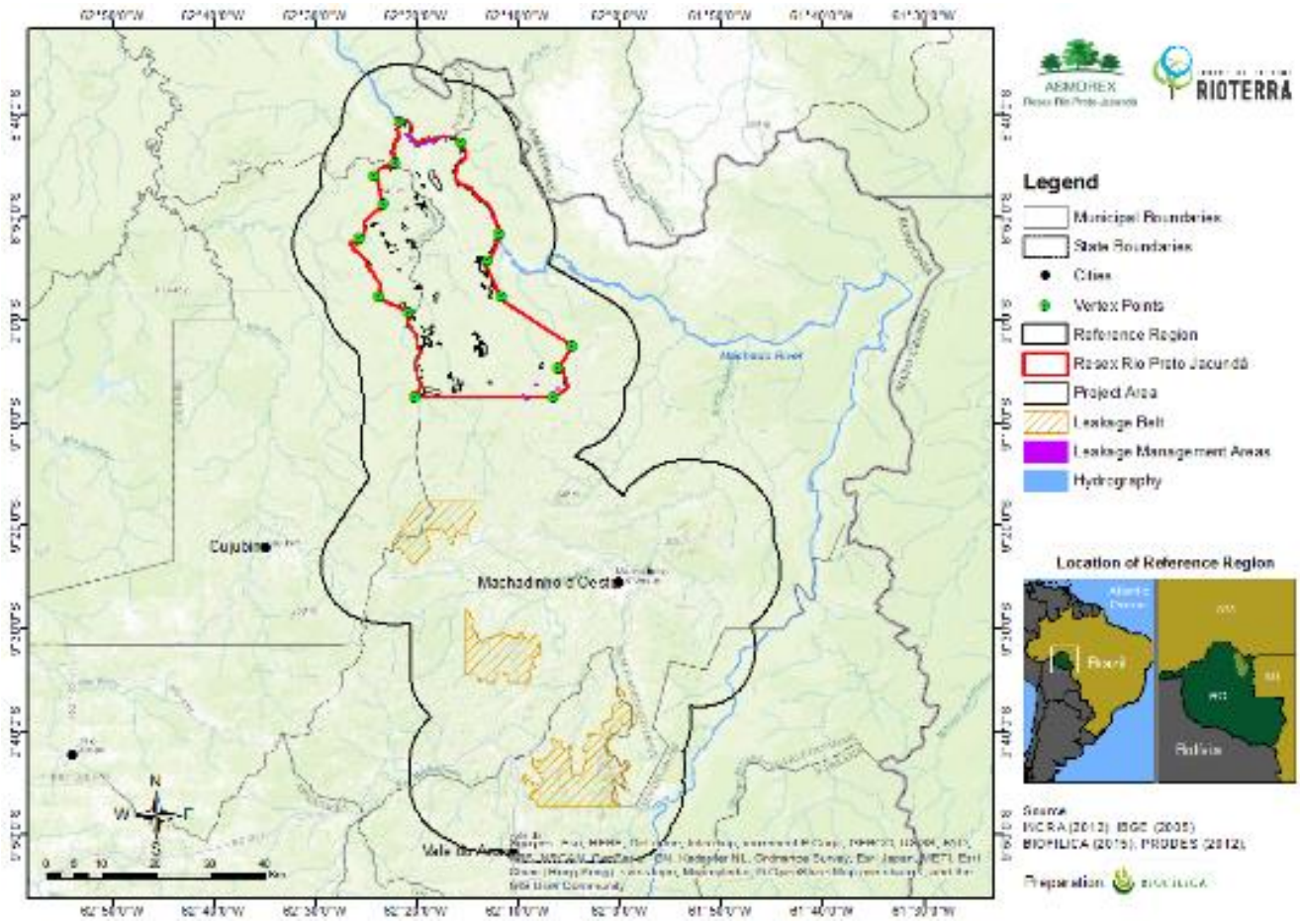


Figure 18. Location of Reference Region, the Project area, leakage belt and leakage management areas.

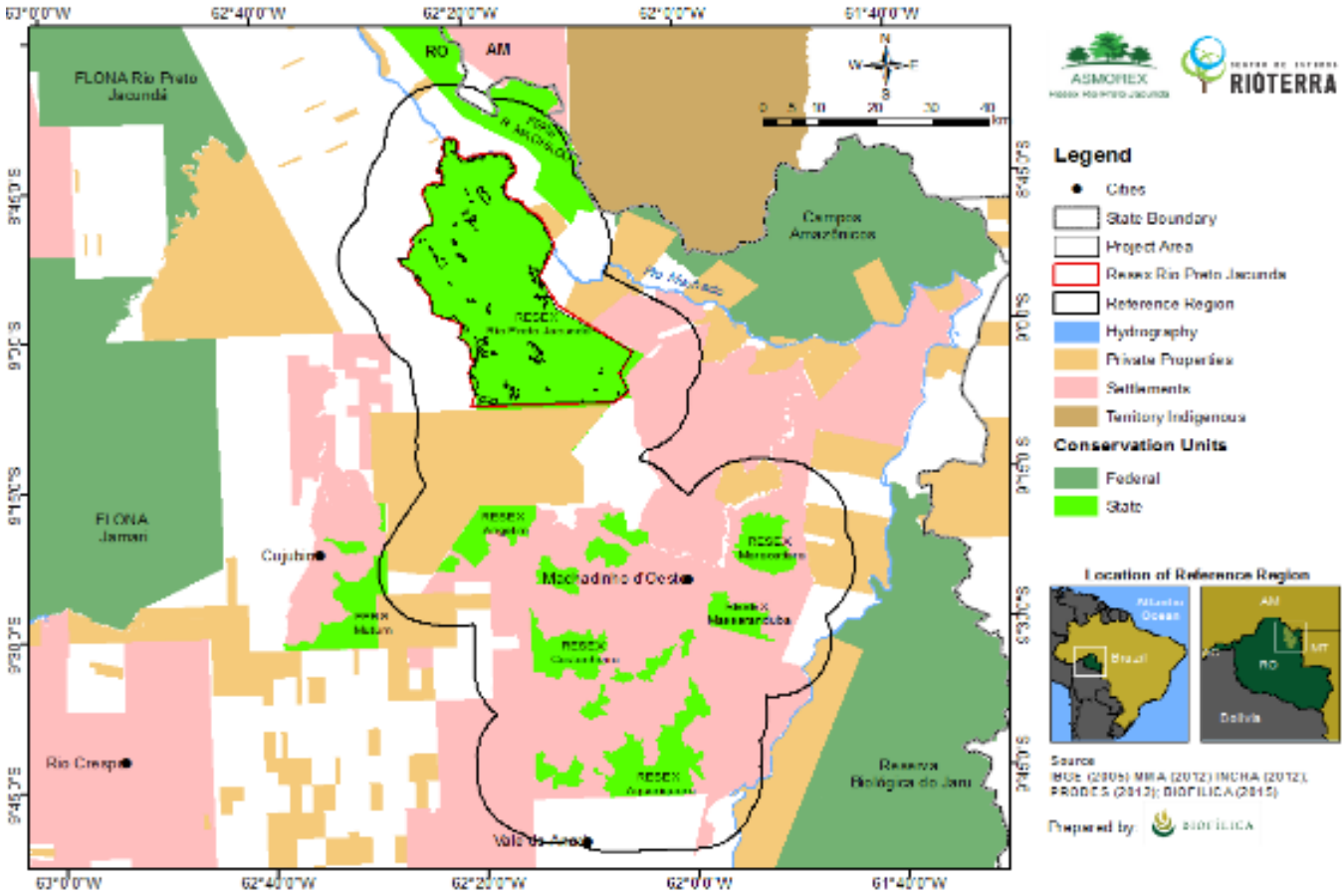


Figure 19. Protected Areas in the Reference Region.

Project Area

REDD+ project corresponds to an area of 94,289 hectares of forest within the Resex Rio Preto-Jacundá, state protected areas under management of Asmorex and SEDAM, where conservation activities proposals will be developed in this project. The project area boundaries are defined as described below:

- **Name of the Project area**: Resex Rio Preto-Jacundá;
- The **physical boundary** is shown in the Project location Figure 20;
- A **description of the land tenure** is described in Item 3 Legal status of this PDD;
- The **description of the participants** and their responsibilities in the Project are described in item 1 of this document.

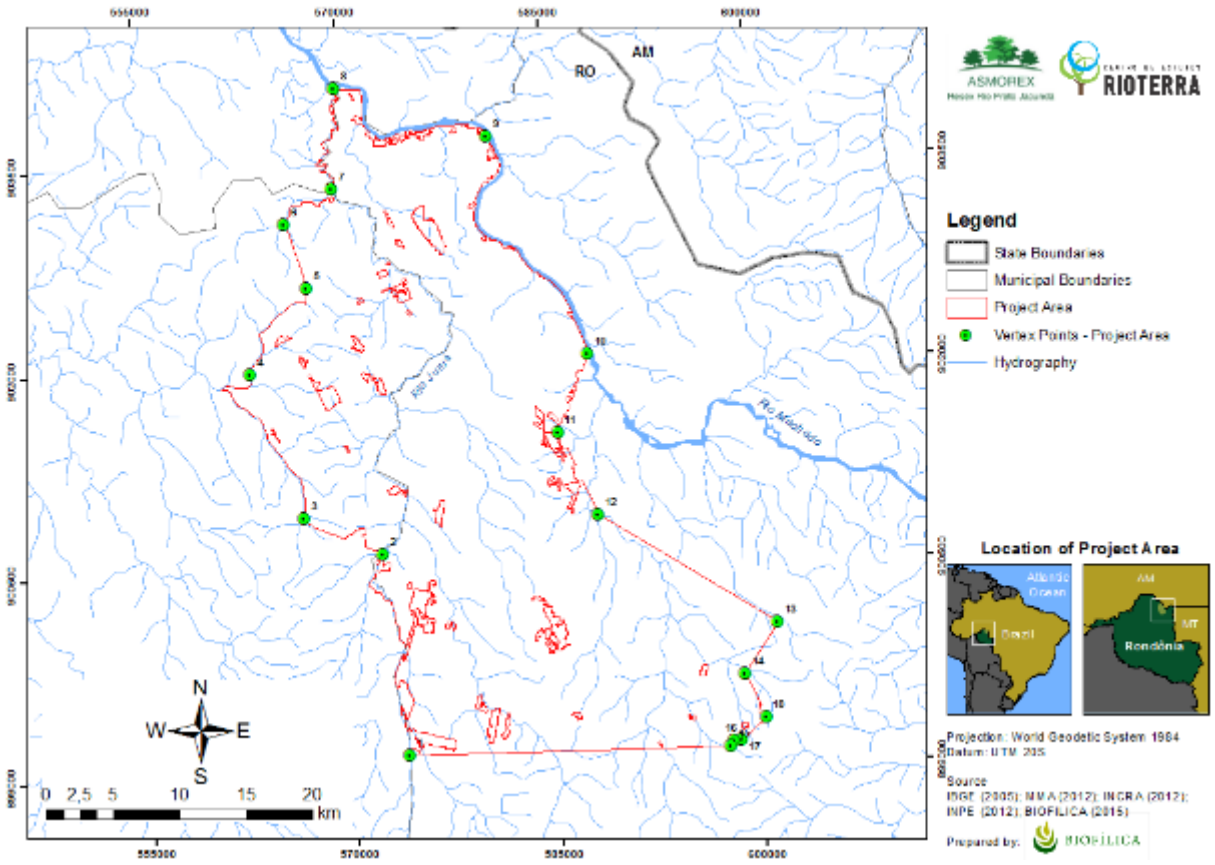


Figure 20. Location of physical boundaries of REDD + Project area.

Table 10. Vertices and coordinates of the Project Area (UTM - Zone 20S. Datum 1984)

Vértices	X	Y
1	573935,5	8991425
2	572415,2	9006347
3	566723,6	9009158
4	563071,8	9019840
5	567419,5	9026129
6	565914,5	9030841
7	569478,5	9033404
8	569860,8	9040776
9	581004,1	9036959
10	587997,2	9020661
11	585611,6	9014878
12	588375,6	9008740

Vértices	X	Y
13	601342,8	9000416
14	598869,1	8996643
15	597637,3	8991372
16	597913,5	8991709
17	598466	8991777
18	600300,3	8993383

Leakage Belt

The leakage belt was defined using the mobility approach (option II available in VCS Methodology VM0015). This option was chosen because there is no data or studies on the reference region showing that economic gains alone is an important vector of deforestation occurred during the historical reference period analyzed.

To demonstrate that Option I cannot be used to define the spatial boundaries of the Leakage Belt, were analyzed TerraClass project data of the year 2012 (INPE and EMBRAPA, 2016). These data show that 0.08% of the deforested area in this period was used for agriculture, 68% for use of livestock and 27% are areas where the vegetation is regenerating (Table 11). Despite the high area occupied by livestock, this type of land use is considered an activity to promote land ownership. These percentages show that the deforested areas in the reference region occur unrelated to economic gains, ie economic gains is not the most important deforestation vector.

Table 11. Use and land cover classes on deforested areas in the reference region

Type of use	Area (hectare)	Area (%)
Annual agriculture	223	0.08
Urban área	1358	0.48
Deforestation	7434	2.61
Mining	35	0.01
Grassland	193428	67.88
Secondary vegetation	77990	27.37
Others	4496	1.58

A multi-criteria analysis was performed to define the leakage belt space limit. This analysis combined the deforestation risk map (produced in the baseline study of deforestation) and the limits of extractive reserves in the reference area. The deforestation risk map was produce based on criteria composed of six independent spatial variables (distance from roads, old deforestation areas, vegetation

type, slope, legal status of the area and soil (Table 23). The restriction criteria to mobility of drivers of deforestation was the selection of areas within extractive reserves with similar features to Resex Rio Preto Jacundá. Based on this approach, the leakage belt was allocated in areas located in Resex Angelim, Resex Castanheira and Resex Aquariquara, which together cover an area of approximately 36,698 hectares.

Area of leakage management

The areas in which the project aims to develop activities to reduce deforestation risks are located within the Resex Rio Preto-Jacundá. The main criteria for selecting these areas were: deforested areas by the year 2012, located near the project area and that families have a predisposition to develop the proposed activities. In Section 2 are described the activities to be undertaken by the REDD + project in the areas of leakage management.

Forest

The definition of " forest " used by the REDD+ project is in line with Resolution No. 2 of the Interministerial Commission on Global Climate Change (CIMGC). Data from Deforestation Monitoring System in the Amazon (PRODES), prepared by the National Institute for Space Research (INPE) were used to produce the forest cover map reference (Step 1.1.5 of VM0015) presented in Figure 21. The smallest mapping unit (MMU) of the Digital PRODES system is 1 hectare (GOFC -GOLD, 2011).

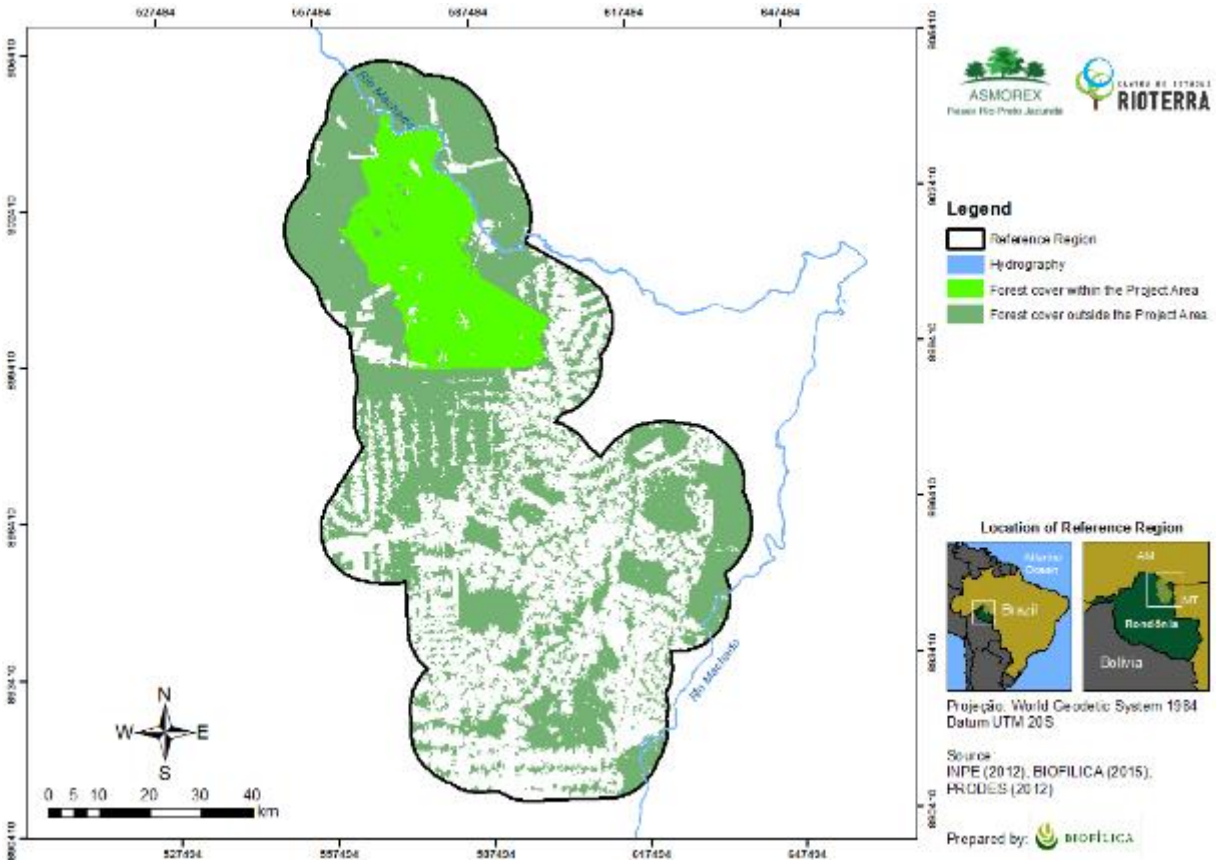


Figure 21. Reference Map of Forest cover in the Reference Region.

Step 1.2 da VM0015 – Temporal boundaries

- **Start date** of conservation activities: October 1st, 2012.
- **Starting date of the reference period** of the LULCC history: 2000
- **Start date and end of the first baseline fixed period**: fixed period from the baseline is 10 years after the start of project activities, with revaluation until 01/10/2022.
- **Monitoring period**: the monitoring period is one year, with its activities in 2012.

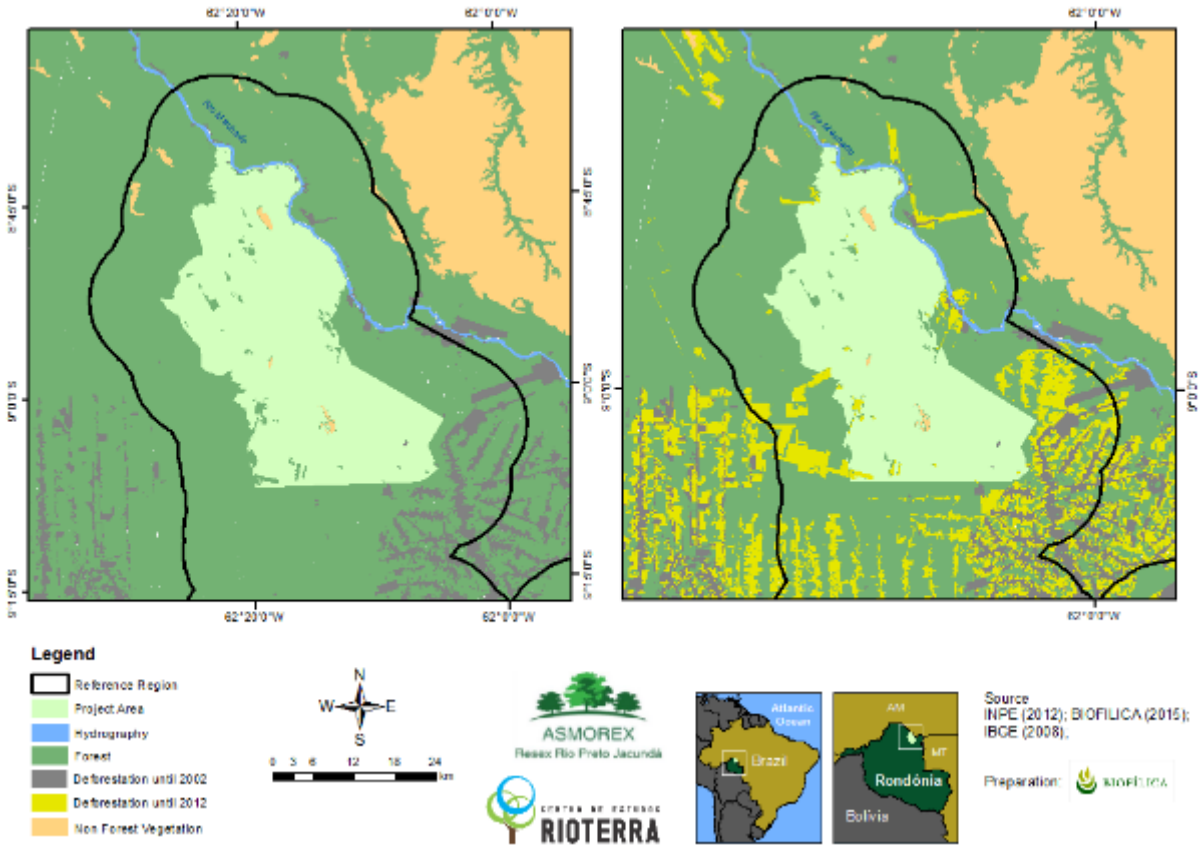


Figure 22. Use and land cover for 2002 and 2012.

Step 1.3 da VM0015 – Carbon pools

The carbon pools considered in the Project are presented in Table 12.

Table 12. Carbon pools included or excluded in RESEX Rio Preto-Jacundá REDD+ Project. (Table 3 VM0015 methodology)

Carbon pools	Included/ Excluded	Justification/Explanation of choice
Above ground	Tree: Included	Change in carbon stocks in this pool is always significant.
	Non tree: Excluded	Must be included in categories with final land cover of perennial crop
Underground	Included	Pool is 11% of the expected emissions in the baseline scenario.
Dead wood	Excluded	Change in carbon stocks in this reservoir are considered insignificant in relation to total emissions and will not be included
Timber products	Excluded	Pool not included as harvested wood products in the baseline scenario is lower than in the Project scenario.
Litter	Excluded	Not to be measured according to VCS Program Update of May 24th, 2010.

Carbon pools	Included/ Excluded	Justification/Explanation of choice
Soil Organic Carbon	Excluded	Recommended when forests are converted to cropland. Not to be measured in conversions to pasture grasses and perennial crop according to VCS Program Update of May 24th, 2010. Not applicable to the project.

GHG sources, sinks and baseline scenario are presented in Table 13.

Table 13. GHG sources included or excluded within the limits of Project activities (Table 4 VM0015 Methodology)

Sources	Gas	Included/Excluded	Justification/Explanation of choice
Biomass burning	CO_2	Excluded	Recorded as changes in carbon stocks
	CH_4	Excluded	Considered insignificant according to updates VCS Program on May 24, 2010.
	N_2O	Excluded	Considered insignificant according to updates VCS Program on May 24, 2010
Emissions from cattle	CO_2	Excluded	It is not a significant source.
	CH_4	Excluded	Not applicable to the Project.
	N_2O	Excluded	Not applicable to the Project.

4.5. Baseline Scenario

Step 2 VM0015 – Historical analysis of the Use and Land Cover

Appropriate data source collection

For mapping of the classes of use and land cover, PRODES Digital program data used were available in vector format (shapefile). A total of 38 Landsat satellite images were used to map the areas of forest, non-forest vegetation, hydrography and disturbed vegetation (deforestation). The images cover the historical reference period (2001-2011) and correspond to the following orbits / satellite Landsat points: 232/66, 231/66, 231/67 (Table 14). The evaluation of PRODES classification was carried out using high spatial resolution images available on RapidEye Satellite.

Table 14. Satellite images used to map land cover in the reference region (Table 5 of VM0015 methodology)

Vector (Satellite)	Sensor	Resolution		Coverage	Acquisition date	Scene identifier	
		Spatial (m)	Spectral	(km^2)	(DD/MM/YY)	Path/ Latitude	Row/ Longitude
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	05/08/2012	232	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	08/08/2006	232	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	12/06/2004	232	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	31/07/2012	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	08/08/2012	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	12/06/2011	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	27/07/2010	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	09/08/2009	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	06/08/2008	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	04/08/2007	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	16/07/2006	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	02/09/2006	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	01/10/2005	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	26/07/2004	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	24/07/2003	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	09/08/2003	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	11/06/2002	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	11/08/2001	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	19/08/2001	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	16/07/2000	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	17/08/2000	231	66
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	08/08/2012	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	12/06/2011	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	27/07/2010	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	09/08/2009	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	06/08/2008	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	04/08/2007	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	16/07/2006	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	02/09/2006	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	14/08/2005	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	26/07/2004	231	67
Landsat 5	TM	30 x 30	0,45 – 2,35 µm	34.225	20/07/2003	231	67
Landsat 5	TM	31 x 30	0,45 – 2,35 µm	34.225	09/08/2003	231	67
Landsat 5	TM	32 x 30	0,45 – 2,35 µm	34.225	11/06/2002	231	67
Landsat 5	TM	33 x 30	0,45 – 2,35 µm	34.225	11/08/2001	231	67
Landsat 5	TM	34 x 30	0,45 – 2,35 µm	34.225	19/08/2001	231	67
Landsat 5	TM	35 x 30	0,45 – 2,35 µm	34.225	16/07/2000	231	67
Landsat 5	TM	36 x 30	0,45 – 2,35 µm	34.225	17/08/2000	231	67
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	05/08/2011	2035117	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/08/2011	2035018	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/08/2011	2035017	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/06/2013	2034919	

Vector (Satellite)	Sensor	Resolution		Coverage	Acquisition date	Scene identifier	
		Spatial (m)	Spectral	(km^2)	(DD/MM/YY)	Path/ Latitude	Row/ Longitude
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/08/2011	2034918	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/08/2011	2034917	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/08/2013	2034819	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/06/2013	2034818	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	14/06/2013	2034719	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	31/10/2012	2034718	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	20/09/2011	2034619	
RapidEye	Multiespectral	5 x 5	0,44 - 0,85 µm	560	31/10/2012	2034618	

Definition of classes of use and land cover

The land cover classes used in this Project are shown in table 15. The description of each class and the existing area before the Project start year is presented below:

Table 15. Classes of use and the existing ground cover in the Reference Region.

Class Identifier		Carbon stock trend	Present in 1	Activity on baseline 2			Description
IDcl	Name			LC	FW	CP	(Including criteria for the definition of unambiguous limits)
1	Forest	Constant	RR, PA	Yes	No	No	Reminiscent forest area
2	Non forest vegetation	Constant	RR, PA	No	No	No	Area of fields
3	Hydrography	Constant	RR, PA	No	No	No	Area of water bodies
4	Anthropic vegetation	Constant	RR, PA	Yes	Yes	No	Area that suffered shallow cut

1 RR: Reference Region; PA: Project Area; LK: Leakage Belt; LM: Areas of Leakage Management.

2 LG: Logging. FW = Fuel-wood collection; CP = Charcoal Production (yes/no)

- **Forest (441,935 ha):** remaining forest area belonging to different vegetation types of open rain forest and dense ombrophilous forest.
- **No forest vegetation (2,487 ha):** established areas of natural vegetation with different physiognomy of forest known as *campinarana, savanna and cerrado.*
- **Hydrography (2,729 ha):** water bodies (rivers, lakes).

- **Anthropic Vegetation in balance (287,007 ha):** areas of rainforest cleared converted to other land uses (mosaic of different types of vegetation that includes pastures, clearings, plantations and second growth).

Definition of the types of land uses change and land cover

The project features two categories of use and changes in land use that are expected to occur within the project area and Leakage Belt: changing areas with Forest for areas with Anthropic Vegetation in balance.

Table 16. Definition of use categories and changes in land use (Table 7.b the VM0015 methodology).

ID_{cl}	Name	Trend in Carbon Stock	Present in	Activity in case of baseline			Name	Trend in Carbon Stock	Present in	Activity in case of Project		
				LG	FW	CP				LG	FW	CP
I1/F1	Forest	Constant	PA	No	No	No	Anthropic vegetation	Constant	RR. LM	No	No	No
I1/F1	Forest	Constant	LK	Yes	Yes	No	Anthropic vegetation	Constant	RR. LM	No	No	No

Analysis of the history of land use and change of land use (Step 2.4 of VM0015)

Good quality data provided by PRODES were used to analyze the historical of land use changes. The main activities carried out by PRODES to map deforestation in the Brazilian Amazon are as follows:

- **Pre-processing:** according to Câmaral et al. (2006) the main procedures of pre-processing of the images executed by the PRODES consist of image selection stages with less cloud cover, with the acquisition date closest to the dry season in the Amazon and with proper radiometric quality; georeferencing of images with a spatial resolution of 30 meters with topographic maps at 1: 100,000 and images in MrSID format orthorectified NASA.
- **Interpretation and Classification:** the satellite images classification method used by PRODES follows four main stages. First it generates a spectral mixture model identifying the images of the vegetation components, soil and shade. This technique is known as linear spectral mixture model (SLMM), which aims to estimate the percentage of vegetation components, ground and shade for each cell (pixel) image. The second step is to apply the segmentation technique, which identifies the image of satellite spatially adjacent regions (segments) with similar spectral characteristics. After segmentation, is the classification of segments individually to identify the classes forest, non-forest vegetation, hydrography and deforestation (anthropic vegetation).

Finally, the result of the classified targeting is subjected to the editing process, or audit of the classification performed by a specialist, ending with the creation of state mosaics.

- **Mapping accuracy evaluation (step 2.5 of VM0015)**: evaluation of Prodes available by mapping was performed by comparing each usage map class and later land cover (2011) with a randomly distributed set of 82 points of the reference region. The reference data used for this step are from visual interpretation of high spatial resolution images available on Google Earth. Using the benchmarks and the use of map and land cover of year 2011, it was possible to assess the mapping performance through the analysis of the confusion matrix (Table 17) as Congalton (1999). The minimum overall accuracy of the Forest Cover Benchmark Map should be 90%. Based on Confusion Matrix (Table 17), the accuracy for Forest Cover Benchmark Map was 93%. The minimum classification accuracy of each class in the Land-Use and land-Cover Map and Land-Cover Change Map, respectively, should be 80%. The found accuracy derived from confusion matrix for classes below (Forest, Deforestation, Hydrography and Non forest) were 93%, 86%, 92% and 84%, respectively.

Table 17. Confusion Matrix of data evaluation PRODES 2012

CLASSIFIED	REFERENCE						
		Forest	**Deforestation**	**Hydrography**	**Non forest**	**Total**	**User Accuracy**
	Forest	53	5	1	3	**62**	**85%**
	Deforestation	4	38	0	0	**42**	**90%**
	Hydrography	0	1	12	0	**13**	**92%**
	Non forest	0	0	0	16	**16**	**100%**
	Total	**57**	**44**	**13**	**19**	**133**	
	Accuracy of producer	**93%**	**86%**	**92%**	**84%**		

Result of Analyses of History of Use and changes in land use

The results of the historical analysis of deforestation occurred between 2000 and 2012 in the reference region are shown in Table 18. Through the subtraction of land cover maps was observed deforested area between 2000 and 2012 approximately 134,444 hectares (about 23% of the existing forest in 2000).

Table 18. Matrix change of land use in the reference region between 2000 and 2012 - have read and represent Fi Home and End respectively for a given i classes (Table 7th of VM0015 methodology)

ID_{cl}		Name	LU/LC Classe Initial (2000)				Total (ha)
			Deforestation	Forest	Hydrography	Anthropic Vegetation	
			I1	I2	I3	I4	
Classes LU/LC Final (2012)	F1	Deforestation	152,563	134,444			287,007
	F2	Forest		441,935			441,935
	F3	Hydrography			2,729		2,729
	F4	Anthropic Vegetation				2,487	2,487
Total (ha)			152,563	576,379	2,729	2,487	734,158

Preparation of Attached Methodology to the PD

Methodological procedures for the acquisition, preprocessing, classification, post-classification and evaluation of the accuracy of remote sensing images for analysis of changes in land use and land cover during the project duration.

Data Acquisition: should be used satellite images of optical or radar sensors. Optical images should have a spectral resolution between 0:45 and 2.35 μm. For radar images, if they are needed, should be provided in the bands X (3 cm), C (5 cm) or L (23 cm). For mapping forest cover and land use should be used images with spatial resolution equal to or greater than 30 meters. The vesting period of the images should be during the time of lower incidence of clouds and rains in the region, between the months of August and November. For the monitoring of forest cover in the project area and leakage belt, the satellite image should cover the area corresponding to the following geographical coordinates: :8°40'00" S - 61°57'30" W and 9°47'50" S - 62°27'08" W.

Preprocessing: the images should be geometrically corrected through georeferencing at ArcGIS 10 software using as a reference topographic maps at the scale of 1:100,000 or orthorectified images from NASA in MrSID format. The georeferencing RMS must be less than 1 pixel optical and approximately 1.5 pixel to radar images. All data should be in the UTM coordinate system, Zone 20S and Datum WGS 1984.

Classification: using the optical images to transform the values of numbers in digital scene components (foliage, soil and shade) by means of a spectral mixture algorithm. Select the images ground and shade component and apply through segmentation technique regions growth algorithm with threshold parameters of similarity equal to 8 and area threshold equal to 4. The classification is performed using the algorithm unsupervised ISOSEG with the threshold of 90% acceptance for classes:

forest, new deforestation, non-forest vegetation, hydrography and clouds. These segmentation algorithms and classification can be applied using the softwares TerraView 4 and Spring 5. The change of category will be mapped forest class for deforestation class.

Post-classification: the classification result in raster format will be transformed into vector format for audit of classification in ArcGIS 10. For analysis of areas with cloud cover will be held, if necessary, the visual interpretation of radar image.

Evaluation of the accuracy of the classification: will be performed through the analysis of the overall accuracy and kappa index obtained from an array of confusion (CONGALTON, 1999). They will be used at least 50 points distributed randomly and come from high spatial resolution satellite images (≤5 meters). The minimum accuracy of classification mapping should be 80%.

Step 3 VM0015 – Analysis of agents, drivers and underlying causes of deforestation and it future development

The agents, drivers and underlying causes of deforestation in the Project Area and Reference Region were identified from information obtained in the field, consultation with researchers and representatives of local institutions, obtained from existing socio-economic studies, interviews with residents of Resex and academic paper.

Identification of deforestation agents

Based on field interviews[3], consulting researchers from UNIR and representatives of local institutions[4], the following groups of drivers of deforestation have been identified:

a) **Name of deforestation agents**: Group 1 - illegal loggers and squatters; Group 2 - squatters and small farmers; Group 3 - medium and large farmers. Figure 24 shows some records of the activities of agents in the vicinity of the project area.

b) **Brief description**: Group 1 - illegal loggers and squatters motivated by low governance in the area and wood supply, already scarce in the region, which makes the region mainly extractive reserves, vulnerable to the action of these and other agents. This group acts by illegal logging that are "esquentadas" in sawmill in Cujubim, municipality where originate most of the illegal roads in Resex Rio Preto-Jacundá. Deforestation caused by this group is in the form of opening roads, extensions, carriers and timber yards. After or during the removal of the wood these agents promote the illegal allotment for the agents that make up the Group 2 - squatters and

[3] Data collected between July 27 to August 1, 2013 for the Socioeconomic Diagnosis conducted by Rioterra (2013)

[4] CDREX members: SEDAM from Machadinho D'Oeste, ASMOREX, ASM e OSR.

small farmers. Agents of Group 2 in turn perform deforestation to install clearings and small areas with cattle grazing, in order to take possession of the area. Often squatters and small farmers buy plots of land through drawer contracts without consultation of the property ownership status in registry offices, INCRA or SEDAM. The agent group 3 is made up of local farmers and farmers of medium and high purchasing power. These agents cause deforestation by irregular access infrastructure opening (extensions, airstrip, port), creating extensive grazing for cattle, illegal logging and cultivation of annual crops cycle. Over time, these agents carry out land concentration in the region through the acquisition of property squatters and small farmers.

c) **Brief assessment of the likely development of population size:** according to the census data from IBGE (2010), the rural population in the reference region grew by 30% in 10 years, a 3% per annum rate (2000 and 2010), according to IBGE (2010).

d) **Deforestation statistics**: 134,444 ha were deforested within the reference region (a rate of 23 % for the period) from 2000 to 2012. The annual deforestation rates presented wide variation between 2000 and 2012 within the reference area. The rates were higher, especially in the early periods between 2001 and 2007. The average rate of deforestation in the reference region was 11,204 ha/year, and the minimum value was 2,333 ha/year and the maximum value of the reporting period is 19,730 ha/year. The annual increase of deforestation is shown in Figure 23. By overlaying maps of changes in land use and land cover obtained in the historical reference period with the land tenure map, it was identified that squatters and small farmers are mainly responsible for the unplanned deforestation within the reference region.

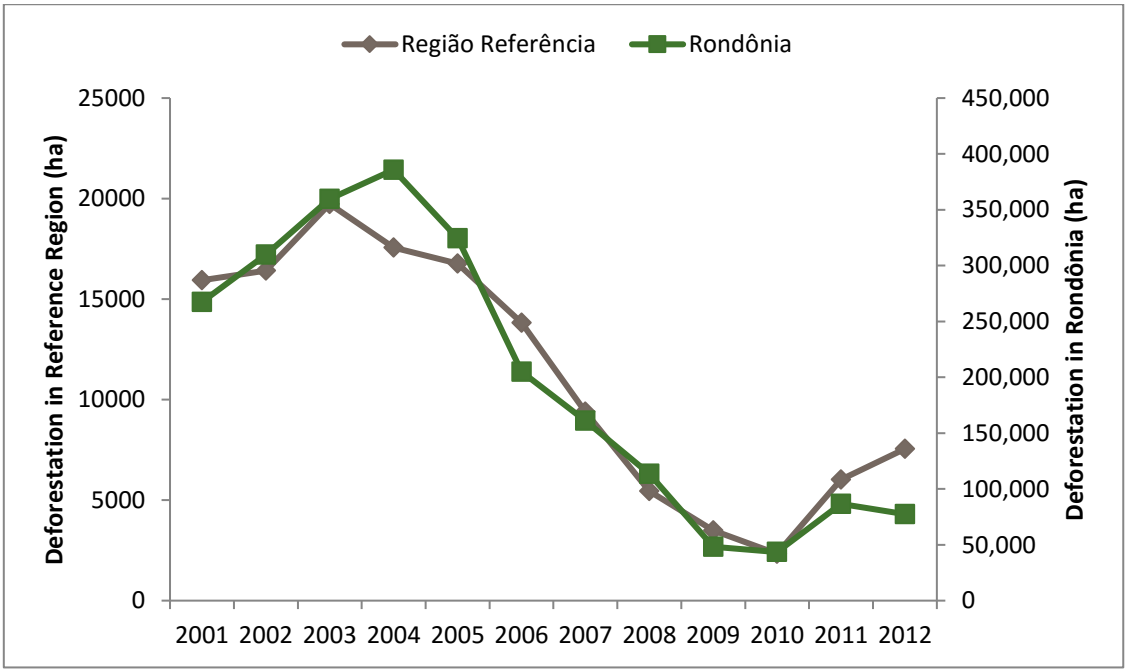


Figure 23. Annual deforestation in the reference region and in Rondônia State in the period of 2001-2012

Table 19. Deforestation assigned to each agent.

Agent	Deforestation (ha)	Contribution (%)
Illegal loggers and invaders	6,885	2%
Squatters and small farmers	249,616	87%
Medium and Large Producers	30,506	11%

Fazenda na margem do Rio Machado.

Fonte: Rogério Marinho (28.08.2012)

Marco histórico de divisa Estados usado para delimitar propriedades de invasores dentro da Resex.

Fonte: Rogério Marinho (28.08.2012)

Placa de identificação de proprietário dentro da Resex

Fonte: Ana Euler (12.04.08)

Fazenda na margem do Rio Machado.

Fonte: Ana Euler (12.04.08)

Figure 24. Photographic record of the actions of deforestation drivers in Resex Rio Preto Jacundá

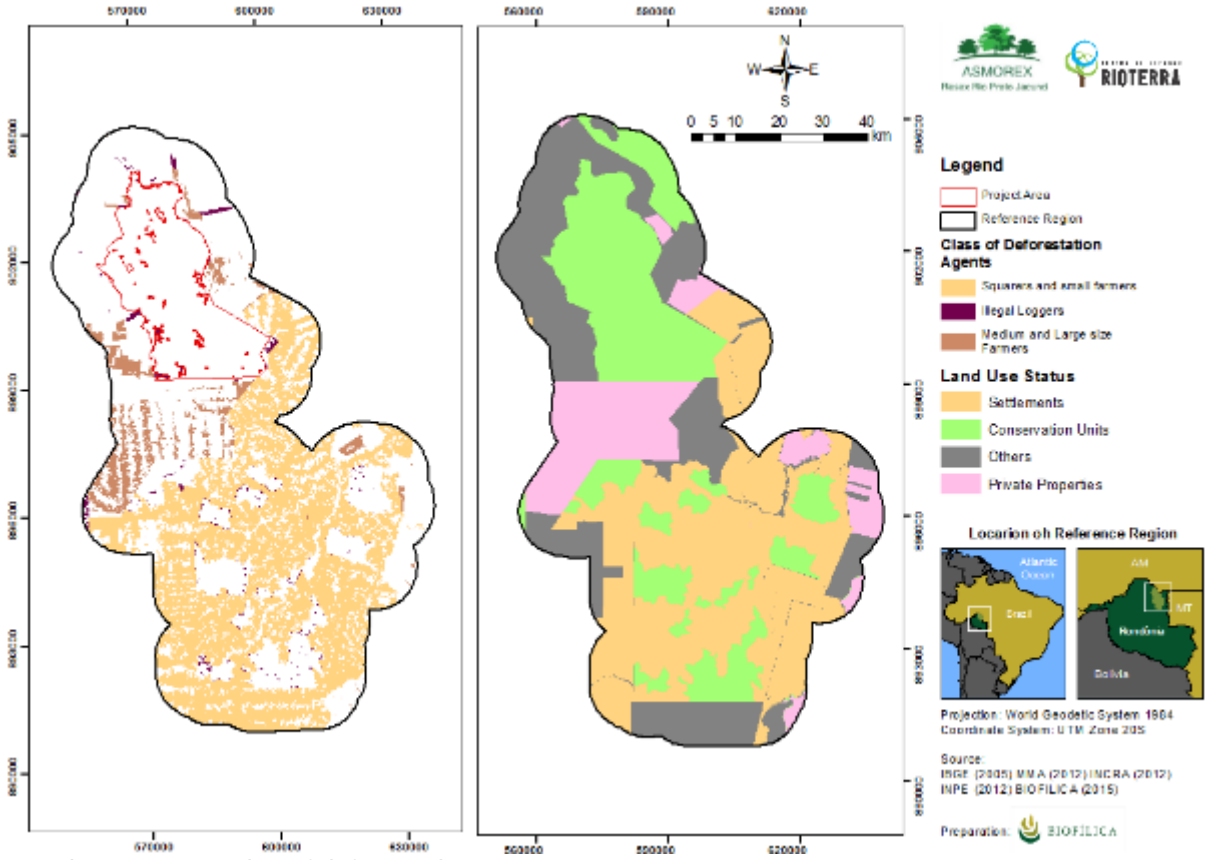


Figure 25. Mapping of deforestation agents

Identification of deforestation drivers

Illegal logging and allotments

a) **Brief description**: illegal logging exists in the territory of several extractive reserves in the region, feeding the wood industries in the cities of Cujubim, Machadinho D'Oeste and Ariquemes. For example, the forest areas of Resex Rio Preto-Jacundá on the side of the municipality of Cujubim has the greatest degradation due to illegal logging, carriers opening, yards and illegal settlements. Documentary evidence[5] and interviews with representatives of local institutions was identified that several farms facilitate access to the interior of extractive reserves. In illegal logging, residents of extractive reserves are affected by threats to their

[5] Carta das Comunidades Extrativistas de Machadinho D'Oeste (2010)

physical integrity, loss of forest heritage and biodiversity. After woods of greater economic value withdrawal, or often acting at the same time with the illegal logging, it starts the invaders action with the allotment of degraded forests by illegal logging. Often the agent himself that extracts timber performs the illegal allotment[6].

b) **Impact on the behavior of agents**: inhabitants of protected areas are recruited to participate in schemes and/or become under threat in the eminence of complaint. Illegal logging is original process for Amazon deforestation[7] because it usually causes progressive forest degradation by the extraction of greater commercial interest woods. After the removal of larger trees, agents promote quick actions of slash and burn the forest, often to delimit lots sold illegally. According to the GTA (2008), the fronts of deforestation and logging has shifted since the 1980s of old occupations along the BR-364 toward the Rondônia Protected Areas.

c) **Development Forecast**: the shortage of hardwoods in private forest areas in the reference region increases the chances of developing this deforestation vector in the illegal exploitation of protected areas, which do not yet have sufficient surveillance and monitoring to stop such activities, as has occurred in other protected areas in the region. During the collection and analysis of evidence[8], there are many reports about political movements of local and state that seek to revoke the creation of protected areas decrees, such as the suggestion made by a state governor, a state deputy and the head of SEDAM in Ariquemes to split Resex Rio Preto-Jacundá in four management areas for different companies logging.

d) **Measures to be implemented**: between project activities to reduce the action of these groups of agents it is expected the development of monitoring forest degradation indications and deforestation reported through quarterly newsletters with information and spatial data (date, affected area, coordinates etc). These newsletters will be sent to the institutions with power of enforcement in cooperation with project proponents, seeking faster action to combat deforestation. At the same time, the project proponents and partners will develop actions to strengthen local management institutions of Resex Rio Preto-Jacundá (ASMOREX, COOPEREX, CDREX), as well as activities to external recognition of the limits of the protected area.

Livestock and agricultural production

[6] Carta das Comunidades Extrativistas de Machadinho D'Oeste (2010)

[7] INPE (2008): Relatório técnico-científico monitoramento da cobertura florestal da Amazônia por satélites.

[8] Carta das Comunidades Extrativistas de Machadinho D'Oeste (2010); Carta Aberta dos Seringueiros de Rondônia (22/06/2005); Operação Arco de Fogo (Portal do Goverto do Estado de Rondônia, 2012).

a) **Brief description**: in the reference region livestock activity is the main land use, confirming the data of growth of this activity in the cities analyzed by socioeconomic diagnosis. Such activity is in over large areas with low productivity, but that historically characterized the formation of pastures and improvement in land (Rioterra, 2013), which begins the process of occupation and deforestation of the area. Recently, the expansion of monocultures, especially soy, has been claiming the incorporation of areas that were previously used for the management of livestock and traditional agriculture.

b) **Impact on the behavior of agents**: livestock allows Group 2 agents (squatters and small farmers) and Group 3 (medium and large farmers) initiate land tenure and capitalize quickly. Some squatters and small farmers, often under pressure or violence, sell their land to ranchers and medium and large farmers expand their activities in the region. This process is often performed in a short period of time, as has happened in some illegal lots within the Resex Rio Preto-Jacundá.

c) **Development forecast**: Rondônia has vocation for livestock, say political actors who advocate this is the best opportunity for the state development. The use and occupation of land in Rondônia have livestock the main trend. It is clear that the reference region, located in the arc of deforestation, it is a dynamic space economically and with new inserts of capital (land concentration, monoculture and mechanization). Agricultural dynamics in the reference region is today the arrival of mechanized agriculture, especially the monoculture of soybeans and rice, which involves the replacement of grazing areas which consequently require new spaces, which enhances the deforestation of forests areas in extractive reserves (Rioterra, 2013). The expansion of clearings areas and farming result in property speculation in rural areas, with consequent exodus of the rural population or the withdrawal of farmers for new cultivation areas and/or mechanized agriculture, which results in increased pressure on the remaining forests of protected areas.

d) **Measures to be implemented**: the strategy addressed to these groups of agents and drivers of deforestation will be based on the same activities presented to the Group 1 agents, previously presented.

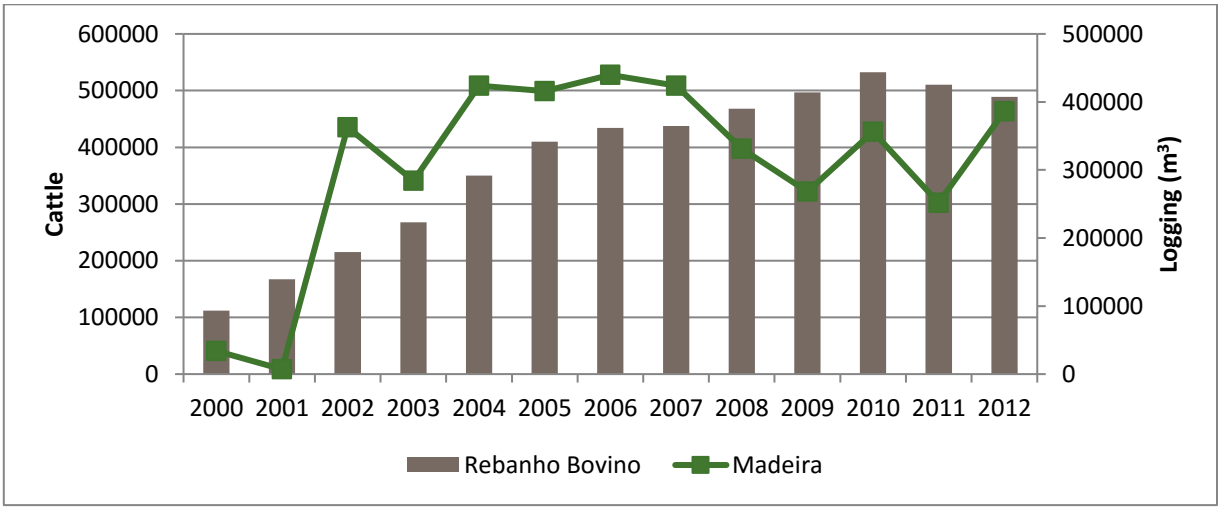
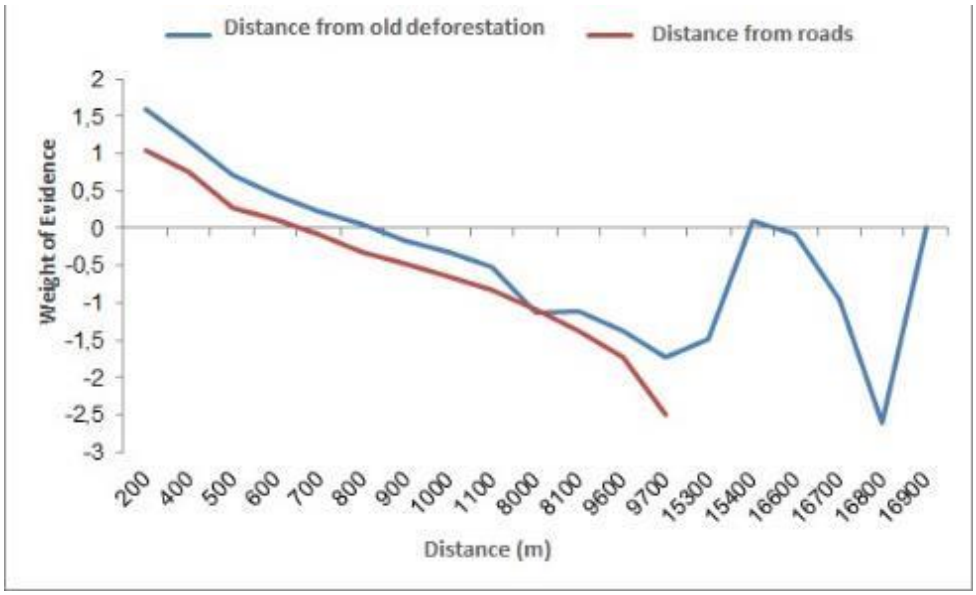
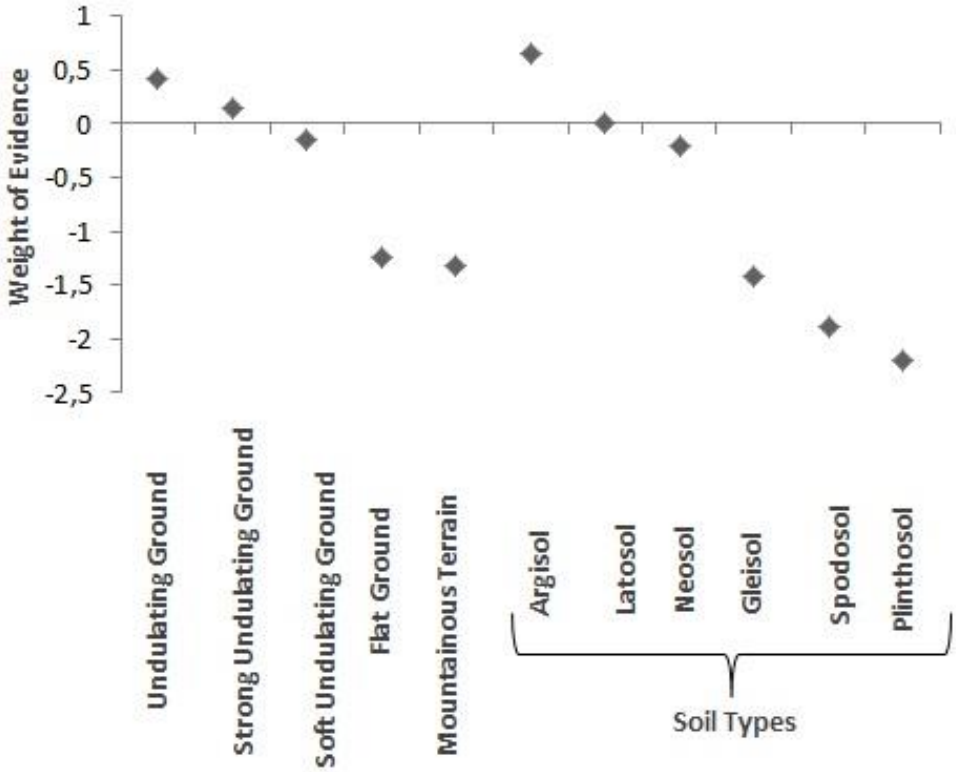


Figure 26. Efetivo dos rebanhos Bovino (cabeças) e produção de madeira em tora (m^3)

Variables that explain the location of deforestation

Six sets of variables were analyzed to identify which have the greatest influence on the location of deforestation occurred. The method used to estimate the importance of the variables was the evidence weights (Bonham-Carter, 1994). The result was positive values, which have high influence, and negative values that represent low influence on the location of deforestation. Analyzing the results shown in Figure 26 we observed that deforestation is more associated with old deforestation proximity, near roads and areas with seating. Forest type, soil characteristics and on the ground did not show high influence on the location of deforestation.


Distance from old deforestation
Distance from roads
Weight of Evidence
2
1,5
1
0,5
0
-0,5
-1
-1,5
-2
-2,5
-3
200
400
500
600
700
800
900
1000
1100
8000
8100
9600
9700
15300
15400
16600
16700
16800
16900
Distance (m)


Weight of Evidence
1
0,5
0
-0,5
-1
-1,5
-2
-2,5
Undulating Ground
Strong Undulating Ground
Soft Undulating Ground
Flat Ground
Mountainous Terrain
Argisol
Latosol
Neosol
Gleisol
Spodosol
Plinthosol
Soil Types

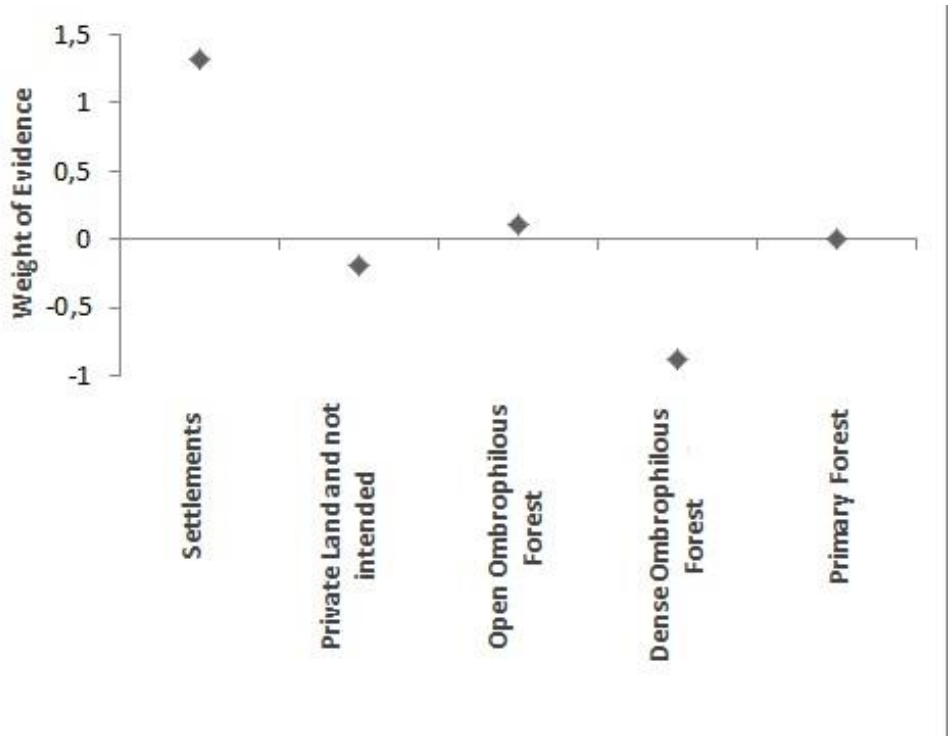


Figure 27. Evidence weights space vector associated with observed deforestation

Following a description of variables to explain the deforestation location in the historic reference period:

- **Distance from ancient deforestation**: forest edge areas may be more accessible due to the proximity to areas already deforested, and thus have a higher risk of deforestation.
- **Distance from roads**: forests nearby roads, carriers and extensions are more affordable and thus have a higher risk of deforestation.
- **Settlements**: forest areas within INCRA settlement projects are the areas that have high deforestation record in the reference region.
- **Extractive reserves**: in the reference region there are several extractive reserves with similar characteristics to Resex Rio Preto-Jacundá. Evidence raised by socioeconomic diagnosis[9] indicate that deforestation agents take advantage of the high land tenure insecurity and low field inspection to timber theft, allot and clearing forests in these protected areas.
- **Private Land or not intended**: these are areas of small, medium and large farms that exploit agricultural activities, forest management or plots in land regularization process.

[9] Rioterra (2013).

- **Vegetation type**: it can be observed that open ombrophilous forests type has increased risk of deforestation compared to other types.
- **Soil types:** the biggest influence in the occurrence of deforestation has been identified over areas with presence of Argissolos.
- **Land slope classes**: major deforestation occurrence records were identified on land in the reference region classified as rippled, with slopes ranging from 8 to 20%.

Underlying causes of deforestation

There are studies that suggest the existence of a number of direct and indirect causes of deforestation in tropical forests, being the result of a complex chain of relationships that contribute to decreased forest. Rivero et al. (2009) indicate that the underlying causes are related to the growth of markets and increasing demands for products that necessarily generate changes in land use. They are associated with this type of cause, population growth, cultural factors and integration of public policies for regional investment, land tenure insecurity, political factors and impunity of environmental crimes.

a) **Brief description**: in the local context there is a lack of land tenure and little environmental inspection which contributes to the poor implementation of multiple use management plan, lack technical assistance and basic public services. The competent bodies responsible for the extractive reserves management in the region suffer from a lack of financial and human resources[10]. Historically, project area was occupied by a colonization project aimed at farmers and ranchers attracted by the land grant and tax incentives, which sparked an intense immigration and a new dynamic of land use with impacts on nature and people who traditionally lived there. In the 1980s, this development vision was consolidated by POLONOROESTE, regional development program financed by World Bank. The organization recognized the environmental problems of the previous program and proposed in the 1990s the PLANAFLORO, which had as financing condition to Rondônia the creation of protected area, such as extractive reserves of the reference region, defined and created from PLANAFLORO[11].

b) **Development forecast**: there is an increase in political and economic movement of actors against the existence of protected areas in the state, supported by government authorities, seeking the regularization of possessions often with the INCRA support to create settlements in demarcated areas such as extractive reserves. According to the document produced by WWF

[10] Carta das Comunidades Extrativistas de Machadinho D'Oeste (2010); Carta Aberta dos Seringueiros de Rondônia (22/06/2005). O Fim da Floresta (WWF, 2008).

[11] PEDLOWSKI et al 1999.

(2008) the intellectual authors of forests destruction operate far through 'laranjas'[12], riding real gangs with the participation of local entrepreneurs, civil servants of bodies that supposed to carry out environmental monitoring. Local politicians also take advantage of low land security of extractive reserves, which in times of election campaigns make promises about regularization of illegal tenure.

c) **Measures to be implemented**: the main measure to be carried out to avoid underlying causes of deforestation in the project area will be strengthening local management institutions Resex Rio Preto-Jacundá (ASMOREX, COOPEREX, CDREX), adequacy of Multiple Use and Forest Management Plan and the establishment of partnerships for monitoring the Resex limits.

Analysis of the chain of events that lead to deforestation

The chain of events leading to deforestation in the reference region follows the complex and typical pattern of the "arc of deforestation". This chain starts with the entry of illegal loggers that corrupt local and smallholder communities, either financially or with violence, to explore hardwoods. After the forest degradation cycle, which also includes the opening of roads, there is the deforestation of the area invaded for agriculture production and pasture. For lack of capital, these small producers sell ownership of their land to medium and large producers, most often linked to cattle raising.

Cattle raising requires the opening of new areas to consolidate the property boundaries. Over time, these areas are converted to deployment of mechanized farming in the case for soybean cultivation. The cycle is repeated for opening new fronts of illegal logging and deforestation. Figure 28 shows the chain of events of relationships identified between agents and drivers of deforestation occurred in the reference region.

[12] Carta das Comunidades Extrativistas de Machadinho D'Oeste (2010).

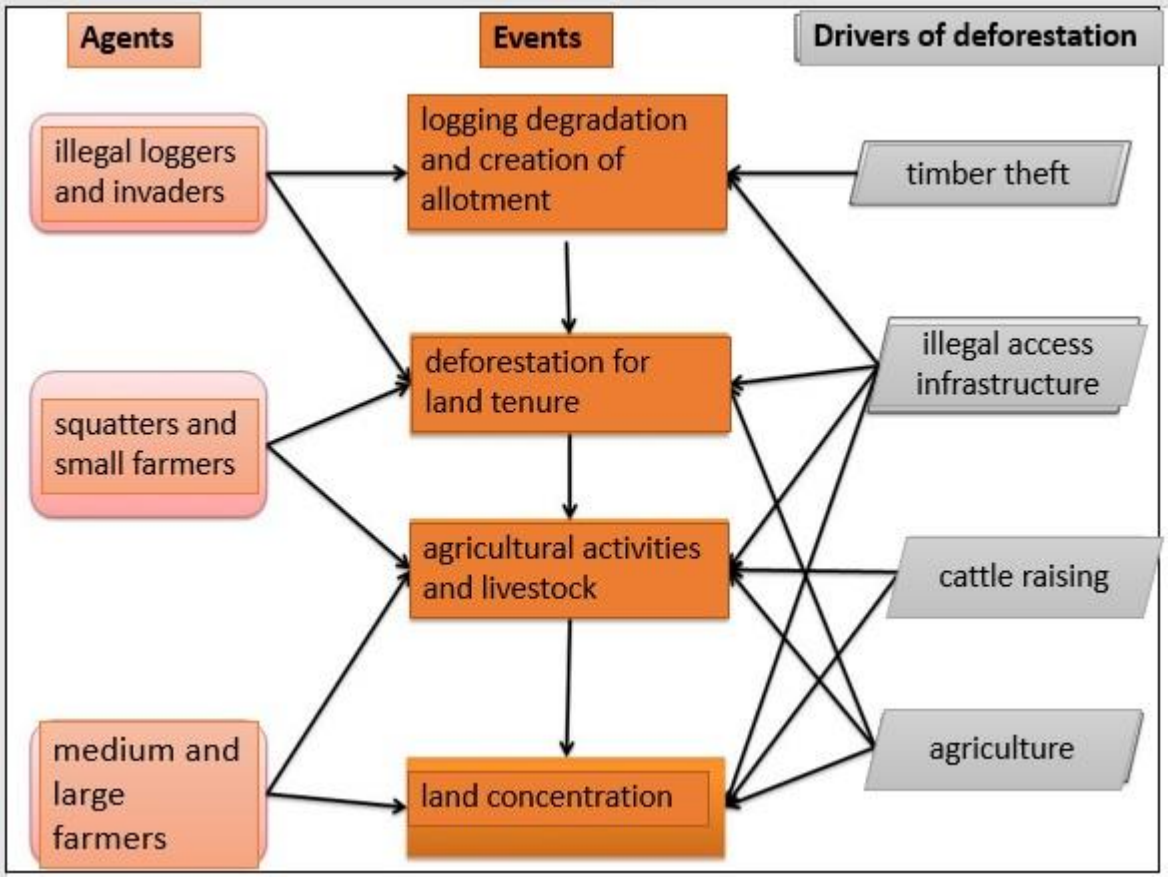


Figure 28. Event chain scheme that causes deforestation in the reference region.

Conclusion

Based on statistics from the IBGE (2013), INPE (2013), INPE and EMBRAPA (2012), field studies (RIOTERRA, 2013), associations documents (ASMOREX, GT-Resex), reports (WWF, 2008) consultation with representatives of local institutions (SEDAM, CDREX, UNIR) it is possible to find conclusive evidence that the relationship between agents, drivers and underlying causes of deforestation can explain the pressure on the remaining forests in the reference region of the Resex Rio Preto-Jacundá. The hypothesis is that the agents and drivers identified will influence in new fronts of deforested areas, and thus demand for new areas for agricultural activities, helped by land tenure insecurity, political factors and the impunity of environmental crimes. In this sense, it is expected that the trend for future baseline is to maintain the influence of agents and drivers shown during the historical period analyzed in the reference region, with risk to reduction of existing extractive reserves boundaries.

Step 4 VM0015 – Projection of Future Deforestation

Quantity projection of future deforestation (Step 4.1)

The reference region does not have stratified limits, since the agents, vectors and causes of deforestation were considered equal in all its area.

Selecting the Baseline Approach

The approach "a" (historical average) was selected to design the baseline deforestation as indicated in step 4.1.1 VM0015 methodology. The choice of this approach was the fact that the deforestation rate observed during the historical reference period does not reveal a single trend behavior. The observed rate showed an increase in the early years (2001-2003), reduction between 2004 and 2009 and a further increase from 2010 (Figure 23).

The evidence presented in Step 3 were conclusive and explain the influence of agents and drivers in the historical deforestation noted, however, none identified variable showed a direct correlation with the annual deforestation rates and they were not suitable to model future deforestation.

A correlation analysis between the data collected from timber production and cattle was performed (IBGE/SIDRA) in the project region during the historical reference period and deforestation evidenced at the same period. Figure 29 and Figure 30 show that there was no clear and direct correlation between the two variables and deforestation, so we opted for the approach "a" to project the baseline of future deforestation.

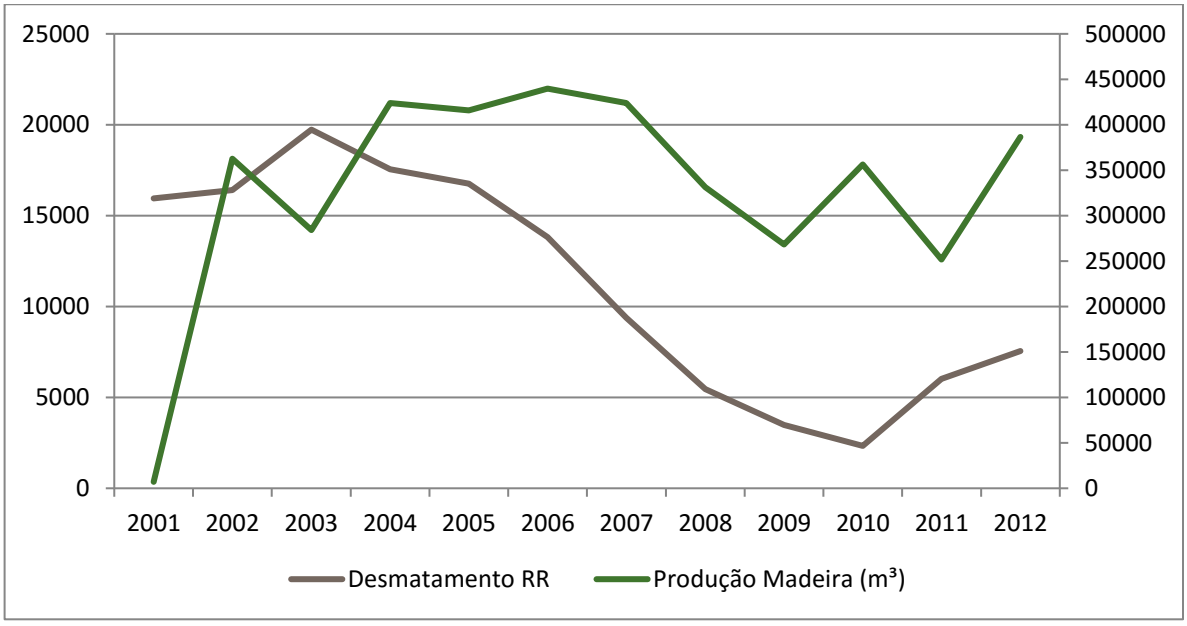


Figure 29. Correlation between deforestation seen in Reference Region and the production of wood in the region.

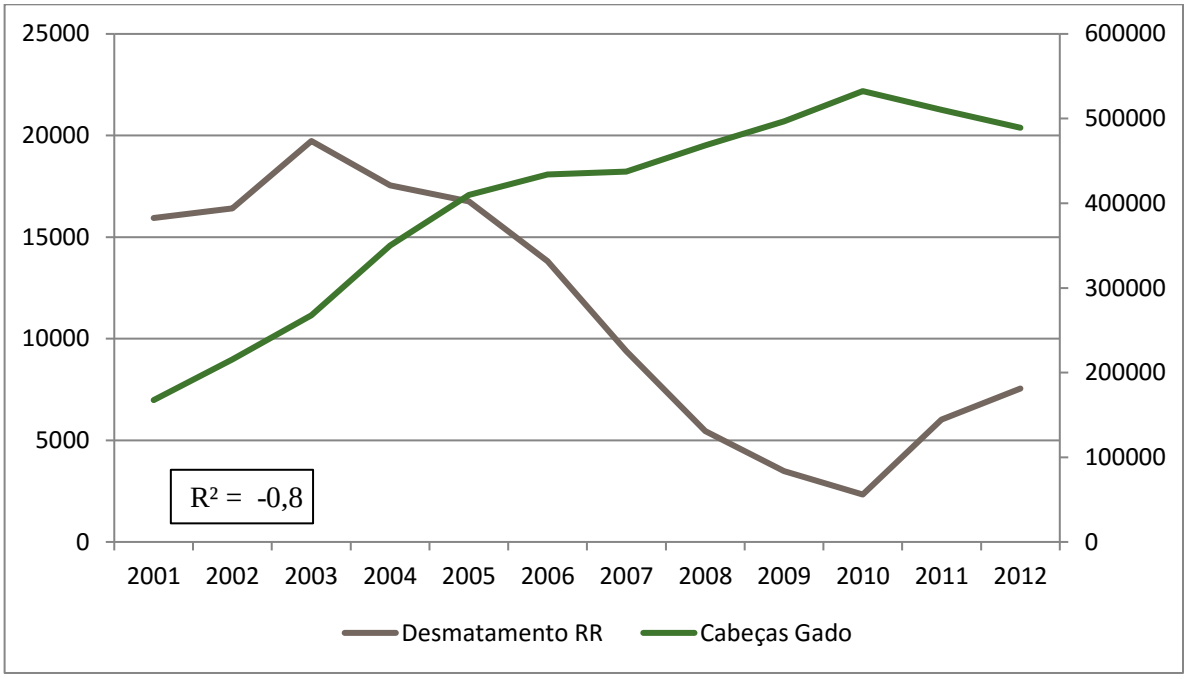


Figure 30. Correlation between deforestation seen in Reference Region and the effective cattle herd in the region

Annual projection of the baseline deforestation areas in the reference region

The annual baseline deforestation in year t for the reference region was calculated as indicated in equation 03 of VM0015 Methodology:

$ABSLRR_{i,t} = ARR_{i,t-1} * RBSLRR_{i,t}$

Where:

$ABSLRR_{i,t}$: annual area of baseline deforestation in stratum i within the reference region at year t (ha yr-1).

$ARR_{i,t-1}$: area with forest cover in stratum i within the reference region at year t-1 (ha)

$RBSLRR_{i,t}$: Deforestation rate applicable to stratum i within the reference region at year t (%)

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

i: 1, 2, 3 … I_{RR}, a stratum within the reference region; dimensionless

The deforestation rate observed between 2000 and 2012 was obtained using the equation 07 indicated in Puyravaud (2003), and the value was 2.21%. The projected deforestation for 30 years (2013-2042) in the reference region is presented in Table 20.

Projected annual areas of baseline deforestation in the Project area and leakage belt

The baseline deforestation for the project area and leakage belt is designed spatially throughout the reference region as step recommendation 4.2.4 of VM0015 Methodology.

Summary of quantitative deforestation projection

This section presents the values of future deforestation projected for the period 2013-2042 in the reference region (Table 20) in the project area (Table 21) and the leakage belt (Table 22).

Table 20. Annual and cumulative deforestation for Reference Region until 2042 (Table 9 of VM0015 methodology)

Project year *t*	Stratum *i* in the reference region	Total	
	1	annual	cumulative
	$ABSLRR_{i,t}$	$ABSLRR_t$	ABSLRR
	ha	ha	ha
2013	9,781	9,781	9,781
2014	9,564	9,564	19,345
2015	9,352	9,352	28,697
2016	9,145	9,145	37,842
2017	8,943	8,943	46,785
2018	8,745	8,745	55,530
2019	8,552	8,552	64,082
2020	8,362	8,362	72,444
2021	8,177	8,177	80,621
2022	7,996	7,996	88,617
2023	7,820	7,820	96,437
2024	7,646	7,646	104,083
2025	7,477	7,477	111,560

Project year *t*	Stratum *i* in the reference region 1 $ABSLRR_{i,t}$ ha	Total annual $ABSLRR_t$ ha	Total cumulative ABSLRR ha
2026	7,311	7,311	118,871
2027	7,150	7,150	126,021
2028	6,991	6,991	133,012
2029	6,837	6,837	139,849
2030	6,685	6,685	146,534
2031	6,537	6,537	153,071
2032	6,393	6,393	159,464
2033	6,251	6,251	165,715
2034	6,113	6,113	171,828
2035	5,977	5,977	177,805
2036	5,845	5,845	183,650
2037	5,716	5,716	189,366
2038	5,589	5,589	194,955
2039	5,466	5,466	200,421
2040	5,345	5,345	205,766
2041	5,226	5,226	210,992
2042	5,111	5,111	216,103

Table 21. Annual and cumulative deforestation for the project area until 2042 (9.b table VM0015 methodology)

Project year *t*	Stratum i of the reference region in the project area 1 $ABSLPA_{i,t}$ ha	Total annual $ABSLPA_t$ ha	Total cumulative ABSLPA ha
2013	867	867	867
2014	1,254	1,254	2,121
2015	1,274	1,274	3,395
2016	1,291	1,291	4,686
2017	1,425	1,425	6,111

Project year *t*	Stratum i of the reference region in the project area	Total	
	1	annual	cumulative
	$ABSLPA_{i,t}$	$ABSLPA_t$	ABSLPA
	ha	ha	ha
2018	1,209	1,209	7,320
2019	1,314	1,314	8,634
2020	1,288	1,288	9,922
2021	1,277	1,277	11,199
2022	1,113	1,113	12,312
2023	1,246	1,246	13,558
2024	1,310	1,310	14,868
2025	1,525	1,525	16,393
2026	1,306	1,306	17,699
2027	1,026	1,026	18,725
2028	1,086	1,086	19,811
2029	1,102	1,102	20,913
2030	1,335	1,335	22,248
2031	1,332	1,332	23,580
2032	1,118	1,118	24,698
2033	1,136	1,136	25,834
2034	955	955	26,789
2035	915	915	27,704
2036	901	901	28,605
2037	1,009	1,009	29,614
2038	1,074	1,074	30,688
2039	1,440	1,440	32,128
2040	942	942	33,070
2041	1,289	1,289	34,359
2042	1,039	1,039	35,398

Table 22. Annual Deforestation and accumulated for the Leakage Belt until 2042 (Table 9.c of VM0015 methodology)

Project year *t*	Stratum i of the reference region in leakage belt 1 $ABSLLK_{i,t}$ ha	Total	
		annual $ABSLLK_t$ ha	cumulative ABSLLK ha
2013	350	350	350
2014	367	367	717
2015	287	287	1,004
2016	289	289	1,293
2017	374	374	1,667
2018	430	430	2,097
2019	393	393	2,490
2020	447	447	2,937
2021	193	193	3,130
2022	494	494	3,624
2023	563	563	4,187
2024	467	467	4,654
2025	221	221	4,875
2026	461	461	5,336
2027	385	385	5,721
2028	516	516	6,237
2029	591	591	6,828
2030	504	504	7,332
2031	618	618	7,950
2032	408	408	8,358
2033	523	523	8,881
2034	394	394	9,275
2035	408	408	9,683
2036	329	329	10,012
2037	553	553	10,565
2038	502	502	11,067
2039	610	610	11,677
2040	643	643	12,320
2041	485	485	12,805

Project year *t*	Stratum i of the reference region in leakage belt	Total	
	1	annual	cumulative
	$ABSLLK_{i,t}$	$ABSLLK_t$	ABSLLK
	ha	ha	ha
2042	417	417	13,222

Projection of Location of Future Deforestation (Step 4.2)

To project the location of future deforestation was used Dinamica-EGO software version 2.0.10. This software is indicated by VM0015 method (p. 51) as an appropriate program for REDD projects baseline modeling. The selection of Dinamica-EGO is justified for the following reasons: a) is a model available in scientific publications of Soares-Filho et al. (2006), Yanai et al. (2012) and Vitel et al. (2013); b) has transparent process for input and output of data and parameters processed graphical interface easy to understand; c) incorporates the use of appropriate data to explain the location of deforestation; d) have appropriate tool for evaluating uncertainties (HAGEN, 2003).

The main steps performed with Dinamica-EGO at this stage were: (i) organization of map of land use and land cover, and maps with the explanatory factors of deforestation; (ii) calibration model by determining the weight of evidence and analyzing correlations between variables; (iii) accuracy assessment of the model; (iv) development of baseline scenarios of deforestation. In Dinamica-EGO were used spatial data with pixel size of 100 x 100 meters, GeoTIFF format, the size of 1,431 rows by 879 columns.

Preparation of the map of factors

This step was performed using the empirical approach to creating maps factors shown in Table 23 below. Studies on deforestation in the Amazon show that maps distances and spatial attributes of the landscape (distance roads, old deforestation areas, vegetation type etc.) have high correction with the location of new deforestation (Imazon, 2011). To prepare the risk map and calibrate the model, Dinamica EGO requires spatial variables input be independent before using them. Thus, there were used 6 independent spatial variables to produce deforestation risk map, as described above in Step 3.

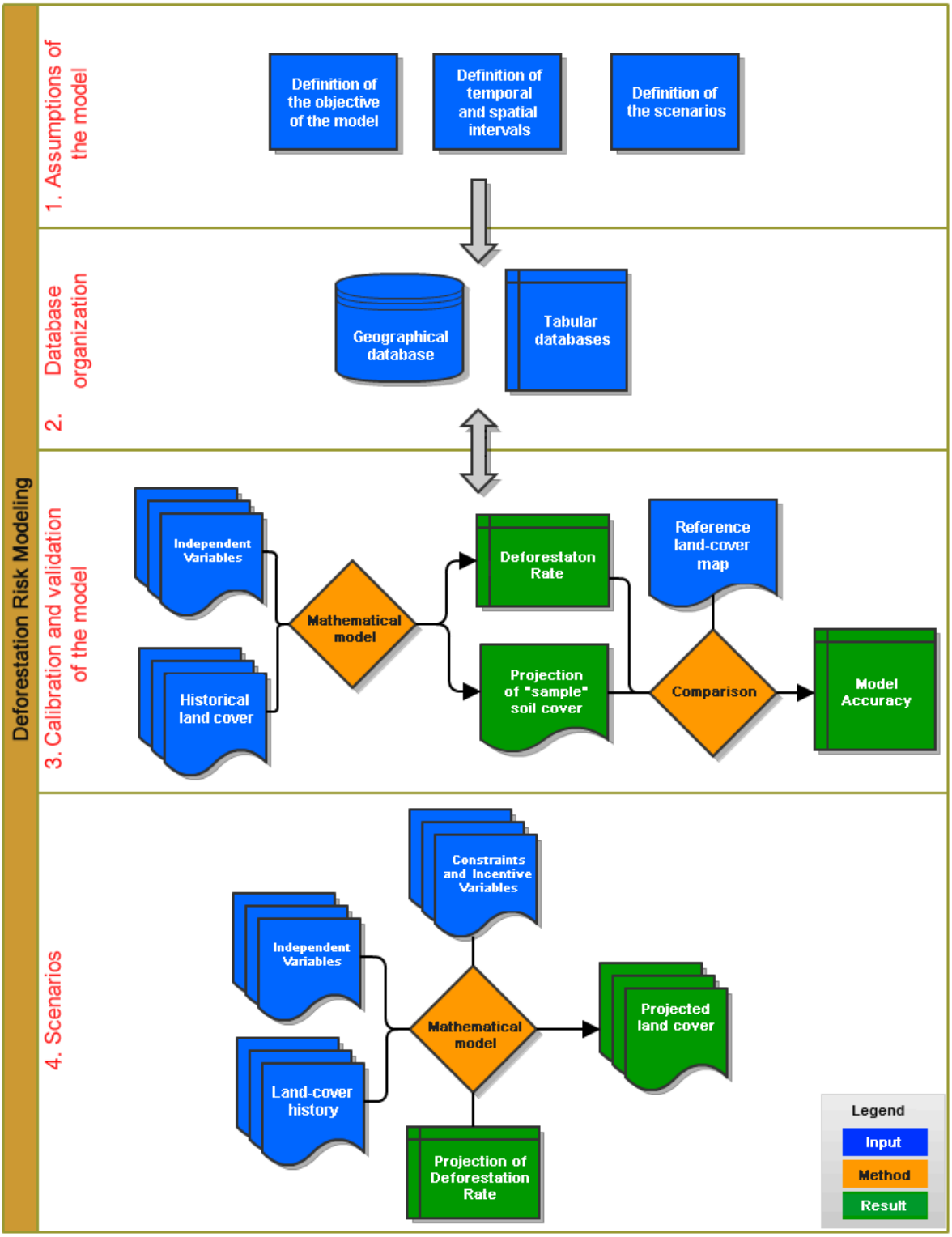


Figure 31. Flowchart of deforestation projection model

Table 23. List of maps, variables and factors maps (Table 10 VM0015)

Factor Maps		Source	Variable represented		Meaning of the categories or pixel value		Other Maps and Variables used to create the factor Map		Algorithm or Equation used
ID	File Name		Unit	Description	Range	Meaning	ID	File Name	
1	distance_to_1	INPE	Metros	Dados contínuos		Distance from old deforestation areas	1	lulc2000.tif	Distância euclidiana (Dinamica EGO 2.0.10)
2	d_estrada	DSG	Metros	Dados contínuos		Distance from roads	2	estradas.shp	Distância euclidiana (ArcGIS 10.1)
3	legal_status	INCRA e MMA	Categorias	Legal status of the área	1 to 3	1 = Assentamentos; 2 = Unidades de Conservação; 3 = Propriedades Privadas e áreas não destinadas.	3	assentamento.shp UC.2010t.shp	-
4	veget	IBGE	Categorias	Vegetation Type	1 to 4	1 = Floresta Ombrófila Aberta. 2 = Floresta Obrófila Densa. 3 = Formações Pioneiras. 4 = Savana	4	vegetacao_diss.shp	-
5	slope	INPE	Categorias	Slope categories	1 to 5	1 = Plano 2 = suave ondulado 3 = ondulado 4 = Forte	5	declividade.tif	-

Factor Maps		Source	Variable represented		Meaning of the categories or pixel value		Other Maps and Variables used to create the factor Map		Algorithm or Equation used
ID	File Name		Unit	Description	Range	Meaning	ID	File Name	
						Ondulado 5 = montanhoso			
6	solo	IBGE	Categorias	Soil types	1 to 8	1 = Argissolo 2 = Espodossolo 3 = Gleissolo 4 = Latossolo 5 = Neossolo 6 = Plintossolo 7 = Hidrografia 8 = Afloramentos de rochas	6	pedologia.shp	-

Preparation of maps of deforestation risks

Deforestation risk maps show the regions with the highest (risk = 1) or lower conditions to occur deforestation (risk = 0). In this project the risk map was produced by the evidence weights method (BONHAM-CARTER, 1994), available in Dinamica EGO, which calculates the probability of forest transition to deforested area in each pixel of the reference region. This probability is calculated based on the sum of all the evidence weights which overlap at a particular pixel and are dependent on combinations of all the static and dynamic map (Soares-Filho et al. 2006).

The result of applying the evidence weights method in Dinamica-EGO is a map of deforestation risk (Figure 32). This risk map identifies areas with higher and lower conditions to occur deforestation. The spatial variables shown in Table 23 together with the deforestation risk map are the starting point for the generation of baseline future scenarios deforestation.

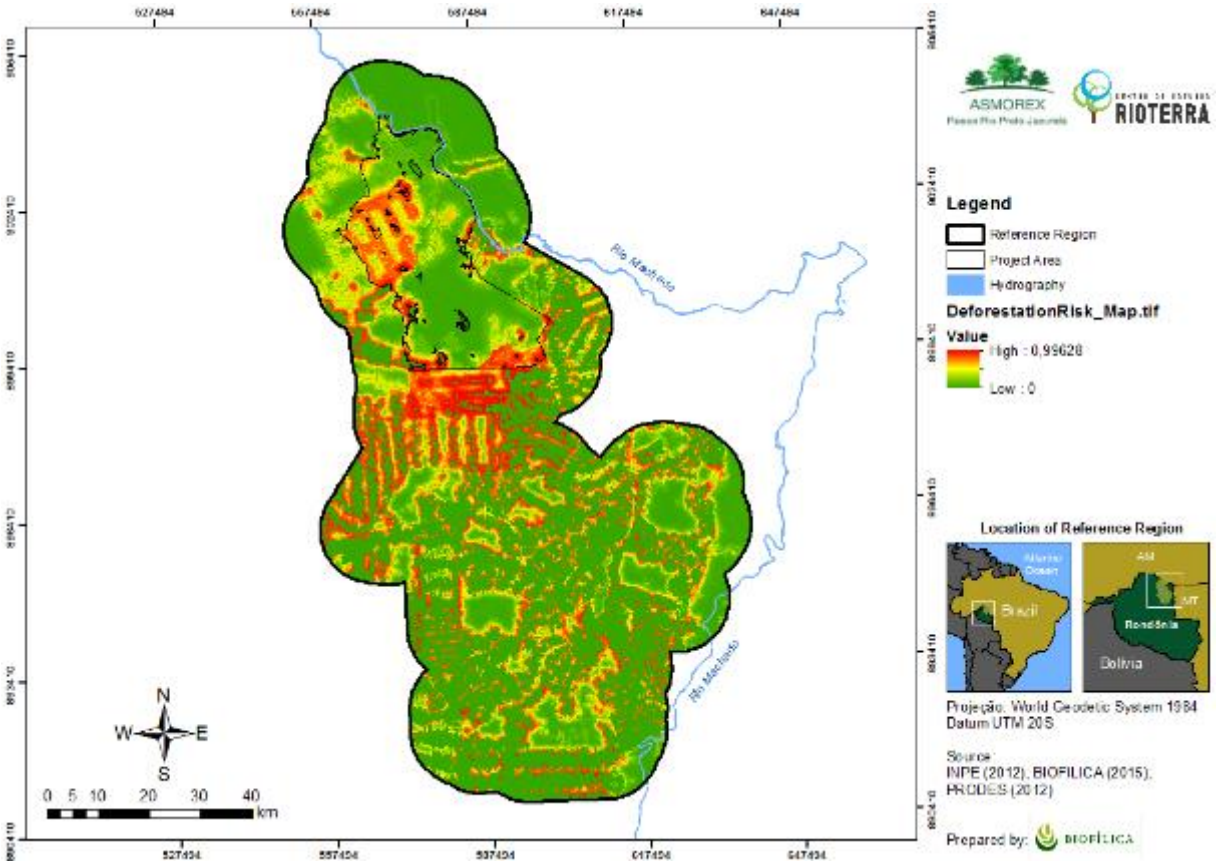


Figure 32. Transition potential map for the occurrence of deforestation in the reference region using Dynamic Ego

Selecting the more accurate deforestation risk map

To assess the quality of the generated model, the "a" (calibration and confirmation by using two periods of years) available methodology VM0015 version 1.1, was selected (page 53). Deforestation data occurred between 2000 and 2007 were used to calibrate the model, while the deforestation occurred map until 2012 was used for the confirmation process. In this process, a map of deforestation for the year 2012 was simulated from the data observed in the years 2000-2007.

The FOM technique (Figure of Merit) was applied to evaluate the accuracy of the simulated map in 2012. The FOM result is due to the intersection of the observed changes (changes between the reference map at time 1 and time 2) and simulated changes (changes between the reference map at time 1 and the reference map at time 2) to the union of change observed and the expected variation, as defined in equation 9 VM0015 methodology.

The VM0015 methodology indicates that the minimum threshold for the best fit measured by FOM should be defined by the net change observed in the reference area for model calibration period. The net change observed should be calculated as the total area of change being modeled in the

reference area during the calibration period as a percentage of the total area of the reference area and the FOM value should the minimum equivalent to this amount. If the FOM value is below this threshold, the project proponent must demonstrate that at least three models were tested (resulting in at least three risk maps), and the one with the best FOM should be used.

The threshold of net changes observed in the reference region was 0.15, and the FOM value obtained by applying the equation 9 VM0015 was 0.86 (Figure 33), as well as the FOM for the first produced risk map is above the minimum threshold, so it was not necessary to produce other models to perform the allocation of future deforestation (Step 4.2.4 VM0015). Thus, the deforestation risk map developed at this stage showed acceptable accuracy to design land use changes until 2042 in the reference region of Resex Rio Preto-Jacundá REDD+ Project.

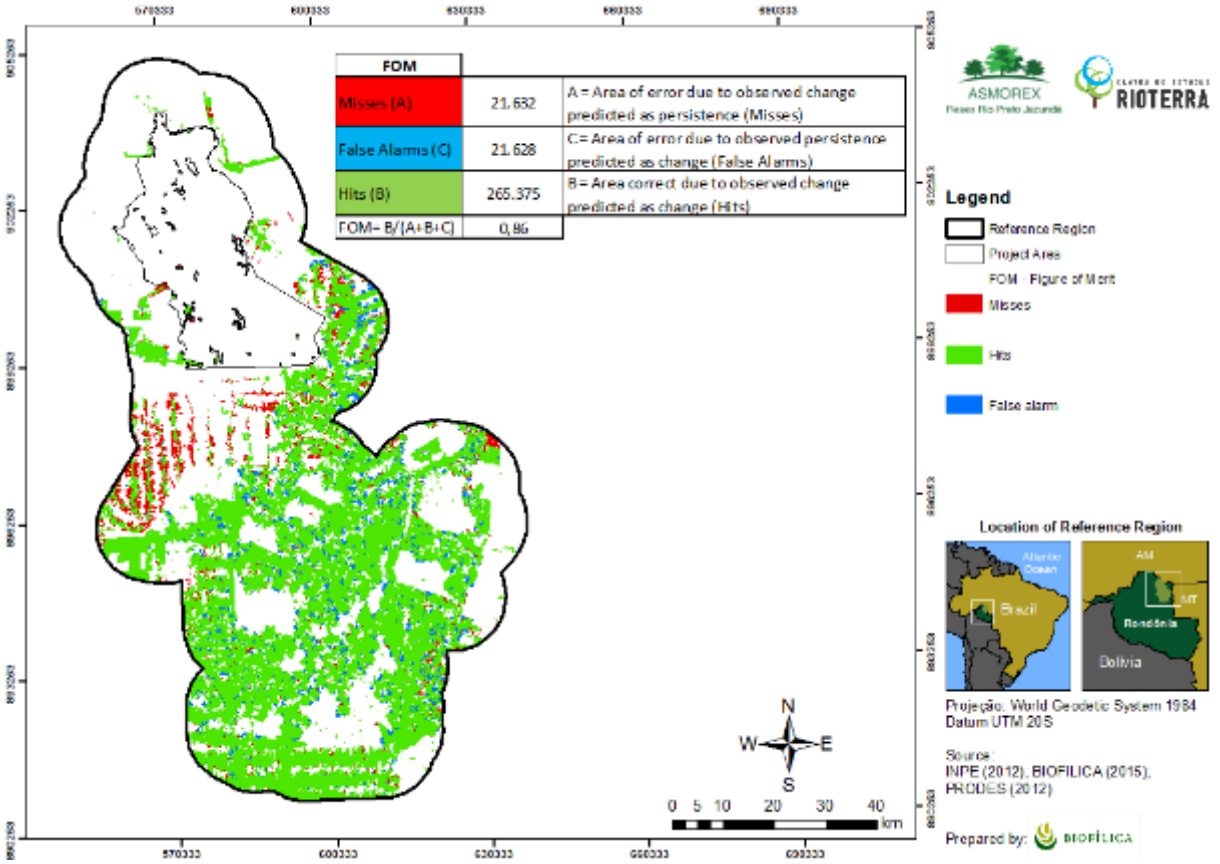


Figure 33. Statement of assessment method with FOM tool.

Mapping of location of future deforestation

The procedure of selecting pixels with increased risk of deforestation and preparation of baseline maps of future deforestation, were executed automatically by Dynamic Ego program. Thus, the

mapping of future deforestation by the year 2042 is designed for the whole reference area (Figure 34). Figure 35 shows the deforestation in the reference region for the first baseline fixed period.

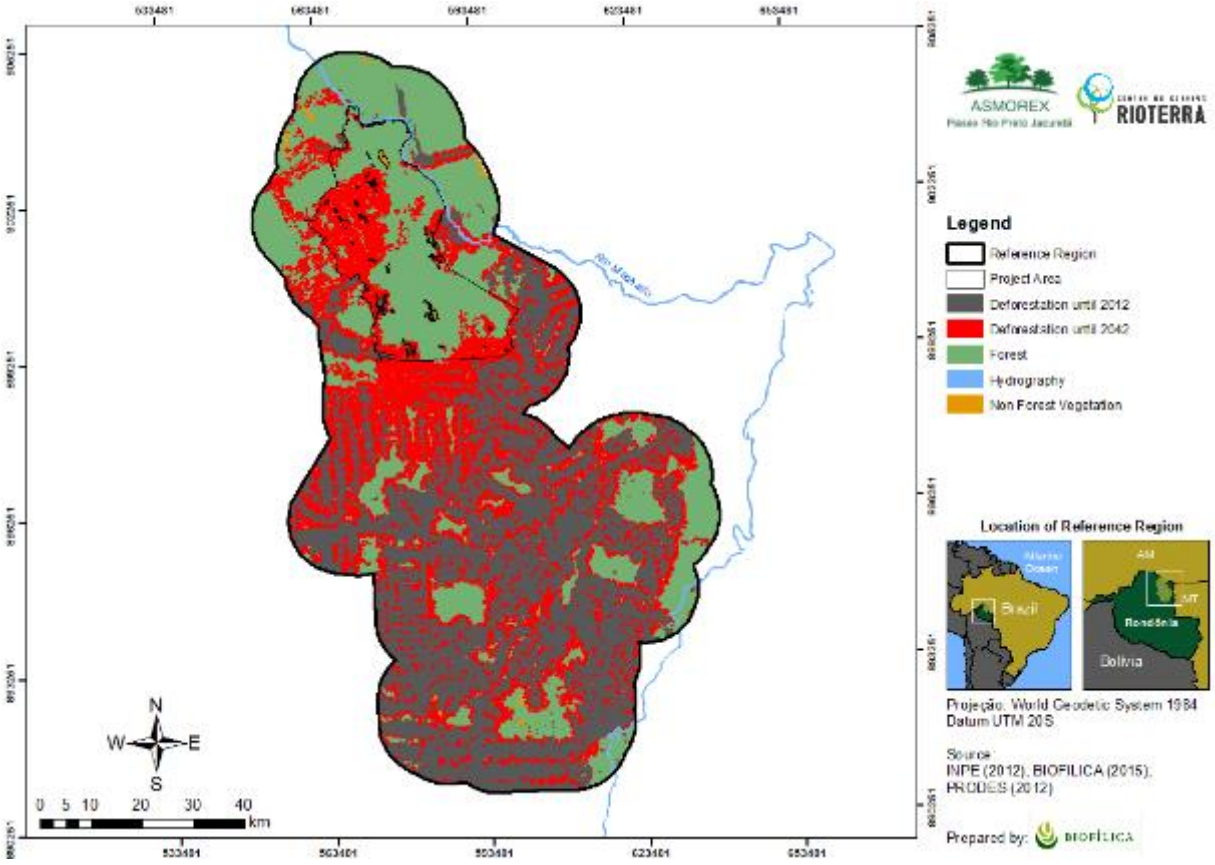


Figure 34. Baseline deforestation in the reference region for the year 2042.

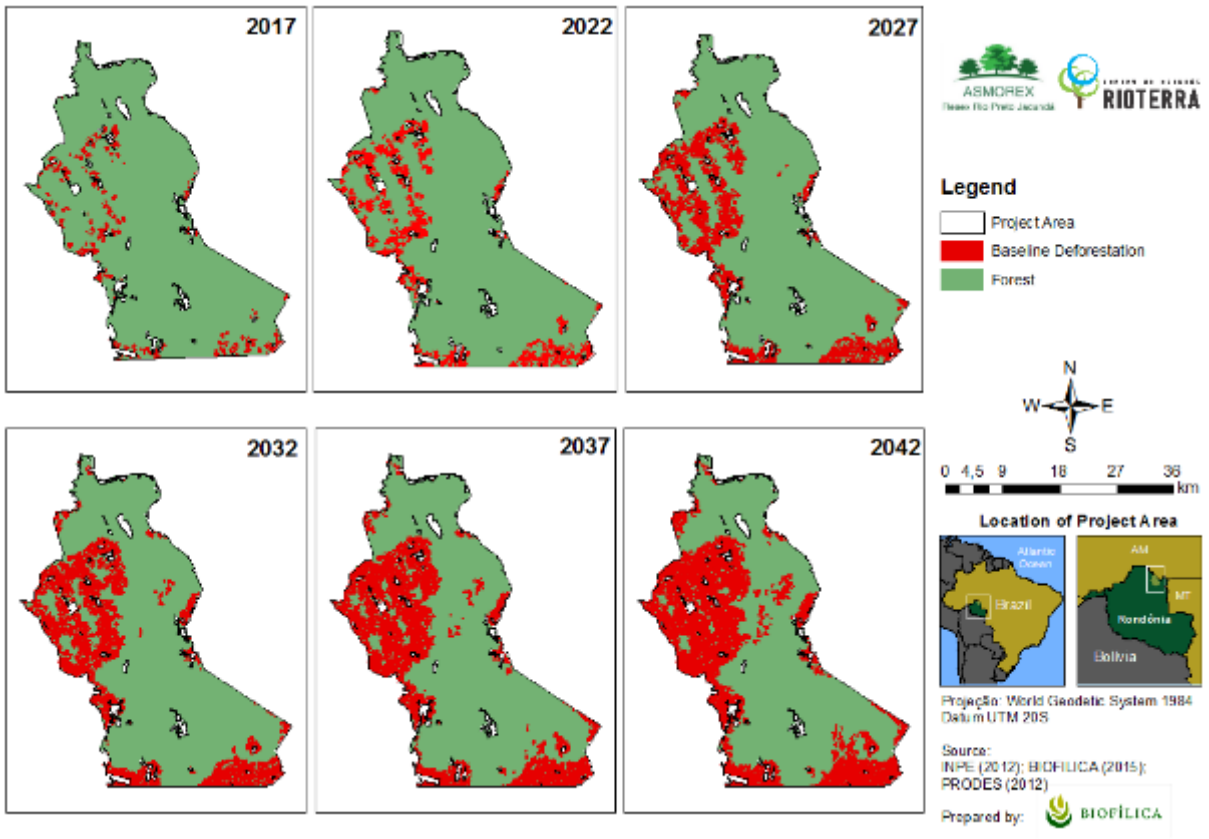


Figure 35. Projection of deforestation using Dinamica EGO

4.6. Additionally

Reductions in greenhouse gas emissions envisaged in the baseline scenario in Resex Rio Preto-Jacundá project will be achieved based on the institutional strengthening of the population living in Resex as to prevent harassment of drivers of deforestation and weaken their actions. Thus, the activities listed by the community consider the primordial seven themes improvement and continuity of Resex RPJ, as per item 2.2. Project activities.

The additionally of the project was analyzed according to the tool approved by VCS " VT0001 - Tool for the Demonstration and Assessment of Additionally in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities ", version 3.0, of February 1, 2012.

The tool's applicability conditions are met because:

- The AFOLU activities are equal or similar to the proposed activities of the project within their respective limits or registered as VCS AFOLU project, and do not lead to a breach of any applicable law even if this law is not applied; and

- The VM0015 baseline methodology provides a step-by-step approach to justify the determination of the most plausible baseline scenario (see "Part 2 - Methodology Steps for ex ante estimation of GHG Emissions Reductions " of VM0015).

Step 1. Identification of alternative scenario of use of land proposed by the activity of the Project VCS AFOLU

Sub-step 1a. – Identify alternative scenarios of land use credible to Project activities proposed VCS AFOLU

Among the alternative scenarios of realistic and credible soil use that would occur within the project boundary in the absence of AFOLU project activity registered in the VCS, were considered:

I. Continuation of the pre-project land use (baseline scenario)

In this scenario, the deforestation agents and drivers continue working to maintain the attacks on Resex RPJ area, which has community occupation restricted to south and riverside, keeping the chain of events involving illegal logging, opening roads, clearcutting as land tenure sign and agricultural and pasture crops. This scenario has intensified in recent years, maintaining the dynamic characterization of Resex, especially in Cujubim portion and the riverside of Rio Machado. Residents keep a contractual partnership with the company operating the timber resources, being treated exclusively as timber production unit, and remains the discontinuity of extractive culture and obtaining income from alternative sources, such as non-wood products as well as keeps dependence on income from timber management. In this scenario, the expected deforestation is 35,222 hectares in the project area, generating emission 14,128,224.6 tCO2e.

Under the supervision and state management, full of RESEX implementation would be limited by the shortage of human and financial resources for the State Protected Areas, which currently carry out monitoring by denouncing after the invasion of events and timber theft have occurred and such as opposing political forces to the existence of the PA and traditional peoples.

II. Containing deforestation by Sedam action without other REDD+ activities

Another credible scenario is the maintenance of the Sedam monitoring financed from the resources of ARPA, Program Ministry of the Environment which entered a new phase recently and has invested more than R$ 160,000[13] between September and October 2015. Command and control actions may contain deforestation and degradation within Resex, leading the shares upon complain. However, the situation of human and social capital weakened and mischaracterization of Resex could be maintained because this scenario does not guarantee

[13] Data resource: Sedam.

the strengthening of local governance and manage on timber management, community organization and rapprochement with the extractive use of the forest, measures that would ensure long-term occupation of Resex by its residents and which have succeeded in the southern part of the area.

III. Project activities without being registered as VCS AFOLU project

The project activities without registration as AFOLU consist in Sedam surveillance operations that could be enhanced with ARPA resources, following the dynamics of withdrawal of invaders, equipment and hardwoods cut illegally in Resex.

The Multiple Use Management Plan to be approved soon by Sedam made use of REDD design elements in their development, such as zoning and biodiversity monitoring, and will guide managers and residents of RESEX in income-generating activities and sustainable use of forest, facilitating social organization 'access to these extractive activities.

The additional investment required in this scenario is sufficient only for Sedam surveillance operations, which are not systematic and preventive. Moreover, the extractive and riverside people do not have conditions shouldering or seek resources for themselves in the implementation of the proposed activities (their "Life Plan" with forest conservation), or if they have the resources, these are poorly managed and do not count with the governance structure established for REDD+ Project. Currently, the source of income that supports the activities of Asmorex comes largely from logging in the area, serving to sustain the Asmorex basic infrastructure, improvements in community structures and the distribution of income for each family.

Sub-step 1b. – Consistence of scenarios of credible land use with laws and applicable regulations

Scenario II and III: is in compliance with applicable laws and regulations;

Scenario I: it is not in compliance with applicable laws and regulations. This is because the action of deforestation agents working in RESEX is intrinsically linked to illegal activities, since the extractive reserve, created under State Decree has the purpose "ecological and social" protection to the traditional way of life extractive and riverside combined with conservation of forest cover, and most of the current deforestation is caused by illegal activities by external agents to RESEX. For these reasons, the legal requirements are not being applied in the region.

A recent study by Imazon (2015)[14], indicate RRPJ among the 50 Protected Areas most critical in deforestation of the Amazon with 0.25% of its total area are deforested in the period, and ranks low

[14] Imazon. Áreas Protegidas Críticas na Amazônia no Período de 2012 a 2014. Junho de 2015

degree of implementation, ie absence of multiple use management plan and sufficient human and financial resources, explicit guarantees in decree that create RESEX.

The Resex RPJ is located at municipalities of Machadinho D'Oeste and Cujubim, which are considered as the smallest administrative unit that encompasses the project area considering the Brazilian territorial organization divided among federal, state and municipal government.

According to the environmental regulations, laws: 12,651 of 2012; 9,605 of 1998 and State Decree No. 6,514 of 2008, the suppression of native vegetation can only occur with prior environmental license issued by the responsible management agency.

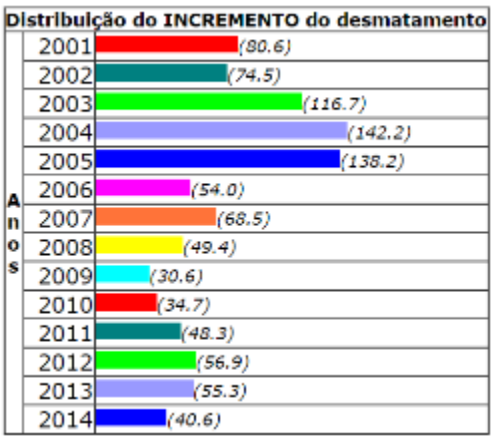
There was an increment of deforestation and an increase in the total deforested area in both municipalities. Comparing the data obtained by PRODES[15] with environmental licenses granted by SEDAM (responsible environmental agency)[16], there has been a clear discrepancy between the data. The Cujubim municipality has licenses with a total area of 4,523 hectares and in Machadinho D'Oeste totaling 859 hectares of areas with potential legalized exploitation.

Thus, it can be concluded that the suppression of native vegetation occurred an illegal situation due the lack of approval by the environmental agency (SEDAM). Note that in this administrative region the occurrence of deforestation from illegal activities represents 41% and 36% of the total area of the municipality of Cujubim and Machadinho D'Oeste, respectively, which shows that the mandatory law is systematically not enforced and that non-compliance with those requirements.

[15] http://www.dpi.inpe.br/prodesdigital/atrmunic.php?ID=1100940&ano=2014&
http://www.dpi.inpe.br/prodesdigital/atrmunic.php?ID=1100130&ano=2014&

[16] http://monitoramento.sedam.ro.gov.br/simlam/

Classes	2014	
	Área (ha)	%
Total deforestation	1632.2	41.81
Increment/previous year	40.6	1.04



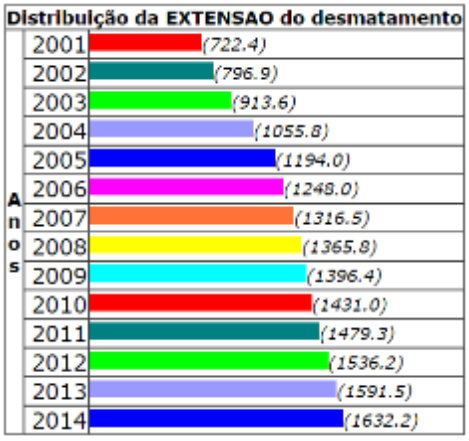
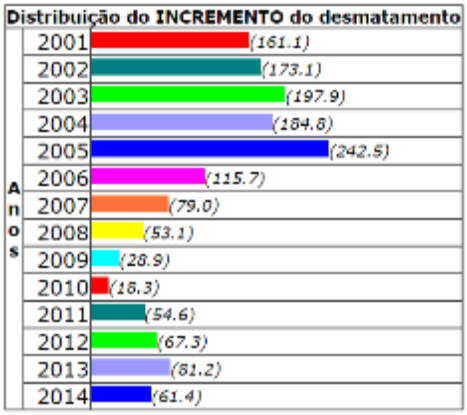


Figure 36. Distribution of increment and extension of deforestation in Cujubim

Classes	2014	
	Área (há)	%
Total deforestation	3077.7	35.83
Increment/previous year	61.4	0.71



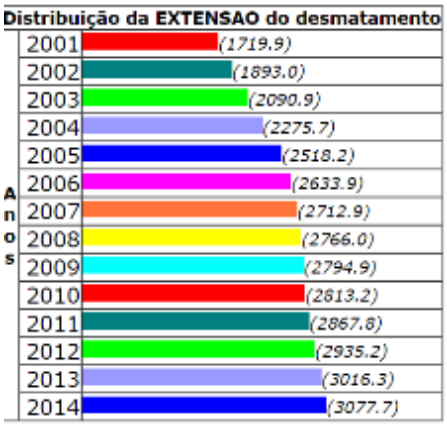


Figure 37. Distribution of increment and extension of deforestation in Machadinho D'Oeste

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

As described in Section 4, sub item 2.4 Baseline Scenario.

Step 2 – Analysis of Investment

The VCS " VT0001 - Tool for the Demonstration and Assessment of Additionally in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities - orders the investment analysis (Step 2) or barrier analysis (Step 3). In this case, we opted for the Barrier Analysis, described below.

Step 3 – Barrier Analysis

This section shows how the project activities would not occur without the income from the sale of greenhouse gas emission reductions credits.

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

A. Institutional barriers:

Lack of legislation enforcement: Amazon Protected Areas should serve as effective measures against deforestation. The Extractive Reserves maims according to the National System of Conservation Units (SNUC) Law 9985/2000, to protect the livelihoods and culture of traditional extractive populations and ensure the sustainable use of its natural resources. But many of them are in critical situation of deforestation, affected by improper exploitation of its resources, illegal occupations, poor supervision and poor implementation. According Prodes data between August 2012 and July 2014 were 1.531 million hectares deforested in the Amazon, 10% of them occurring in 160 protected areas. Imazon (2015), states that the sustainable use protected areas represent 95% of all protected areas in critical condition of deforestation, among these 15% are Resex. Between 50 UCs in critical deforestation Imazon presented in the report (2015), 11 are located in the state of Rondônia, 4 of them extractive reserves, which proves the lack of implementation of legislation relating to protected areas in the state. According Fachinello (2013), a study that evaluated the problems in PAs management of Rondônia, some public officials point out as to Resex destination livestock and timber management only in what concerns the degree of adulteration of these community areas.

B. Barriers related to lack of organization of local communities:

In general, the associations and unions are more representative on paper than in operational activities. The study Fachinello (2013) cites the example of Coopflora (Cooperative forest tissues) in Rondônia, which mismanagement problems into debt and was forced to stop production, exchange the board and reorganize their activities. Thus, the cooperative initiatives are few that actually organize the production process, transfer and commercialization, leading to greater vulnerability of extraction. There is lack of

support for collective and social entrepreneurship with a view to consolidating and strengthening local organizations.

The Socio-Economic Study of the project, conducted by CES Rioterra (2013) identified that the municipalities of Machadinho and Cujubim associations and cooperatives are incipient resulting in numerous local losses, as external decisions override the internal because of weak local organizations.

C. Barriers related to local tradition:

Customs and traditional practices and market conditions: According Fachinello (2010), the productive chain of NTFPs in Rondônia presents fragile and craft structure. Moreira (2010) highlights in research on Resex Aquariquara the low economic efficiency of extractive activity, coupled with the lack of education and managerial capacity of extraction, keeping the children living in the city to study and have other opportunities. Also stands out in the extraction "atravessador" figure who acquires the community production and distributes it to local and major cities vendors, causing disadvantage to extractive due to low trading values (Meldrado et al, 2014). One of the questions attributed to marketing difficulty is the isolation of communities affected by logistical difficulties and high transport costs for disposal of production. Also according to Fachinello (2010), some Extractive Reserves practically do not collect NTFPs for selling anymore, getting the hand labor dedicated exclusively to timber management plans.

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

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

Step 4 – Analysis of common practice

Extractive reserves of Rondônia state have suffered from a lack of financial and human resources invested in the maintenance and welfare of the residents who live there. Financial resources available in the ARPA program have been a differential but are insufficient on the issue of maintaining the forest cover of the protected areas as well as in the characterization of the same, which has been losing space for agricultural activities and logging (Figure 30).

An analysis of the extractive state reserves shows that the activities proposed by the project are not common practices: there is no management of structured plans as well as planning activities ranging from reducing deforestation to the rescue of the traditional riverside and extractive way of life.

Fact is that many were created on paper, but have not yet been implemented, lacking minimum conditions to perform their goals (GTA, 2008).

The Jaci-Paraná Resex is an emblematic case of violation of environmental laws and human rights. Located in the municipalities of Porto Velho and Nova Mamoré RESEX was created via state Decree the same year as the Rio Preto-Jacundá (1996), and that same year a law lowers its limits at 6.7%. Police operations in the area arrested the RESEX invaders, however, they were soon released, which opened precedent for the intensification of invasion in the area, while the residents were forcibly expelled from the land and threatened with death leaders. The Resex currently has 32% of its deforested area (INPE, 2015), as shown in **Figure 38.**

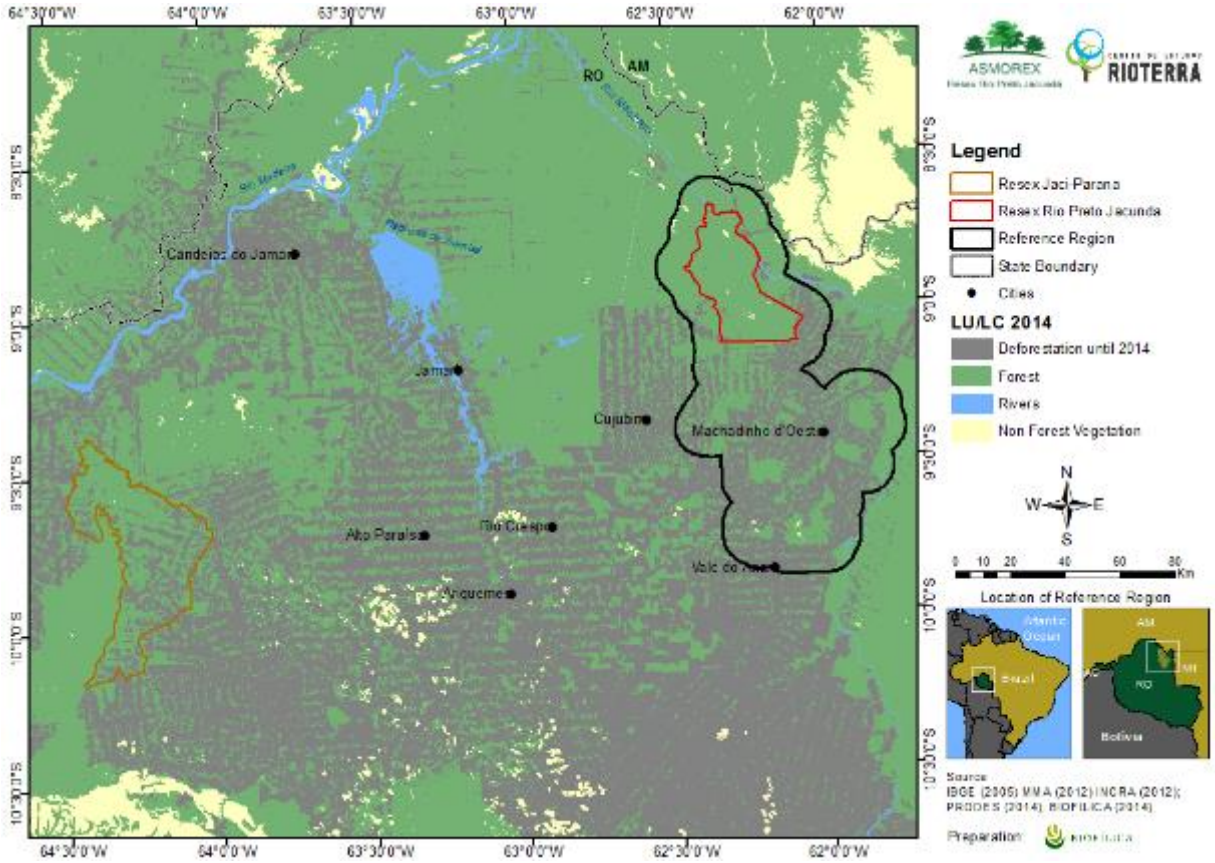


Figure 38. Location of Resex Jaci-Paraná

In 2014, the Rondônia legislative assembly approved the project of Legislative Decree 143 quenching RESEX under justification of the characterization of the area as such category of UC.

Another iconic case occurred in 2005 when the president of the Rubber Tappers Association of Anari Valley was murdered in Resex Aquariquara, crime possibly driven by wood theft complaints within the reserve (unproven). Invasions have been increasingly violent, which has demanded the

government inspection operations with large police contingent and high investments. The fear is great among the extractive community of Rondônia, and in RESEX Rio Preto-Jacundá could not be otherwise.

Another case that needs to be highlighted is the Resex do Rio Cautário, in the municipality of Costa Marques, where there is land grabbing, timber theft, illegal logging and threat to the life of the rubber.

In a letter signed by the Organization of Rubber Tappers of Rondônia (OSR) in 2005 for the Ministry of Environment, the main causes for these problems are:

- Absence of a Multiple Use Management plan;
- Lack of supervision and punishment of offenders;
- Little or no investment in sustainable development projects in Resex.

Ten years later, in August 2015, the OSR sent another letter to the head of Sedam stressing the urgency on the issues of timber theft, invasions and even internal limits placed by the invading agents.

Thus, the current activities are illegal and opposed to the proposed project activities, it does not undertake to reduce deforestation and strengthen the extractive lifestyle.

5 QUANTIFICATION OF REDUCTION AND REMOVAL OF GHG EMISSIONS

5.1. Project scale and estimated production and removal of GHG

Table 24. Project scale

Project	x
Megaproject	

Table 25. Estimate of reduced and removals of GHG.

Years	GHG removals and reduced emissions estimates (tCO2e)
2013	271,129
2014	405,694
2015	417,481
2016	423,613
2017	481,711
2018	414,597
2019	457,966
2020	453,397
2021	454,258
2022	396,915
2023	446,928
2024	471,030
2025	551,980
2026	469,449
2027	364,046
2028	386,690
2029	392,779
2030	480,568
2031	479,423
2032	398,778
2033	405,592
2034	337,484
2035	322,580
2036	317,418
2037	358,121
2038	382,618

Years	GHG removals and reduced emissions estimates (tCO2e)
2039	520,446
2040	332,891
2041	463,665
2042	369,478
Total	12,428,713
Total Number of Crediting Years	30
Annual Average Ers	414,290

5.2. Leakage management

The description of the activities of leakage management to be developed in areas already open in communities are discussed in Item 2.2. Description of project activities.

5.3. Baseline emissions

Step 5 VM0015 – Definition of Change component in use and lad cover in baseline

Calculation of activity data from baseline for forest class

The outcome of the baseline projections indicated a deforestation of approximately 35,398 hectares of forest in the project area between 2013 and 2042 (Table 26) and 13,222 hectares for the leakage belt (Table 27).

Table 26. Annual deforested area by forest icl class within the project area in the baseline case (Table 11b of VM0015).

Area deforested per forest class *icl* within the project area		Total baseline deforestation in the project area	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	cumulative
Project $year_t$	ha	ha	ha
2013	867	867	867
2014	1,254	1,254	2,121
2015	1,274	1,274	3,395
2016	1,291	1,291	4,686
2017	1,425	1,425	6,111
2018	1,209	1,209	7,320

Area deforested per forest class *icl* within the project area		Total baseline deforestation in the project area	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	cumulative
Project year$_t$	ha	ha	ha
2019	1,314	1,314	8,634
2020	1,288	1,288	9,922
2021	1,277	1,277	11,199
2022	1,113	1,113	12,312
2023	1,246	1,246	13,558
2024	1,310	1,310	14,868
2025	1,525	1,525	16,393
2026	1,306	1,306	17,699
2027	1,026	1,026	18,725
2028	1,086	1,086	19,811
2029	1,102	1,102	20,913
2030	1,335	1,335	22,248
2031	1,332	1,332	23,580
2032	1,118	1,118	24,698
2033	1,136	1,136	25,834
2034	955	955	26,789
2035	915	915	27,704
2036	901	901	28,605
2037	1,009	1,009	29,614
2038	1,074	1,074	30,688
2039	1,440	1,440	32,128
2040	942	942	33,070
2041	1,289	1,289	34,359
2042	1,039	1,039	35,398

Table 27. Annual deforested area by forest class icl within the leakage belt in the case of baseline (table 11c of VM0015).

Area deforested per forest class *icl* within the leakage belt area		Total baseline deforestation in the project area	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	cumulative
Project year$_t$	ha	ha	ha
2013	350	350	350
2014	367	367	717

Area deforested per forest class *icl* within the leakage belt area		Total baseline deforestation in the project area	
ID_{icl}>	icl1	$ABSLPA_t$	ABSLPA
Name>	Forest	annual	cumulative
Project $year_t$	ha	ha	ha
2015	287	287	1,004
2016	289	289	1,293
2017	374	374	1,667
2018	430	430	2,097
2019	393	393	2,490
2020	447	447	2,937
2021	193	193	3,130
2022	494	494	3,624
2023	563	563	4,187
2024	467	467	4,654
2025	221	221	4,875
2026	461	461	5,336
2027	385	385	5,721
2028	516	516	6,237
2029	591	591	6,828
2030	504	504	7,332
2031	618	618	7,950
2032	408	408	8,358
2033	523	523	8,881
2034	394	394	9,275
2035	408	408	9,683
2036	329	329	10,012
2037	553	553	10,565
2038	502	502	11,067
2039	610	610	11,677
2040	643	643	12,320
2041	485	485	12,805
2042	417	417	13,222

Calculation of activity data for baseline class post class

Method 1 available in VM0015 methodology was used to define the class that will replace the forest cover in the baseline of the project (called Anthropic Vegetation in balance). Table 28 shows the

area of zone 1, which encompasses the project area, leakage belt and leakage management areas, and the corresponding area of each class of use and coverage after deforestation.

Table 28. Areas of the reference region encompassing the classes of use and land cover after clearing baseline (Table 12 VM0015).

Zone		Name		Total of all other LU/LC classes present in the zone		Total area of each Zone	
		Zona 1					
		ID_{fcl}	1				
		Area	% of Zone	Area	% of Zone	Area	% of Zone
IDz	Name	ha	%	ha	%	ha	%
1	Zone 1	131,257	100	48,620	37.04	131,257	100
Total area of each class *fcl*		131,257	100	48,620	37.04	131,257	100

Table 29. Annual deforested area in each zone within the area of the Project in the scenario of baseline (Table 13b of VM0015).

Area established after deforestation per zone within the project area		Total baseline deforestation in the project area	
IDz>	1		
Name>	Zone 1	$ABSLPA_t$	ABSLPA
Project $year_t$	ha	ha	ha
2013	867	867	867
2014	1,254	1,254	2,121
2015	1,274	1,274	3,395
2016	1,291	1,291	4,686
2017	1,425	1,425	6,111
2018	1,209	1,209	7,320
2019	1,314	1,314	8,634
2020	1,288	1,288	9,922
2021	1,277	1,277	11,199
2022	1,113	1,113	12,312
2023	1,246	1,246	13,558
2024	1,310	1,310	14,868
2025	1,525	1,525	16,393
2026	1,306	1,306	17,699
2027	1,026	1,026	18,725
2028	1,086	1,086	19,811

Area established after deforestation per zone within the project area		Total baseline deforestation in the project area	
IDz>	1		
Name>	Zone 1	$ABSLPA_t$	ABSLPA
Project year$_t$	ha	ha	ha
2029	1,102	1,102	20,913
2030	1,335	1,335	22,248
2031	1,332	1,332	23,580
2032	1,118	1,118	24,698
2033	1,136	1,136	25,834
2034	955	955	26,789
2035	915	915	27,704
2036	901	901	28,605
2037	1,009	1,009	29,614
2038	1,074	1,074	30,688
2039	1,440	1,440	32,128
2040	942	942	33,070
2041	1,289	1,289	34,359
2042	1,039	1,039	35,398

Table 30. Annual deforested area in each zone within the leakage belt in the scenario of the baseline (Table 13c of VM0015).

Area established after deforestation per zone within the leakage belt		Total baseline deforestation in the leakage belt	
IDz>	1		
Name>	Zone 1	$ABSLLK_t$	ABSLLK
Project year$_t$	ha	ha	ha
2013	350	350	350
2014	367	367	717
2015	287	287	1,004
2016	289	289	1,293
2017	374	374	1,667
2018	430	430	2,097
2019	393	393	2,490
2020	447	447	2,937
2021	193	193	3,130
2022	494	494	3,624

Area established after deforestation per zone within the leakage belt		Total baseline deforestation in the leakage belt	
IDz>	1		
Name>	Zone 1	$ABSLLK_t$	ABSLLK
Project year$_t$	ha	ha	ha
2023	563	563	4,187
2024	467	467	4,654
2025	221	221	4,875
2026	461	461	5,336
2027	385	385	5,721
2028	516	516	6,237
2029	591	591	6,828
2030	504	504	7,332
2031	618	618	7,950
2032	408	408	8,358
2033	523	523	8,881
2034	394	394	9,275
2035	408	408	9,683
2036	329	329	10,012
2037	553	553	10,565
2038	502	502	11,067
2039	610	610	11,677
2040	643	643	12,320
2041	485	485	12,805
2042	417	417	13,222

Calculation of activity data by type of change in land use and land cover

It does not apply.

Step 6 VM0015 – Estimation of changes in carbon stocks and non-CO2 emissions ion the baseline

The estimate of carbon stock for the forest class was obtained through a primary forest inventory conducted in 2013 by technical team from Hdom Engenharia e Projetos Ambientais Ltda. in partnership with Biofílica Investimentos Ambientais. Following are the main results obtained in this study. More information can be found in document Technical Report of the calculated estimates of the Forest Inventory extractive reserve Rio Preto-Jacundá (Hdom Engenharia e projetos Ambientais Ltda, 2013).

Average estimate of carbon stock by use class in land cover change

To carry out the forest inventory in Resex Rio Preto-Jacundá, due to the Amazon forest characteristics, sampling methodology included sampling in two stages, namely, the primary unit was selected at random and the secondary systematically distributed. Characterized by the installation of the sampling units (plot) as a function of access to points of upland forest of each sample point. Each sample point is regarded as the points of access to the forest.

The second step was to identify whether the sampling points in each forest (if the difference between forests is proven) have statistical difference between them. In the case of managed forest, each Annual Production Unit (UPA) sampled is regarded as Sample Point. For primary forest, each locality or community was regarded as Sample Point. Finally, the same procedure applied to the sampling units (plots).

Estimated variables

Number of Individuals

The number of individuals per unit area was estimated by extrapolation of the number of individuals, living arboreal, necromass (individuals dead standing and fallen) and palm trees, measured inside the plots and then estimated per hectare.

Basal Area

The Basal area reflects the degree of occupation of the trees within a given area. This is a density measure of afforestation, which makes it a very important estimate in the decision-making moment.

Adjustments of equation of volume and stock estimation

The volume of standing trees was estimated by an adjusted equation, based on data collected by the team of Fallen Trees. With a specific volume equation to the site sampled, can be used for planning and monitoring of forest management. The actual volume was calculated using the cubed combined method Smalian and Hohenald (Machado and Figueiredo Filho, 2006).

Dominant Height (Hd) and correction factor (fc)

The dominant height meets the concept established by Weise (1880), quoted by Loetsch et al. (1973), where Hd is average height of 20% thicker trees in the forest, or sampled. This variable is used to determine a correction factor (CF) to compensate for the structural difference between the sampled site and the site where the biomass equation was adjusted (Lima et al., 2012).

Carbon stock of the forest

The carbon stock of living trees (biomass) of the forest was estimated in stages. The first was to estimate the individual stock of Fresh Biomass. Since the biomass estimation is compartmentalized into three levels, based on the equations available by Silva (2007), pages 76 to 86:

i. Total Fresh Biomass (TotBfw);

ii. below ground Fresh Biomass level (BGBfw);

iii. Above ground fresh biomass level (AGBfw).

Each equation was applied to each individual measured at Forest Inventory. Then added up the mass of all individuals within each plot and by extrapolation, estimated the stock per hectare.

Then the equations for estimating the stock of fresh weight:

$$BGBfw = 0{,}0469 \times DAP^{2{,}4754} \times fc,\ R^2 = 0{,}95 \text{ e } Syx\% = 5{,}12$$

$$AGBfw = 2{,}2737 \times DAP^{1{,}9156} \times fc,\ R^2 = 0{,}85 \text{ e } Syx\% = 6{,}20$$

$$TotBfw = BGBfw + AGBfw$$

To estimate the carbon stock, we considered the water content and average carbon found by Silva (2007) (pages 66 to 73), they are:

$$Cblg = BGBfw \times 0{,}533 \times 0{,}464$$

$$Cabg = AGBfw \times 0{,}584 \times 0{,}485$$

$$Ctot = Cabg + Cblg$$

Where: C_{tot}= Total Carbon, in kg; C_{blg} = Carbon below ground, in kg; C_{abg} = Carbon above ground, in kg

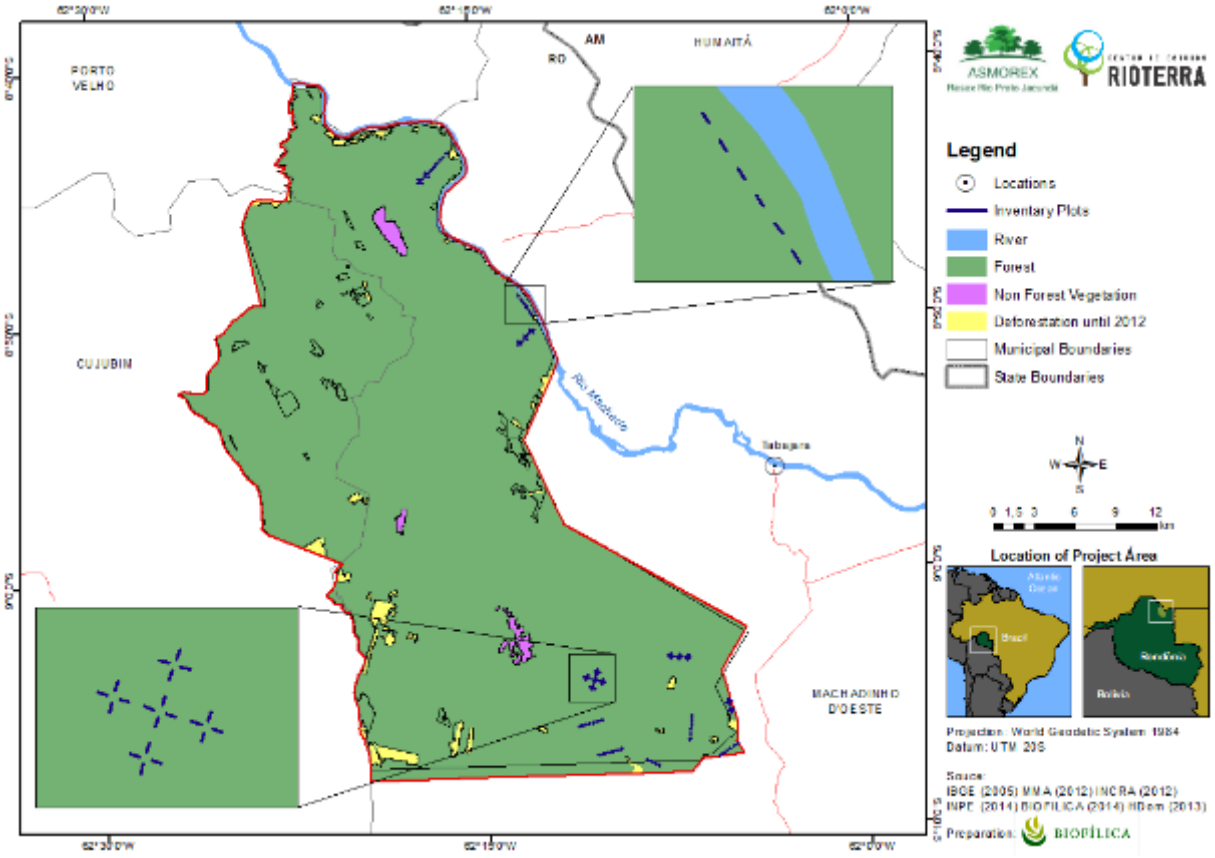


Figure 39. Allocation of sample units of forest inventory in the project area.

Table 31. Estimated proportion of each type sampled in relation to the total project area

Typology	Area (ha)	%
Hydrography	0	0
Non Forest + Anthropized	0	0
Primary Forest	90,284	96%
Managed Forest	4,006	4%
TOTAL	94,290	100%

The estimated carbon stocks calculated for the above and below ground considering the average values calculated for managed forest and primary forest was 114,196 C / ha to tank above the ground and 15,84 to the reservoir below ground considering a confidence level of 5% and 7% respectively for each reservoir.

For carbon credit calculation purposes, this stock should be multiplied by the carbon dioxide equivalent (CO2e). To convert the carbon from trees and forests in credits is a formula for it. According to rules of basic chemistry: 1kg C = 3.6667kg of CO2.

Table 32 presents the average values of carbon per hectare for the initial class of use and land cover considered for the baseline scenario present in the project area and leakage belt.

Table 32. Carbon stocks per hectare for existing icl initial class in the project area and leakage belt (Table 15a VM0015)

Initial forest class *icl*							
Name:	Forest						
ID_{icl}	1						
Average carbon stock per hectare + 90% CI							
Cab_{icl}		Cbb_{icl}		Cdw_{icl}		$Ctot_{icl}$	
C stock	± 95% CI	C stock	± 95% CI	C stock	± 95% CI	C stock	± 95% CI
418.7	21	58.1	4	-	-	476.8	24.6

Where:

Cabicl = Stock average carbon equivalent per hectare for biomass tank above ground to the initial class forest;
Cbbicl = Equivalent average carbon stocks per hectare for the reservoir of below-ground biomass for the initial class forest;
Cdwicl = Equivalent average carbon stocks per hectare for biomass reservoir dead to the initial class forest;
Ctoticl = Equivalent average carbon stocks per hectare for total biomass reservoir for the initial class forest;

The VM0015 methodology allows the use of estimates from local studies, and thus a value of 61.2 tCO2e ha -1 was used as a reference for carbon storage of anthropogenic vegetation class in balance, the projected class to exist in the area Project and Leakage Belt in the Project scenario. This carbon stock estimates were obtained by (Fearnside, 1996), through a long-term study, the landscape and average composition of vegetation in deforested areas of the Brazilian Amazon, consisting of a composite matrix pastures, small-scale agriculture and plantations (temporary and permanent) usually found in a post-deforestation in the Amazon scenario. This figure is conservative because it represents an average estimate of the composition of a landscape in balance, with a 30 % increase over the amount reported by the author.

Fearnside (1996) is a scientific literature review, and is the only study to the Brazilian Amazon over the carbon stock in deforested areas, meeting the requirements of section 4.5.6 of the VCS Standard:

1. Data were not collected directly from primary sources;

2. Data were collected from secondary sources, by researchers from INPA (renowned research institute for the theme in Brazil), published by a scientific journal International and conceptualized (Forest Ecology and Management);
3. The data are from a period that accurately reflects current practice available for the determination of carbon stock, recently accepted at other international scientific publications as a reference (Yanavi et al, 2012; Fearnside et al, 2009);
4. No sampling was applied to the data;
5. The data are publicly available via the website: http://philip.inpa.gov.br/publ_livres/LISTAS%20POR%20ASSUNTO-L.htm. Accessed on December 12, 2013;
6. Available for independent assessment of VCSA and VVB;
7. The data are appropriate for the geographic scope of VM0015,
8. The expert analysis was not necessary; and
9. The data are not only kept in central repository storage.

Calculation of change factors in carbon stock

The project baseline scenario considers the changes in the stock of forest carbon replaced by a type of vegetation that can be pasture areas, small-scale plantations or temporary and permanent crops. The requirements of VCS document AFOLU requires consideration of the stock of carbon decay of organic soil carbon pools, below-ground biomass, dead wood and wood products.

To calculate this decay, the VM0015 version 1.1 applies a linear function to account for stock decay initial carbon to the initial forest class (icl) and an increase in carbon stocks in the class after deforestation (FCL). Table 20a (Table 33) and Table 20b (Table 34 in the document) display as the factor of carbon stock changes was calculated.

Table 33. Change factor in carbon stock for the class of icl initial forest (Method 1) (Table 20a VM0015).

Year after deforestation		$\Delta Cab_{icl,t}$	$\Delta Cbb_{icl,t}$	$\Delta Cdw_{icl,t}$	$\Delta Ctot_{cl,t}$
1	t*	418.7	5.8	0.0	424.5
2	t*+1	0	5.8	0.0	5.8
3	t*+2	0	5.8	0.0	5.8
4	t*+3	0	5.8	0.0	5.8
5	t*+4	0	5.8	0.0	5.8
6	t*+5	0	5.8	0.0	5.8
7	t*+6	0	5.8	0.0	5.8

Year after deforestation		$\Delta Cab_{icl,t}$	$\Delta Cbb_{icl,t}$	$\Delta Cdw_{icl,t}$	$\Delta Ctot_{cl,t}$
8	t*+7	0	5.8	0.0	5.8
9	t*+8	0	5.8	0.0	5.8
10	t*+9	0	5.8	0.0	5.8
11	t*+10				
12	t*+11				
13	t*+12				
14	t*+13				
15	t*+14				
16	t*+15				
17	t*+16				
18	t*+17				
19	t*+18				
20	t*+19				
21-T	t*+20...				

Table 34. Carbon stock change factor for FCL class or z zones (Method 1) (Table 20b VM0015).

Year after deforestation		$\Delta Ctot_{fcl,t}$
1	t*	6.1
2	t*+1	6.1
3	t*+2	6.1
4	t*+3	6.1
5	t*+4	6.1
6	t*+5	6.1
7	t*+6	6.1
8	t*+7	6.1
9	t*+8	6.1
10	t*+9	6.1
11	t*+10	0
12	t*+11	0
13	t*+12	0
14	t*+13	0
15	t*+14	0
16	t*+15	0
17	t*+16	0
18	t*+17	0
19	t*+18	0

Year after deforestation		$\Delta Ctot_{tcl,t}$
20	t*+19	0
21-T	t*+20...	

Baseline calculation of changes in carbon stock

Method 1 VM0015 version 1.1 (activity data are available for classes) was used to calculate the change of baseline carbon stock in the project area (Table 35) and the leakage belt (Table 36) for the year t, according to equation 10 on page 72 of the VM0015 version 1.1.

Table 35. Baseline changes in carbon stocks in the Project area.

Carbon stock changes per initial forest class *icl*		Total carbon stock change of initial forest class in the project area		Carbon stock changes per post-deforestation zone z		Total carbon stock change of post-deforestation zones in the project area		Total net carbon stock change of the project area	
ID_{icl}>	1	$\Delta CBSLPA_{icl,t}$	$\Delta CBSLPA_{icl}$	ID_{iz}>	1	$\Delta CBSLPA_{z,t}$	$\Delta CBSLPA_{z}$	$\Delta CBSLPA_{t}$	$\Delta CBSLPA$
Name>	Forest	annual	cumulative	Name>	Zone 1	annual	cumulative	annual	cumulative
Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
2013	368,053.6	368,053.6	368,053.6	2013	5,303.4	5,303.4	5,303.4	362,750.2	362,750.2
2014	537,375.2	537,375.2	905,428.8	2014	12,974.0	12,974.0	18,277.4	524,401.3	887,151.5
2015	553,147.7	553,147.7	1,458,576.5	2015	20,766.9	20,766.9	39,044.3	532,380.7	1,419,532.2
2016	567,762.7	567,762.7	2,026,339.1	2016	28,663.9	28,663.9	67,708.2	539,098.8	1,958,631.0
2017	632,144.5	632,144.5	2,658,483.7	2017	37,380.5	37,380.5	105,088.7	594,764.1	2,553,395.0
2018	548,724.7	548,724.7	3,207,208.4	2018	44,775.8	44,775.8	149,864.5	503,948.9	3,057,343.9
2019	600,319.5	600,319.5	3,807,527.9	2019	52,813.5	52,813.5	202,678.0	547,506.0	3,604,849.9
2020	596,912.7	596,912.7	4,404,440.6	2020	60,692.1	60,692.1	263,370.0	536,220.6	4,141,070.5
2021	599,722.6	599,722.6	5,004,163.2	2021	68,503.4	68,503.4	331,873.4	531,219.3	4,672,289.8
2022	537,518.0	537,518.0	5,541,681.2	2022	75,311.5	75,311.5	407,184.9	462,206.5	5,134,496.3
2023	595,406.9	595,406.9	6,137,088.2	2023	77,629.8	77,629.8	484,814.7	517,777.1	5,652,273.5
2024	622,529.4	622,529.4	6,759,617.5	2024	77,972.4	77,972.4	562,787.0	544,557.0	6,196,830.5
2025	714,008.9	714,008.9	7,473,626.5	2025	79,507.7	79,507.7	642,294.7	634,501.2	6,831,331.7
2026	622,399.2	622,399.2	8,096,025.7	2026	79,599.5	79,599.5	721,894.2	542,799.8	7,374,131.5
2027	502,844.3	502,844.3	8,598,870.0	2027	77,158.8	77,158.8	799,053.0	425,685.5	7,799,817.0
2028	527,252.4	527,252.4	9,126,122.5	2028	76,406.4	76,406.4	875,459.4	450,846.0	8,250,663.0
2029	532,720.6	532,720.6	9,658,843.1	2029	75,109.6	75,109.6	950,569.0	457,611.0	8,708,274.0
2030	630,552.2	630,552.2	10,289,395.3	2030	75,397.1	75,397.1	1,025,966.2	555,155.1	9,263,429.2
2031	629,615.5	629,615.5	10,919,010.9	2031	75,733.6	75,733.6	1,101,699.7	553,882.0	9,817,311.1

Carbon stock changes per initial forest class *icl*		Total carbon stock change of initial forest class in the project area		Carbon stock changes per post-deforestation zone z		Total carbon stock change of post-deforestation zones in the project area		Total net carbon stock change of the project area	
ID_{icl}>	1	$\Delta CBSLPA_{icl,t}$	$\Delta CBSLPA_{icl}$	ID_{iz}>	1	$\Delta CBSLPA_{z,t}$	$\Delta CBSLPA_{z}$	$\Delta CBSLPA_{t}$	$\Delta CBSLPA$
Name>	Forest	annual	cumulative	Name>	Zone 1	annual	cumulative	annual	cumulative
Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
2032	540,041.3	540,041.3	11,459,052.2	2032	75,764.1	75,764.1	1,177,463.9	464,277.2	10,281,588.3
2033	546,939.2	546,939.2	12,005,991.4	2033	75,091.3	75,091.3	1,252,555.2	471,848.0	10,753,436.2
2034	469,091.8	469,091.8	12,475,083.2	2034	72,919.8	72,919.8	1,325,475.0	396,172.0	11,149,608.2
2035	448,801.2	448,801.2	12,923,884.3	2035	69,188.5	69,188.5	1,394,663.4	379,612.7	11,529,220.9
2036	440,587.4	440,587.4	13,364,471.7	2036	66,711.1	66,711.1	1,461,374.5	373,876.3	11,903,097.2
2037	485,709.0	485,709.0	13,850,180.7	2037	66,607.1	66,607.1	1,527,981.6	419,101.9	12,322,199.1
2038	512,855.2	512,855.2	14,363,035.9	2038	66,533.7	66,533.7	1,594,515.4	446,321.5	12,768,520.6
2039	668,064.7	668,064.7	15,031,100.7	2039	68,601.2	68,601.2	1,663,116.6	599,463.5	13,367,984.1
2040	457,266.6	457,266.6	15,488,367.2	2040	66,197.3	66,197.3	1,729,313.9	391,069.3	13,759,053.4
2041	602,308.1	602,308.1	16,090,675.3	2041	65,934.3	65,934.3	1,795,248.1	536,373.8	14,295,427.2
2042	497,172.6	497,172.6	16,587,848.0	2042	65,451.0	65,451.0	1,860,699.2	431,721.6	14,727,148.8

Table 36. Baseline changes in carbon stock in the leakage belt.

Carbon stock changes per initial forest class *icl*		Total carbon stock change of initial forest class in the leakage belt area		Carbon stock changes per post-deforestation zone z		Total carbon stock change of post-deforestation zones in leakage belt area		Total net carbon stock change of the leakage belt area	
ID_{icl}>	1	$\Delta CBSLLK_{icl,t}$	$\Delta CBSLLK_{icl}$	ID_{iz}>	1	$\Delta CBSLLK_{z,t}$	$\Delta CBSLLK_{z}$	$\Delta CBSLLK_{t}$	$\Delta CBSLLK$
Name>	Forest	annual	cumulative	Name>	Zone 1	annual	cumulative	annual	cumulative
Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	Project Year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
2013	148,579.9	148,579.9	148,579.9	2013	2,140.9	2,140.9	2,140.9	146,439.0	146,439.0
2014	157,829.1	157,829.1	306,409.0	2014	4,385.8	4,385.8	6,526.8	153,443.3	299,882.2
2015	125,999.2	125,999.2	432,408.2	2015	6,141.4	6,141.4	12,668.1	119,857.8	419,740.0
2016	128,514.9	128,514.9	560,923.1	2016	7,909.2	7,909.2	20,577.3	120,605.7	540,345.8
2017	166,276.8	166,276.8	727,199.9	2017	10,196.9	10,196.9	30,774.2	156,079.9	696,425.7
2018	192,221.5	192,221.5	919,421.4	2018	12,827.2	12,827.2	43,601.4	179,394.3	875,820.0
2019	179,011.5	179,011.5	1,098,432.9	2019	15,231.1	15,231.1	58,832.5	163,780.4	1,039,600.4
2020	204,217.5	204,217.5	1,302,650.4	2020	17,965.4	17,965.4	76,797.9	186,252.1	1,225,852.5
2021	98,986.7	98,986.7	1,401,637.1	2021	19,146.0	19,146.0	95,943.9	79,840.8	1,305,693.2
2022	227,886.2	227,886.2	1,629,523.3	2022	22,167.7	22,167.7	118,111.6	205,718.5	1,511,411.7
2023	258,013.9	258,013.9	1,887,537.2	2023	23,470.6	23,470.6	141,582.2	234,543.3	1,745,955.0
2024	218,398.7	218,398.7	2,105,935.9	2024	24,082.3	24,082.3	165,664.5	194,316.4	1,940,271.4
2025	115,013.6	115,013.6	2,220,949.5	2025	23,678.6	23,678.6	189,343.1	91,335.0	2,031,606.4
2026	216,502.1	216,502.1	2,437,451.6	2026	24,730.7	24,730.7	214,073.8	191,771.4	2,223,377.8
2027	184,744.2	184,744.2	2,622,195.8	2027	24,798.0	24,798.0	238,871.8	159,946.2	2,383,324.0
2028	240,094.2	240,094.2	2,862,290.0	2028	25,324.0	25,324.0	264,195.8	214,770.2	2,598,094.2
2029	272,647.0	272,647.0	3,134,937.0	2029	26,535.2	26,535.2	290,731.0	246,111.9	2,844,206.0
2030	236,550.6	236,550.6	3,371,487.6	2030	26,883.9	26,883.9	317,614.8	209,666.7	3,053,872.8
2031	286,751.2	286,751.2	3,658,238.8	2031	29,483.5	29,483.5	347,098.4	257,267.6	3,311,140.4
2032	198,323.3	198,323.3	3,856,562.1	2032	28,957.5	28,957.5	376,055.9	169,365.8	3,480,506.2
2033	246,242.3	246,242.3	4,102,804.4	2033	28,712.8	28,712.8	404,768.7	217,529.5	3,698,035.7
2034	191,805.2	191,805.2	4,294,609.6	2034	28,266.3	28,266.3	433,035.0	163,538.9	3,861,574.7
2035	198,753.1	198,753.1	4,493,362.7	2035	29,410.1	29,410.1	462,445.1	169,342.9	4,030,917.6
2036	164,908.7	164,908.7	4,658,271.3	2036	28,602.7	28,602.7	491,047.8	136,306.0	4,167,223.5
2037	259,674.6	259,674.6	4,917,945.9	2037	29,630.4	29,630.4	520,678.2	230,044.2	4,397,267.8
2038	238,239.2	238,239.2	5,156,185.2	2038	29,544.7	29,544.7	550,222.9	208,694.5	4,605,962.3
2039	283,569.9	283,569.9	5,439,755.1	2039	29,660.9	29,660.9	579,883.8	253,909.0	4,859,871.3
2040	298,194.4	298,194.4	5,737,949.5	2040	30,511.2	30,511.2	610,395.0	267,683.2	5,127,554.5
2041	231,266.4	231,266.4	5,969,215.9	2041	29,697.6	29,697.6	640,092.6	201,568.8	5,329,123.3
2042	202,846.6	202,846.6	6,172,062.5	2042	29,752.7	29,752.7	669,845.3	173,093.9	5,502,217.2

Baseline of emissions of non-CO2 by forest

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

5.4. Project emissions

Ex ante estimate of the actual changes in carbon due to planned activities

The Cooperex has a partnership agreement with the company Wood Shopping since 2005 and reaffirmed in 2013 with 30-year exclusivity for logging in the project area. The timber management is not part directly from REDD+ project scope, however, it is known that such activity causes a reduction in inventory related carbon mainly to deforestation in annual production units (UPA) for infrastructure deployment as patios and skid trails.

In this sense experts on the subject were consulted in search of a reasonable percentage of opening accepted in conventional forest management in the Amazon, which came to 8% in UPAs with 500 ha (located in Figure 40), the maximum allowed under plan of timber management of extractive reserves.

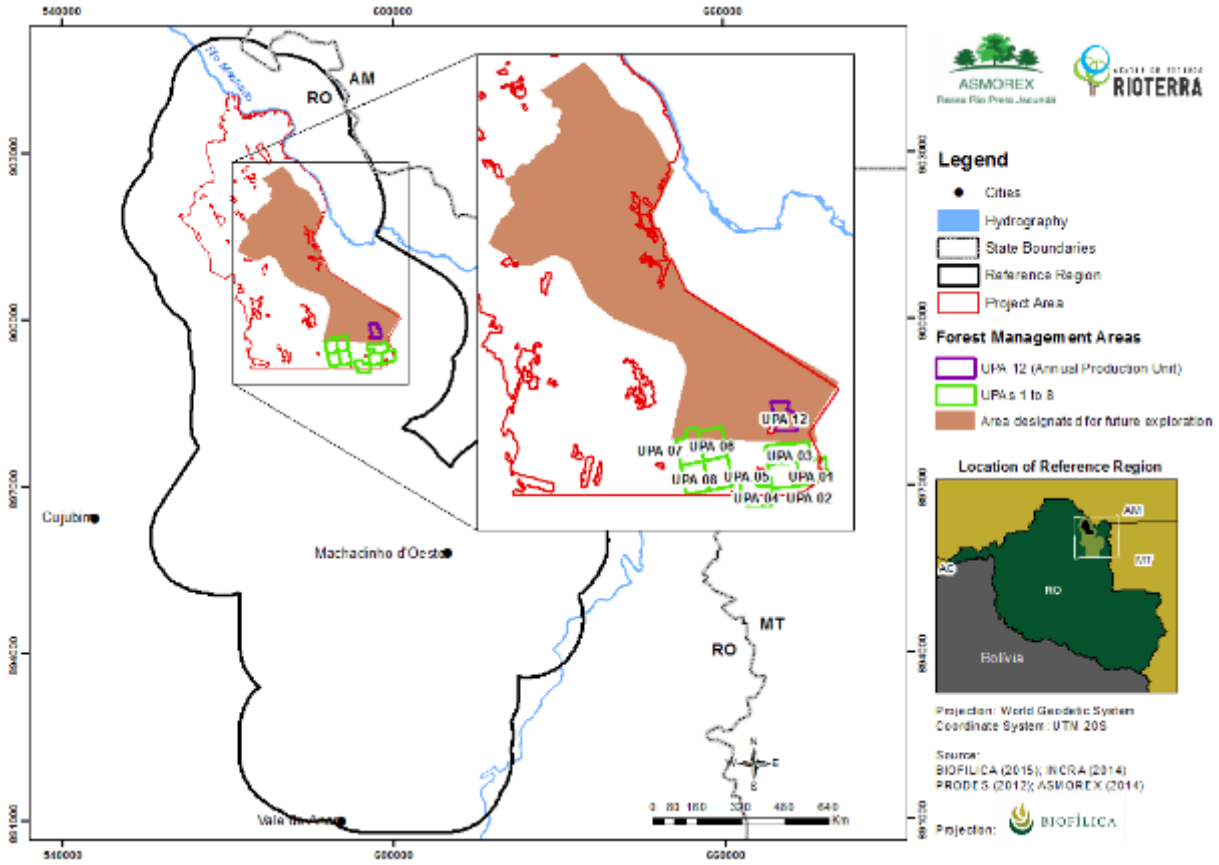


Figure 40. Location of UPAs

Is scheduled between project activities the formation of three new communities strategically located in areas where there is encroachment and illegal logging as participatory zoning (Figure 13). For this, the installation of four families is expected in each community, paying attention to the allowed maximum of 5 ha of openness on the family, as prior use plan Resex Rio Preto-Jacundá. This activity does not have a set schedule, but will occur soon, being completed in six years.

Table 37. Estimate in advance of inventory reduction due to deforestation planned in the project area (Table 25a of VM0015).

Project Year *t*	Areas of planned deforestation x Carbon stock change (decrease) in the project area		Total carbon stock decrease due to planned deforestation	
	ID_{cl} =	1	annual	cumulative
	$APDPA_{icl.t}$	$Ctot_{icl.t}$	$\Delta CPDdPA_t$	$\Delta CPDdPA$
	ha	$tCO_2e\ ha^{-1}$	tCO_2e	tCO_2e
2013	40	476.8	19,071.1	19,071.1
2014	40	476.8	19,071.1	38,142.2
2015	40	476.8	19,071.1	57,213.4
2016	50	476.8	23,838.9	81,052.3
2017	50	476.8	23,838.9	104,891.2
2018	50	476.8	23,838.9	128,730.1
2019	50	476.8	23,838.9	152,569.0
2020	50	476.8	23,838.9	176,407.9
2021	50	476.8	23,838.9	200,246.8
2022	40	476.8	19,071.1	219,317.9
2023	40	476.8	19,071.1	238,389.0
2024	40	476.8	19,071.1	257,460.2
2025	40	476.8	19,071.1	276,531.3
2026	40	476.8	19,071.1	295,602.4
2027	40	476.8	19,071.1	314,673.5
2028	40	476.8	19,071.1	333,744.7
2029	40	476.8	19,071.1	352,815.8
2030	40	476.8	19,071.1	371,886.9
2031	40	476.8	19,071.1	390,958.0
2032	40	476.8	19,071.1	410,029.2
2033	40	476.8	19,071.1	429,100.3
2034	40	476.8	19,071.1	448,171.4
2035	40	476.8	19,071.1	467,242.5
2036	40	476.8	19,071.1	486,313.7

Project Year *t*	Areas of planned deforestation x Carbon stock change (decrease) in the project area		Total carbon stock decrease due to planned deforestation	
	ID_{cl} =	1	annual	cumulative
	$APDPA_{icl.t}$	$Ctot_{icl.t}$	$\Delta CPDdPA_t$	$\Delta CPDdPA$
	ha	$tCO_2e\ ha^{-1}$	tCO_2e	tCO_2e
2037	40	476.8	19,071.1	505,384.8
2038	40	476.8	19,071.1	524,455.9
2039	40	476.8	19,071.1	543,527.0
2040	40	476.8	19,071.1	562,598.1
2041	40	476.8	19,071.1	581,669.3
2042	40	476.8	19,071.1	600,740.4

The forest management activities planned by Wood Shopping will be monitored and reported on each project verification event, this monitoring will be based on post-harvest reports. If the observed reduction in carbon stock due to logging, Table 25b of VM0015 will be filled ex-post.

The construction of infrastructure for forest management activities, such as courtyards and roads, will be considered as planned deforestation in the project area. And according to footnote number 85 of the VM0015, the stock of carbon forestry products in order to be durable wooden goods can be ignored conservatively in the project scenario.

Charcoal production and firewood gathering

Not expected to produce charcoal or firewood collection. It was identified that type of use among families during the social diagnosis. If there is reduction in the stock of forest carbon because of this activity, Table 25c of VM0015 will be presented ex post.

Table 38 presents the ex-ante estimate of the reduction in carbon stock due to activities planned by the project.

Table 38. Estimate Ex ante reduction in carbon stock due to planned activities in the project area (Table 25d of VM0015).

Project Year t	Total carbon stock decrease due to planned deforestation		Total carbon stock decrease due to planned logging activities		Total carbon stock decrease due to planned fuel-wood and charcoal activities		Total carbon stock decrease due to planned activities	
	annual $\Delta CPDdPA_t$ tCO_2e	cumulative $\Delta CPDdPA$ tCO_2e	annual $\Delta CPLdPA_t$ tCO_2e	cumulative $\Delta CPLdPA$ tCO_2e	annual $\Delta CPFdPA_t$ tCO_2e	cumulative $\Delta CPFdPA$ tCO_2e	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e
2013	19,071.1	19,071.1	0.0	0.0	0.0	0.0	19,071.1	19,071.1
2014	19,071.1	38,142.2	0.0	0.0	0.0	0.0	19,071.1	38,142.2
2015	19,071.1	57,213.4	0.0	0.0	0.0	0.0	19,071.1	57,213.4
2016	23,838.9	81,052.3	0.0	0.0	0.0	0.0	23,838.9	81,052.3
2017	23,838.9	104,891.2	0.0	0.0	0.0	0.0	23,838.9	104,891.2
2018	23,838.9	128,730.1	0.0	0.0	0.0	0.0	23,838.9	128,730.1
2019	23,838.9	152,569.0	0.0	0.0	0.0	0.0	23,838.9	152,569.0
2020	23,838.9	176,407.9	0.0	0.0	0.0	0.0	23,838.9	176,407.9
2021	23,838.9	200,246.8	0.0	0.0	0.0	0.0	23,838.9	200,246.8
2022	19,071.1	219,317.9	0.0	0.0	0.0	0.0	19,071.1	219,317.9
2023	19,071.1	238,389.0	0.0	0.0	0.0	0.0	19,071.1	238,389.0
2024	19,071.1	257,460.2	0.0	0.0	0.0	0.0	19,071.1	257,460.2
2025	19,071.1	276,531.3	0.0	0.0	0.0	0.0	19,071.1	276,531.3
2026	19,071.1	295,602.4	0.0	0.0	0.0	0.0	19,071.1	295,602.4
2027	19,071.1	314,673.5	0.0	0.0	0.0	0.0	19,071.1	314,673.5
2028	19,071.1	333,744.7	0.0	0.0	0.0	0.0	19,071.1	333,744.7
2029	19,071.1	352,815.8	0.0	0.0	0.0	0.0	19,071.1	352,815.8
2030	19,071.1	371,886.9	0.0	0.0	0.0	0.0	19,071.1	371,886.9
2031	19,071.1	390,958.0	0.0	0.0	0.0	0.0	19,071.1	390,958.0
2032	19,071.1	410,029.2	0.0	0.0	0.0	0.0	19,071.1	410,029.2
2033	19,071.1	429,100.3	0.0	0.0	0.0	0.0	19,071.1	429,100.3
2034	19,071.1	448,171.4	0.0	0.0	0.0	0.0	19,071.1	448,171.4
2035	19,071.1	467,242.5	0.0	0.0	0.0	0.0	19,071.1	467,242.5
2036	19,071.1	486,313.7	0.0	0.0	0.0	0.0	19,071.1	486,313.7
2037	19,071.1	505,384.8	0.0	0.0	0.0	0.0	19,071.1	505,384.8
2038	19,071.1	524,455.9	0.0	0.0	0.0	0.0	19,071.1	524,455.9
2039	19,071.1	543,527.0	0.0	0.0	0.0	0.0	19,071.1	543,527.0
2040	19,071.1	562,598.1	0.0	0.0	0.0	0.0	19,071.1	562,598.1
2041	19,071.1	581,669.3	0.0	0.0	0.0	0.0	19,071.1	581,669.3
2042	19,071.1	600,740.4	0.0	0.0	0.0	0.0	19,071.1	600,740.4

Optional accountability of the increase in carbon stocks

Ex -ante estimate of the increase in carbon stock for regeneration after the management of activities was not considered by conservative measure.

Ex ante estimate of changes in the carbon stock due to unplanned deforestation inevitable in the Project area

It is expected that the project activities could reduce about 61% of baseline emissions for the first four years of implementation (2013, 2014, 2015 and 2016). After this period, considering a more effective monitoring of forest cover and a stronger community by the activities of the project, it is expected that the project Effectiveness Index gradually increase to reach 71% in the ninth of the project (2021).

Ex ante estimate of net changes in carbon stocks in the Project area

Table 39 shows the change in the stock of carbon related to planned activities and the project's effectiveness.

Table 39. Estimates ex ante net reduction of carbon stocks in the project area about the project scenario (Table 27 VM0015)

Project Year t	Total carbon stock decrease due to planned activities		Total carbon stock increase due to planned activities		Total carbon stock decrease due to unavoided unplanned deforestation		Total carbon stock change in the project case	
	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e	annual $\Delta CPAiPA_t$ tCO_2e	cumulative $\Delta CPAiPA$ tCO_2e	annual $\Delta CUDdPA_t$ tCO_2e	cumulative $\Delta CUDdPA$ tCO_2e	annual $\Delta CPSPA_t$ tCO_2e	cumulative $\Delta CPSPA$ tCO_2e
2013	19,071.1	19,071.1	0.0	0.0	36,275.0	36,275.0	55,346.1	55,346.1
2014	19,071.1	38,142.2	0.0	0.0	52,440.1	88,715.1	71,511.2	126,857.4
2015	19,071.1	57,213.4	0.0	0.0	53,238.1	141,953.2	72,309.2	199,166.6
2016	23,838.9	81,052.3	0.0	0.0	53,909.9	195,863.1	77,748.8	276,915.4
2017	23,838.9	104,891.2	0.0	0.0	53,528.8	249,391.9	77,367.7	354,283.0
2018	23,838.9	128,730.1	0.0	0.0	40,315.9	289,707.8	64,154.8	418,437.9
2019	23,838.9	152,569.0	0.0	0.0	38,325.4	328,033.2	62,164.3	480,602.2
2020	23,838.9	176,407.9	0.0	0.0	32,173.2	360,206.4	56,012.1	536,614.3
2021	23,838.9	200,246.8	0.0	0.0	26,561.0	386,767.4	50,399.9	587,014.2
2022	19,071.1	219,317.9	0.0	0.0	23,110.3	409,877.7	42,181.5	629,195.6
2023	19,071.1	238,389.0	0.0	0.0	25,888.9	435,766.6	44,960.0	674,155.6
2024	19,071.1	257,460.2	0.0	0.0	27,227.9	462,994.4	46,299.0	720,454.6
2025	19,071.1	276,531.3	0.0	0.0	31,725.1	494,719.5	50,796.2	771,250.8

Project Year t	Total carbon stock decrease due to planned activities		Total carbon stock increase due to planned activities		Total carbon stock decrease due to unavoided unplanned deforestation		Total carbon stock change in the project case	
	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e	annual $\Delta CPAiPA_t$ tCO_2e	cumulative $\Delta CPAiPA$ tCO_2e	annual $\Delta CUDdPA_t$ tCO_2e	cumulative $\Delta CUDdPA$ tCO_2e	annual $\Delta CPSPA_t$ tCO_2e	cumulative $\Delta CPSPA$ tCO_2e
2026	19,071.1	295,602.4	0.0	0.0	27,140.0	521,859.5	46,211.1	817,461.9
2027	19,071.1	314,673.5	0.0	0.0	21,284.3	543,143.8	40,355.4	857,817.3
2028	19,071.1	333,744.7	0.0	0.0	22,542.3	565,686.1	41,613.4	899,430.7
2029	19,071.1	352,815.8	0.0	0.0	22,880.5	588,566.6	41,951.7	941,382.4
2030	19,071.1	371,886.9	0.0	0.0	27,757.8	616,324.4	46,828.9	988,211.3
2031	19,071.1	390,958.0	0.0	0.0	27,694.1	644,018.5	46,765.2	1,034,976.5
2032	19,071.1	410,029.2	0.0	0.0	23,213.9	667,232.3	42,285.0	1,077,261.5
2033	19,071.1	429,100.3	0.0	0.0	23,592.4	690,824.7	42,663.5	1,119,925.0
2034	19,071.1	448,171.4	0.0	0.0	19,808.6	710,633.3	38,879.7	1,158,804.7
2035	19,071.1	467,242.5	0.0	0.0	18,980.6	729,613.9	38,051.8	1,196,856.5
2036	19,071.1	486,313.7	0.0	0.0	18,693.8	748,307.8	37,764.9	1,234,621.4
2037	19,071.1	505,384.8	0.0	0.0	20,955.1	769,262.9	40,026.2	1,274,647.6
2038	19,071.1	524,455.9	0.0	0.0	22,316.1	791,578.9	41,387.2	1,316,034.8
2039	19,071.1	543,527.0	0.0	0.0	29,973.2	821,552.1	49,044.3	1,365,079.1
2040	19,071.1	562,598.1	0.0	0.0	19,553.5	841,105.6	38,624.6	1,403,703.7
2041	19,071.1	581,669.3	0.0	0.0	26,818.7	867,924.3	45,889.8	1,449,593.5
2042	19,071.1	600,740.4	0.0	0.0	21,586.1	889,510.3	40,657.2	1,490,250.7

Ex ante estimate of non'CO2 emissions due to forest fire

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

Total Ex ante estimated for the Project area

Table 40 presents the expected net change and emissions of non- CO2 in the project area. Emissions that occur during the development of the project activities will be monitored and reported, if verified the increase in projected emissions in the scenario with the project.

Table 40. Estimated ex ante net changes in carbon stocks and non- CO2 emissions in the project area.

Project Year t	Total ex ante carbon stock decrease due to planned activities		Total ex ante carbon stock increase due to planned activities		Total ex ante carbon stock decrease due to unavoided unplanned deforestation		Total ex ante net carbon stock change		Total ex ante estimated actual non-CO_2 emissions from forest fires in the project area	
	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e	annual $\Delta CPAiPA_t$ tCO_2e	cumulative $\Delta CPAiPA$ tCO_2e	annual $\Delta CUDdPA_t$ tCO_2e	cumulative $\Delta CUDdPA$ tCO_2e	annual $\Delta CPSPA_t$ tCO_2e	cumulative $\Delta CPSPA$ tCO_2e	annual $EBBPSPA_t$ tCO_2e	cumulative $EBBPSPA$ tCO_2e
2013	19,071.1	19,071.1	0.0	0.0	36,275.0	36,275.0	55,346.1	55,346.1	0.0	0.0
2014	19,071.1	38,142.2	0.0	0.0	52,440.1	88,715.1	71,511.2	126,857.4	0.0	0.0
2015	19,071.1	57,213.4	0.0	0.0	53,238.1	141,953.2	72,309.2	199,166.6	0.0	0.0
2016	23,838.9	81,052.3	0.0	0.0	53,909.9	195,863.1	77,748.8	276,915.4	0.0	0.0
2017	23,838.9	104,891.2	0.0	0.0	53,528.8	249,391.9	77,367.7	354,283.0	0.0	0.0
2018	23,838.9	128,730.1	0.0	0.0	40,315.9	289,707.8	64,154.8	418,437.9	0.0	0.0
2019	23,838.9	152,569.0	0.0	0.0	38,325.4	328,033.2	62,164.3	480,602.2	0.0	0.0
2020	23,838.9	176,407.9	0.0	0.0	32,173.2	360,206.4	56,012.1	536,614.3	0.0	0.0
2021	23,838.9	200,246.8	0.0	0.0	26,561.0	386,767.4	50,399.9	587,014.2	0.0	0.0
2022	19,071.1	219,317.9	0.0	0.0	23,110.3	409,877.7	42,181.5	629,195.6	0.0	0.0
2023	19,071.1	238,389.0	0.0	0.0	25,888.9	435,766.6	44,960.0	674,155.6	0.0	0.0
2024	19,071.1	257,460.2	0.0	0.0	27,227.9	462,994.4	46,299.0	720,454.6	0.0	0.0
2025	19,071.1	276,531.3	0.0	0.0	31,725.1	494,719.5	50,796.2	771,250.8	0.0	0.0
2026	19,071.1	295,602.4	0.0	0.0	27,140.0	521,859.5	46,211.1	817,461.9	0.0	0.0
2027	19,071.1	314,673.5	0.0	0.0	21,284.3	543,143.8	40,355.4	857,817.3	0.0	0.0
2028	19,071.1	333,744.7	0.0	0.0	22,542.3	565,686.1	41,613.4	899,430.7	0.0	0.0
2029	19,071.1	352,815.8	0.0	0.0	22,880.5	588,566.6	41,951.7	941,382.4	0.0	0.0
2030	19,071.1	371,886.9	0.0	0.0	27,757.8	616,324.4	46,828.9	988,211.3	0.0	0.0
2031	19,071.1	390,958.0	0.0	0.0	27,694.1	644,018.5	46,765.2	1,034,976.5	0.0	0.0
2032	19,071.1	410,029.2	0.0	0.0	23,213.9	667,232.3	42,285.0	1,077,261.5	0.0	0.0
2033	19,071.1	429,100.3	0.0	0.0	23,592.4	690,824.7	42,663.5	1,119,925.0	0.0	0.0
2034	19,071.1	448,171.4	0.0	0.0	19,808.6	710,633.3	38,879.7	1,158,804.7	0.0	0.0
2035	19,071.1	467,242.5	0.0	0.0	18,980.6	729,613.9	38,051.8	1,196,856.5	0.0	0.0
2036	19,071.1	486,313.7	0.0	0.0	18,693.8	748,307.8	37,764.9	1,234,621.4	0.0	0.0
2037	19,071.1	505,384.8	0.0	0.0	20,955.1	769,262.9	40,026.2	1,274,647.6	0.0	0.0
2038	19,071.1	524,455.9	0.0	0.0	22,316.1	791,578.9	41,387.2	1,316,034.8	0.0	0.0
2039	19,071.1	543,527.0	0.0	0.0	29,973.2	821,552.1	49,044.3	1,365,079.1	0.0	0.0
2040	19,071.1	562,598.1	0.0	0.0	19,553.5	841,105.6	38,624.6	1,403,703.7	0.0	0.0

Project Year t	Total ex ante carbon stock decrease due to planned activities		Total ex ante carbon stock increase due to planned activities		Total ex ante carbon stock decrease due to unavoided unplanned deforestation		Total ex ante net carbon stock change		Total ex ante estimated actual non-CO_2 emissions from forest fires in the project area	
	annual $\Delta CPAdPA_t$ tCO_2e	cumulative $\Delta CPAdPA$ tCO_2e	annual $\Delta CPAiPA_t$ tCO_2e	cumulative $\Delta CPAiPA$ tCO_2e	annual $\Delta CUDdPA_t$ tCO_2e	cumulative $\Delta CUDdPA$ tCO_2e	annual $\Delta CPSPA_t$ tCO_2e	cumulative $\Delta CPSPA$ tCO_2e	annual $EBBPSPA_t$ tCO_2e	cumulative $EBBPSPA$ tCO_2e
2041	19,071.1	581,669.3	0.0	0.0	26,818.7	867,924.3	45,889.8	1,449,593.5	0.0	0.0
2042	19,071.1	600,740.4	0.0	0.0	21,586.1	889,510.3	40,657.2	1,490,250.7	0.0	0.0

5.5. Leakage

Ex ante estimative of the reduction of carbon stock and increase of GHG emissions due to leakage prevention measures.

Leak prevention measures will be implemented within the limits of the extractive reserve Rio Preto-Jacundá, ie in the communities included in the areas of leakage management within RRPJ. Complementarily, the protected areas included in the leakage belt will be monitored in the quarterly reports in order to contribute to the policies and actions of Sedam.

As described in Section 2, Section 2.2 of this document is not expected to develop any activity that can reduce carbon stocks or increase GHG emissions compared to the baseline scenario. However, if such activities occasioning significant changes in carbon stock, they will be monitored, recorded and reported.

Changes of carbon stock due to implementation of activities in the leakage area

Table 30c of VM0015 (Step 8.1.1) is not applicable, as reduced due to the implementation of activities are not expected.

Ex ante emissions of CH_4 and N_2O due to pastures activities

As noted earlier, it is not provided for activities, which entail a significant increase in CH4 and N2O. Thus, Tables 31 and 32 of VM0015 were not applied.

Ex ante estimate in carbon stock changes and increase of GHG emissions due to measures of leakage prevention

Table 33 of VM0015 does not apply.

Ex ante estimate in carbon stock changes and increase of GHG emissions due to leakage displacement

As described in Step 3, deforestation agents are external to Resex and act criminally led often by important state figures. A 10% leakage displacement factor has been assumed for the first year of project activities, with a gradual reduction until reaching 5% in the ninth year of implementation (2021). It is expected that the project will control any displacement leakage because the Leakage Belt will be monitored remotely.

Table 41 shows the estimated Ex ante leakage due to activity shifting to the first fixed period baseline and Table 42 indicating the total Ex ante leak.

Ex ante estimate in carbon stock changes and increase of GHG emissions due to leakage displacement

Table 41. Ex ante estimate of leakage due to activity displacement (Table 34 of VM0015).

Project Year t	Total ex ante estimated decrease in carbon stocks due to displaced deforestation		Total ex ante estimated increase in GHG emissions due to displaced forest fires	
	annual $\Delta CADLK_t$ tCO_2e	cumulative $\Delta CADLK$ tCO_2e	annual $EADLK_t$ tCO_2e	cumulative $EADLK$ tCO_2e
2013	36,275.0	36,275.0	0.0	0.0
2014	47,196.1	83,471.1	0.0	0.0
2015	42,590.5	126,061.6	0.0	0.0
2016	37,736.9	163,798.5	0.0	0.0
2017	35,685.8	199,484.4	0.0	0.0
2018	25,197.4	224,681.8	0.0	0.0
2019	27,375.3	252,057.1	0.0	0.0
2020	26,811.0	278,868.1	0.0	0.0
2021	26,561.0	305,429.1	0.0	0.0
2022	23,110.3	328,539.4	0.0	0.0
2023	25,888.9	354,428.3	0.0	0.0
2024	27,227.9	381,656.1	0.0	0.0
2025	31,725.1	413,381.2	0.0	0.0
2026	27,140.0	440,521.2	0.0	0.0
2027	21,284.3	461,805.5	0.0	0.0
2028	22,542.3	484,347.8	0.0	0.0
2029	22,880.5	507,228.3	0.0	0.0
2030	27,757.8	534,986.1	0.0	0.0

Project Year t	Total ex ante estimated decrease in carbon stocks due to displaced deforestation		Total ex ante estimated increase in GHG emissions due to displaced forest fires	
	annual $\Delta CADLK_t$ tCO_2e	cumulative $\Delta CADLK$ tCO_2e	annual $EADLK_t$ tCO_2e	cumulative $EADLK$ tCO_2e
2031	27,694.1	562,680.2	0.0	0.0
2032	23,213.9	585,894.0	0.0	0.0
2033	23,592.4	609,486.4	0.0	0.0
2034	19,808.6	629,295.0	0.0	0.0
2035	18,980.6	648,275.6	0.0	0.0
2036	18,693.8	666,969.5	0.0	0.0
2037	20,955.1	687,924.6	0.0	0.0
2038	22,316.1	710,240.6	0.0	0.0
2039	29,973.2	740,213.8	0.0	0.0
2040	19,553.5	759,767.3	0.0	0.0
2041	26,818.7	786,586.0	0.0	0.0
2042	21,586.1	808,172.0	0.0	0.0

Total ex ante leakage estimate

Table 42. Estimated Ex ante leakage (Table 35 of VM0015)

Project Year *t*	Total ex ante GHG emissions from increased grazing activities		Total ex ante increase in GHG emissions due to displaced forest fires		Total ex ante decrease in carbon stocks due to displaced deforestation		Carbon stock decrease due to leakage prevention measures		Total net carbon stock change due to leakage		Total net increase in emissions due to leakage	
	annual $EgLK_t$ tCO_2e	cumulative $EgLK$ tCO_2e	annual $EADLK_t$ tCO_2e	cumulative $EADLK$ tCO_2e	annual $\Delta CADLK_t$ tCO_2e	cumulative $\Delta CADLK$ tCO_2e	annual $\Delta CLPMLK_t$ tCO_2e	cumulative $\Delta CLPMLK$ tCO_2e	annual ΔCLK_t tCO_2e	cumulative ΔCLK tCO_2e	annual ELK_t tCO_2e	cumulative ELK tCO_2e
2013	0.0	0.0	0.0	0.0	36,275.0	36,275.0	0.0	0.0	36,275.0	36,275.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	47,196.1	83,471.1	0.0	0.0	47,196.1	83,471.1	0.0	0.0
2015	0.0	0.0	0.0	0.0	42,590.5	126,061.6	0.0	0.0	42,590.5	126,061.6	0.0	0.0
2016	0.0	0.0	0.0	0.0	37,736.9	163,798.5	0.0	0.0	37,736.9	163,798.5	0.0	0.0
2017	0.0	0.0	0.0	0.0	35,685.8	199,484.4	0.0	0.0	35,685.8	199,484.4	0.0	0.0
2018	0.0	0.0	0.0	0.0	25,197.4	224,681.8	0.0	0.0	25,197.4	224,681.8	0.0	0.0
2019	0.0	0.0	0.0	0.0	27,375.3	252,057.1	0.0	0.0	27,375.3	252,057.1	0.0	0.0

Project Year *t*	Total ex ante GHG emissions from increased grazing activities		Total ex ante increase in GHG emissions due to displaced forest fires		Total ex ante decrease in carbon stocks due to displaced deforestation		Carbon stock decrease due to leakage prevention measures		Total net carbon stock change due to leakage		Total net increase in emissions due to leakage	
	annual $EgLK_t$ tCO_2e	cumulative $EgLK$ tCO_2e	annual $EADLK_t$ tCO_2e	cumulative $EADLK$ tCO_2e	annual $\Delta CADLK_t$ tCO_2e	cumulative $\Delta CADLK$ tCO_2e	annual $\Delta CLPMLK_t$ tCO_2e	cumulative $\Delta CLPMLK$ tCO_2e	annual ΔCLK_t tCO_2e	cumulative ΔCLK tCO_2e	annual ELK_t tCO_2e	cumulative ELK tCO_2e
2020	0.0	0.0	0.0	0.0	26,811.0	278,868.1	0.0	0.0	26,811.0	278,868.1	0.0	0.0
2021	0.0	0.0	0.0	0.0	26,561.0	305,429.1	0.0	0.0	26,561.0	305,429.1	0.0	0.0
2022	0.0	0.0	0.0	0.0	23,110.3	328,539.4	0.0	0.0	23,110.3	328,539.4	0.0	0.0
2023	0.0	0.0	0.0	0.0	25,888.9	354,428.3	0.0	0.0	25,888.9	354,428.3	0.0	0.0
2024	0.0	0.0	0.0	0.0	27,227.9	381,656.1	0.0	0.0	27,227.9	381,656.1	0.0	0.0
2025	0.0	0.0	0.0	0.0	31,725.1	413,381.2	0.0	0.0	31,725.1	413,381.2	0.0	0.0
2026	0.0	0.0	0.0	0.0	27,140.0	440,521.2	0.0	0.0	27,140.0	440,521.2	0.0	0.0
2027	0.0	0.0	0.0	0.0	21,284.3	461,805.5	0.0	0.0	21,284.3	461,805.5	0.0	0.0
2028	0.0	0.0	0.0	0.0	22,542.3	484,347.8	0.0	0.0	22,542.3	484,347.8	0.0	0.0
2029	0.0	0.0	0.0	0.0	22,880.5	507,228.3	0.0	0.0	22,880.5	507,228.3	0.0	0.0
2030	0.0	0.0	0.0	0.0	27,757.8	534,986.1	0.0	0.0	27,757.8	534,986.1	0.0	0.0
2031	0.0	0.0	0.0	0.0	27,694.1	562,680.2	0.0	0.0	27,694.1	562,680.2	0.0	0.0
2032	0.0	0.0	0.0	0.0	23,213.9	585,894.0	0.0	0.0	23,213.9	585,894.0	0.0	0.0
2033	0.0	0.0	0.0	0.0	23,592.4	609,486.4	0.0	0.0	23,592.4	609,486.4	0.0	0.0
2034	0.0	0.0	0.0	0.0	19,808.6	629,295.0	0.0	0.0	19,808.6	629,295.0	0.0	0.0
2035	0.0	0.0	0.0	0.0	18,980.6	648,275.6	0.0	0.0	18,980.6	648,275.6	0.0	0.0
2036	0.0	0.0	0.0	0.0	18,693.8	666,969.5	0.0	0.0	18,693.8	666,969.5	0.0	0.0
2037	0.0	0.0	0.0	0.0	20,955.1	687,924.6	0.0	0.0	20,955.1	687,924.6	0.0	0.0
2038	0.0	0.0	0.0	0.0	22,316.1	710,240.6	0.0	0.0	22,316.1	710,240.6	0.0	0.0
2039	0.0	0.0	0.0	0.0	29,973.2	740,213.8	0.0	0.0	29,973.2	740,213.8	0.0	0.0
2040	0.0	0.0	0.0	0.0	19,553.5	759,767.3	0.0	0.0	19,553.5	759,767.3	0.0	0.0
2041	0.0	0.0	0.0	0.0	26,818.7	786,586.0	0.0	0.0	26,818.7	786,586.0	0.0	0.0
2042	0.0	0.0	0.0	0.0	21,586.1	808,172.0	0.0	0.0	21,586.1	808,172.0	0.0	0.0

5.6. Summary of GHG Emissions Reductions and Removals

Total net ex ante of anthropogenic emissions of GHG *Significance Evaluation*

Using the document "EB- approved CDM " Tool for testing significance of GHG emissions in A / R CDM Project activities" it found that the above-ground biomass will contribute 80% of the expected emissions in the baseline scenario. Already below-ground biomass will contribute 11%.

Ex ante calculation of estimates of net total reduction of GHG emissions

Equation 19 suggested by the VM0015 has been used for the Ex ante estimation of project emissions reductions. The result is shown in Table 43.

Ex ante calculation of Verified Carbon Units (VCUs)

The VM0015 the equation 20 was used to estimate the number of VCUs. Project Risk Factor parameter was estimated using the VCS document AFOLU Non- Permanence Risk Tool, resulting in 10%. The result is shown in Table 43.

Table 43. Estimate Ex ante net anthropogenic emission reductions (DREDD) and Verified Carbon Units (Table 36 of VM0015).

Project Year t	Baseline carbon stock changes		Baseline GHG emissions		Ex ante project carbon stock changes		Ex ante project GHG emissions		Ex ante leakage carbon stock changes		Ex ante leakage GHG emissions		Ex ante net anthropogenic GHG emission reductions		Ex ante VCUs tradable		Ex ante buffer credits	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	$\Delta CBSLPA_t$	$\Delta CBSLPA$	$\Delta EBBBSLPA_t$	$\Delta EBBBSLPA$	$\Delta CPSPA_t$	$\Delta CPSPA$	$EBBPSPA_t$	$EBBPSPA$	ΔCLK_t	ΔCLK	ELK_t	ELK	$\Delta REDD_t$	$\Delta REDD$	VCU_t	VCU	VCB_t	VCB
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2013	362,750.2	362,750.2	0.0	0.0	55,346.1	55,346.1	0.0	0.0	36,275.0	36,275.0	0.0	0.0	271,129	271,129	240,388	240,388	30,741	30,741
2014	524,401.3	887,151.5	0.0	0.0	71,511.2	126,857.4	0.0	0.0	47,196.1	83,471.1	0.0	0.0	405,693	676,822	360,404	600,792	45,289	76,030
2015	532,380.7	1,419,532.2	0.0	0.0	72,309.2	199,166.6	0.0	0.0	42,590.5	126,061.6	0.0	0.0	417,481	1,094,303	371,473	972,265	46,008	122,038
2016	539,098.8	1,958,631.0	0.0	0.0	77,748.8	276,915.4	0.0	0.0	37,736.9	163,798.5	0.0	0.0	423,613	1,517,916	377,478	1,349,743	46,135	168,173
2017	594,764.1	2,553,395.0	0.0	0.0	77,367.7	354,283.0	0.0	0.0	35,685.8	199,484.4	0.0	0.0	481,710	1,999,626	429,970	1,779,713	51,740	219,913
2018	503,948.9	3,057,343.9	0.0	0.0	64,154.8	418,437.9	0.0	0.0	25,197.4	224,681.8	0.0	0.0	414,596	2,414,222	370,616	2,150,329	43,980	263,893
2019	547,506.0	3,604,849.9	0.0	0.0	62,164.3	480,602.2	0.0	0.0	27,375.3	252,057.1	0.0	0.0	457,966	2,872,188	409,431	2,559,760	48,535	312,428
2020	536,220.6	4,141,070.5	0.0	0.0	56,012.1	536,614.3	0.0	0.0	26,811.0	278,868.1	0.0	0.0	453,397	3,325,585	405,376	2,965,136	48,021	360,449
2021	531,219.3	4,672,289.8	0.0	0.0	50,399.9	587,014.2	0.0	0.0	26,561.0	305,429.1	0.0	0.0	454,258	3,779,843	406,176	3,371,312	48,082	408,531
2022	462,206.5	5,134,496.3	0.0	0.0	42,181.5	629,195.6	0.0	0.0	23,110.3	328,539.4	0.0	0.0	396,914	4,176,757	354,911	3,726,223	42,003	450,534
2023	517,777.1	5,652,273.5	0.0	0.0	44,960.0	674,155.6	0.0	0.0	25,888.9	354,428.3	0.0	0.0	446,928	4,623,685	399,646	4,125,869	47,282	497,816
2024	544,557.0	6,196,830.5	0.0	0.0	46,299.0	720,454.6	0.0	0.0	27,227.9	381,656.1	0.0	0.0	471,030	5,094,715	421,204	4,547,073	49,826	547,642
2025	634,501.2	6,831,331.7	0.0	0.0	50,796.2	771,250.8	0.0	0.0	31,725.1	413,381.2	0.0	0.0	551,979	5,646,694	493,608	5,040,681	58,371	606,013
2026	542,799.8	7,374,131.5	0.0	0.0	46,211.1	817,461.9	0.0	0.0	27,140.0	440,521.2	0.0	0.0	469,448	6,116,142	419,789	5,460,470	49,659	655,672
2027	425,685.5	7,799,817.0	0.0	0.0	40,355.4	857,817.3	0.0	0.0	21,284.3	461,805.5	0.0	0.0	364,045	6,480,187	325,511	5,785,981	38,534	694,206
2028	450,846.0	8,250,663.0	0.0	0.0	41,613.4	899,430.7	0.0	0.0	22,542.3	484,347.8	0.0	0.0	386,690	6,866,877	345,766	6,131,747	40,924	735,130
2029	457,611.0	8,708,274.0	0.0	0.0	41,951.7	941,382.4	0.0	0.0	22,880.5	507,228.3	0.0	0.0	392,778	7,259,655	351,212	6,482,959	41,566	776,696
2030	555,155.1	9,263,429.2	0.0	0.0	46,828.9	988,211.3	0.0	0.0	27,757.8	534,986.1	0.0	0.0	480,568	7,740,223	429,735	6,912,694	50,833	827,529

Project Year t	Baseline carbon stock changes		Baseline GHG emissions		Ex ante project carbon stock changes		Ex ante project GHG emissions		Ex ante leakage carbon stock changes		Ex ante leakage GHG emissions		Ex ante net anthropogenic GHG emission reductions		Ex ante VCUs tradable		Ex ante buffer credits	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	$\Delta CBSLPA_t$	$\Delta CBSLPA$	$\Delta EBBBSLPA_t$	$\Delta EBBBSLPA$	$\Delta CPSPA_t$	$\Delta CPSPA$	$EBBPSPA_t$	$EBBPSPA$	ΔCLK_t	ΔCLK	ELK_t	ELK	$\Delta REDD_t$	$\Delta REDD$	VCU_t	VCU	VCB_t	VCB
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2031	553,882.0	9,817,311.1	0.0	0.0	46,765.2	1,034,976.5	0.0	0.0	27,694.1	562,680.2	0.0	0.0	479,422	8,219,645	428,710	7,341,404	50,712	878,241
2032	464,277.2	10,281,588.3	0.0	0.0	42,285.0	1,077,261.5	0.0	0.0	23,213.9	585,894.0	0.0	0.0	398,778	8,618,423	356,578	7,697,982	42,200	920,441
2033	471,848.0	10,753,436.2	0.0	0.0	42,663.5	1,119,925.0	0.0	0.0	23,592.4	609,486.4	0.0	0.0	405,592	9,024,015	362,673	8,060,655	42,919	963,360
2034	396,172.0	11,149,608.2	0.0	0.0	38,879.7	1,158,804.7	0.0	0.0	19,808.6	629,295.0	0.0	0.0	337,483	9,361,498	301,753	8,362,408	35,730	999,090
2035	379,612.7	11,529,220.9	0.0	0.0	38,051.8	1,196,856.5	0.0	0.0	18,980.6	648,275.6	0.0	0.0	322,580	9,684,078	288,423	8,650,831	34,157	1,033,247
2036	373,876.3	11,903,097.2	0.0	0.0	37,764.9	1,234,621.4	0.0	0.0	18,693.8	666,969.5	0.0	0.0	317,417	10,001,495	283,805	8,934,636	33,612	1,066,859
2037	419,101.9	12,322,199.1	0.0	0.0	40,026.2	1,274,647.6	0.0	0.0	20,955.1	687,924.6	0.0	0.0	358,120	10,359,615	320,212	9,254,848	37,908	1,104,767
2038	446,321.5	12,768,520.6	0.0	0.0	41,387.2	1,316,034.8	0.0	0.0	22,316.1	710,240.6	0.0	0.0	382,618	10,742,233	342,124	9,596,972	40,494	1,145,261
2039	599,463.5	13,367,984.1	0.0	0.0	49,044.3	1,365,079.1	0.0	0.0	29,973.2	740,213.8	0.0	0.0	520,446	11,262,679	465,404	10,062,376	55,042	1,200,303
2040	391,069.3	13,759,053.4	0.0	0.0	38,624.6	1,403,703.7	0.0	0.0	19,553.5	759,767.3	0.0	0.0	332,891	11,595,570	297,646	10,360,022	35,245	1,235,548
2041	536,373.8	14,295,427.2	0.0	0.0	45,889.8	1,449,593.5	0.0	0.0	26,818.7	786,586.0	0.0	0.0	463,665	12,059,235	414,616	10,774,638	49,049	1,284,597
2042	431,721.6	14,727,148.8	0.0	0.0	40,657.2	1,490,250.7	0.0	0.0	21,586.1	808,172.0	0.0	0.0	369,478	12,428,713	330,371	11,105,009	39,107	1,323,704

6 COMMUNITY

6.1. Community Scenario Without Project

6.1.1. Characteristics of Resex Rio Preto-Jacundá

The population resident in Resex consists, for the most part,

of children and adolescents who represent 60% of the effective population (Figure 41). There are 130 residents, 29 families, 20 of them on the mainland and 9 in the riverside sector, distributed in three communities: Cabeça-de–boi, Jatuarana and Jatoba (**Figure 42**). These communities are located within the limits of the territory, the western portion being in the municipality of Cujubim is uninhabited.

There is great internal turnover of residents of the riverside area (Jatoba) migrating to the land division (Cabeça-de–boi and Jatuarana), a fact that is due to easier access to health, education, energy and transport in the land sector.

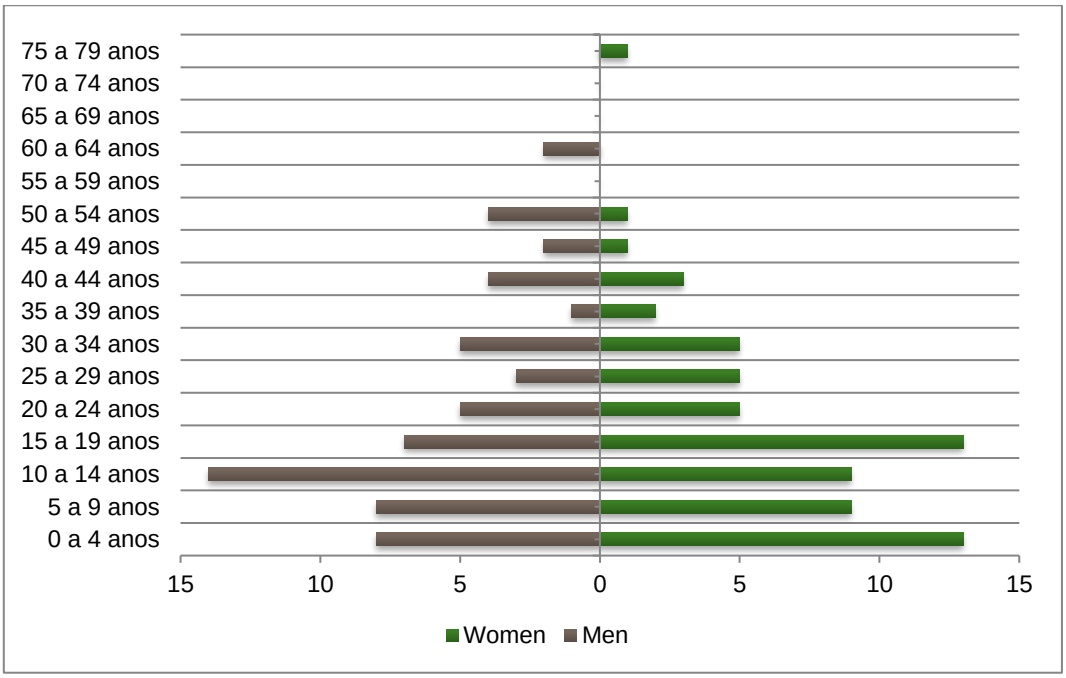


Figure 41. Resident population by age - Resex RPJ.
Source: CES Rioterra, 2013

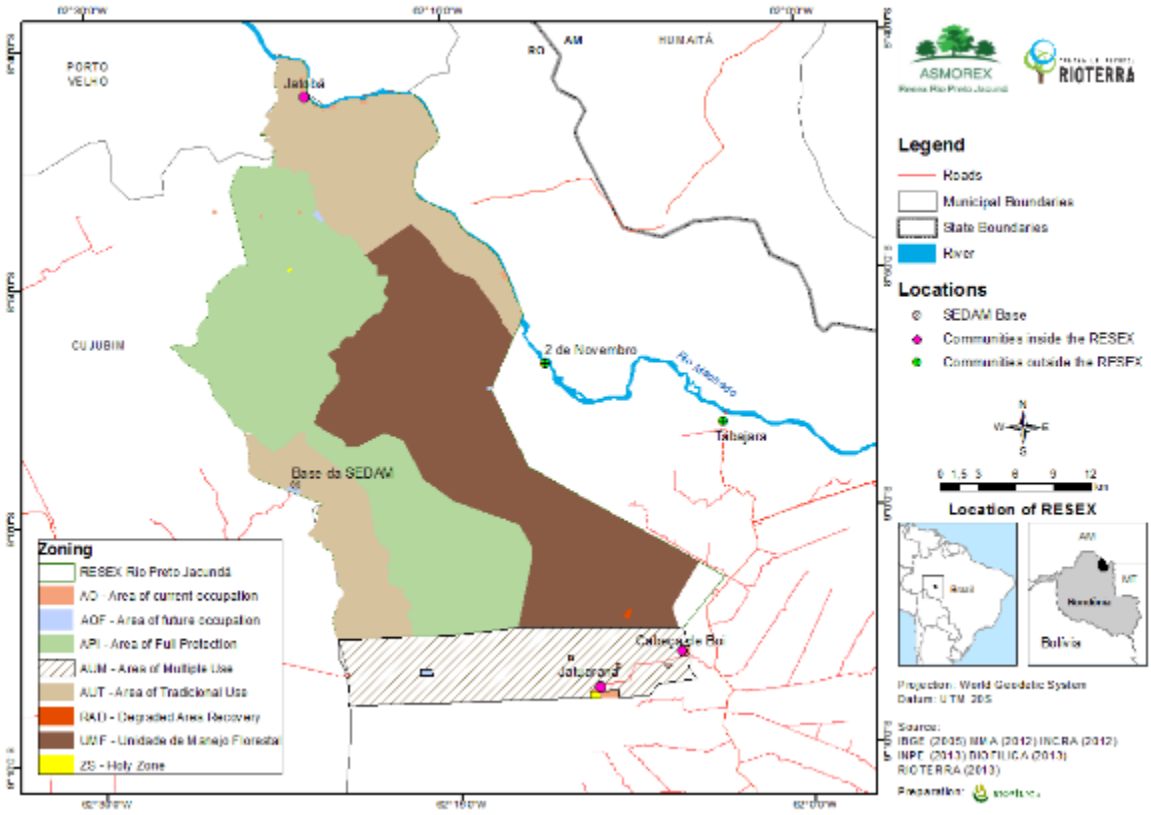


Figure 42. Location of communities

The RESEX since its creation goes through an oscillating migration which has a direct impact on income, including no longer having the traditional extractive character and is directed to timber forest management.

Based on the number of families pointed out by the authors and considering the current residents, it appears that approximately 1/3 of the population has abandoned RESEX. If maintained the migratory level of the population, there is the risk of depopulation of the territory, which would favor predatory actions as illegal logging, land invasion and the presence of fishermen and hunters who act clandestinely.

Infrastructure

The residences in Resex, mostly, are wooden houses, with tiles of asbestos or straw floors and burnt cement. On infrastructure, some houses have indoor bathroom (28%), running water (33%) and sewage systems septic tank type external (66%).

In 2013, at the time of the socioeconomic diagnosis, from the 26 families interviewed, 62% lived in homes with electricity whose source of supply was coming from generators from Asmorex, 44% with own engines and 6% with the Luz no Campo Program. In mid-2014, continuous power grid reached

the communities of the mainland and an alternative energy program will be implemented soon in riverside homes.

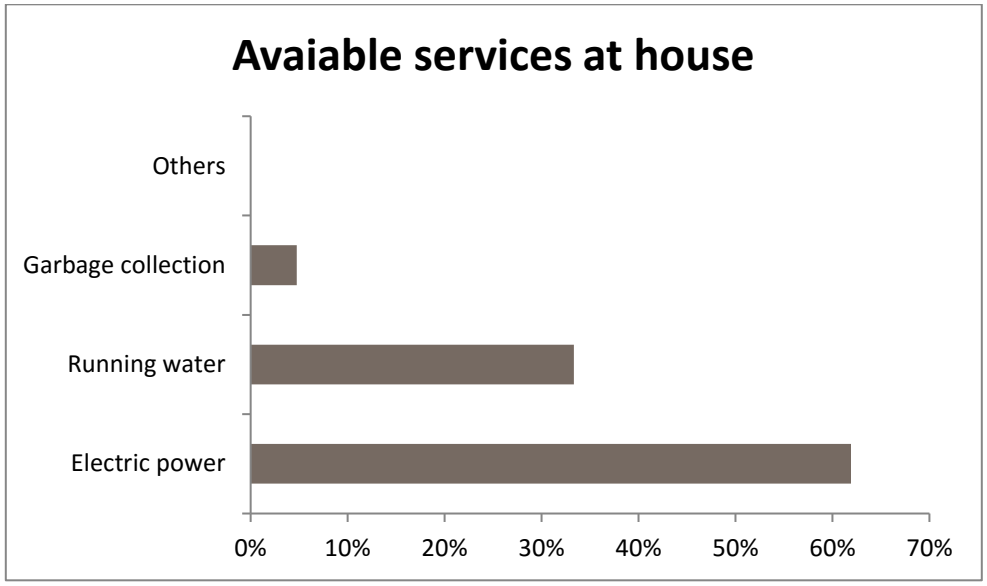


Figure 43. Percentage of houses of the following service

The household waste has its allocation distributed as follows: a) 12% is buried in holes close to home; b) 85% is burned in backyards; c) 3% have other purposes. As for the disposal of domestic sewage, it was found that 50% is deposited in tanks, sinks 6%, 31% in ditches and 13% in waterways (rivers and streams).

Regarding the origin of water source for human consumption, 4% are from collective wells with depths above 15 meters, 43% from individual wells known as Amazonian consisting of irregular perforations with variable depth, near drains and that due to the dynamic the water table in rainy periods increases the possibility of water contamination by bacteria, 52% use water streams and rivers. From this result only 4% of the residents have the routine to boil it and 28% purify it with the use of chlorine, while 68% did not perform any type of treatment.

In terms of transport used by the families, the data obtained and presented in Figure 44 shows that the major forms of transportation are motorcycles and boats. Motorcycles, used both by the inhabitants of the mainland and riverine, have low maintenance costs and are agile in moving to the city. The boats are almost exclusively used in the riverside, with the exception of activities that require equipment such as fishing and territorial surveillance in RESEX.

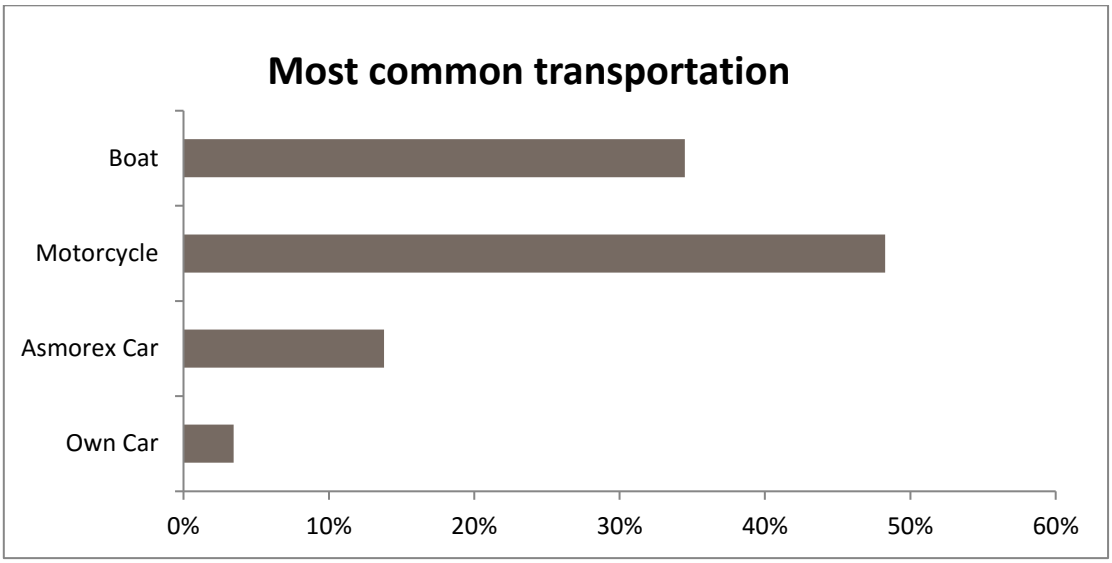


Figure 44. Means of transportation used by families.
Source: Field surveys, 2013.

Income and production

According to data from a socioeconomic survey held in RRPJ, the sources of income of the inhabitants are distributed as follows (Table 44).

Table 44. Sources of income of residents in Resex Rio Preto-Jacundá

Income	% families	Income	% families
Extractivism	57%	Bolsa Família (Financial Aid from the government)	46%
Agriculture	57%	Retirement	14%
Livestock	4%	Pension	7%
Fishing	25%	Others	32%

Source: Field Survey, 2013

The most practiced activities to obtain income are extractive and small-scale agriculture. Still, the economic conditions are unfavorable and 46% of families receive government assistance through the Family Grant Program.

It is also known that families associated with Asmorex receive the proceeds from the net income obtained in the timber forest management held in RESEX, according to Resolution 003 of 2004. However, at the time of the research it was not obtained the amount received neither by the locals neither by Asmorex. The main benefits offered by the timber company, according to residents, is the generation of jobs and road maintenance inside the Resex, in addition to the movement of this activity ensures a certain physical presence in the area and inhibits the action of invaders.

	Extractivism	Agriculture	Bolsa Família	Fishing	Retirement	Pension	Others
Annual Average (R$)/family	3,069	3,426	2,356	456	4,113	4,043	12,503
Families	16	16	13	7	4	2	9

Figure 45. Income per family per activity
Source: Field Survey, 2013.

As shown in Figure 45, if we consider the total of 130 residents, we will have a per capita income of R$ 230/year or R$19/ month, which places them in extreme poverty.

Regarding the impression on the income being or not sufficient to meet the family needs, half the residents understand it as satisfactory. About this fact, according to the Socioeconomic Diagnosis DSEA (CES Rioterra, 2013), there is the need for greater investment in education and vocational training courses for residents in RESEX so that in the medium term may arise professionals with diverse skills and more critical about their situation.

On income and production, DSEA brought the following considerations:

- families do not have clarity as to the volume of agricultural production and plant extractive (timber and non-timber) and animal (hunting and fishing), or as the value generated in each of these sectors;
- the production system is almost exclusively family for livelihood except in sporadic cases in collecting chestnut and there is no cooperation between families;
- the working techniques and production are almost exclusively provided by hand without the use of technology;
- regarding the degree of processing of the products, with the exception of cassava flour, all others to pass through a vertical integration process;
- the activities that generate employment and income are incipient and lack of diversification of production in order to ensure the entry of funds during the year;
- residents attribute the low income from forest products to the shortage and low productivity of the forest, which requires proof.

Agriculture

The open areas are used mainly for agriculture, which occupies approximately 143 ha, an average of 5 ha / family, as provided by the interim plan of use RESEX.

Agricultural production (rice, beans and coffee) is made in small areas near the homes and is geared almost exclusively to family subsistence (food security) and corn to feed chickens. Staple foods are purchased outside RESEX by half of the families, so there is no exact knowledge about the amount of production within RESEX.

Cassava is an agricultural product with greater visibility and nearly all families plant it. One of the difficulties that many residents have is with the land preparation. For some it was important that the Association acquire machinery for land preparation, as the use of fire is not allowed.

Later, cassava is processed into flour and manioc powder to meet the food safety and the surplus product is sold to middlemen or in regional markets, with 90.91% of the production being destined to the cities for sale and only 9.09% consumed by communities. The amount sold is bought by middlemen and businessmen of the city.

Table 45. Total agricultural production in Resex

Crop	Annual Production (Kg)
Clean Rice	5,400
Beans	2,700
Coffee (not grounded/roasted)	1,200
Cassava flour	6,000

In the production, the use of agricultural inputs is reduced, being used by ¼ of families, but there is a significant use of motorized equipment and the use of machinery in the three communities is:

- 63.16 % chainsaw;
- 5.26% jerico;
- 21.05% mowing;
- 10.53% tractor, considered the most important for increasing production, being able to recuperate the capoeiras.

To enlarge the area under cultivation in the year, 19% of families made felled. The perception of the families about it is:

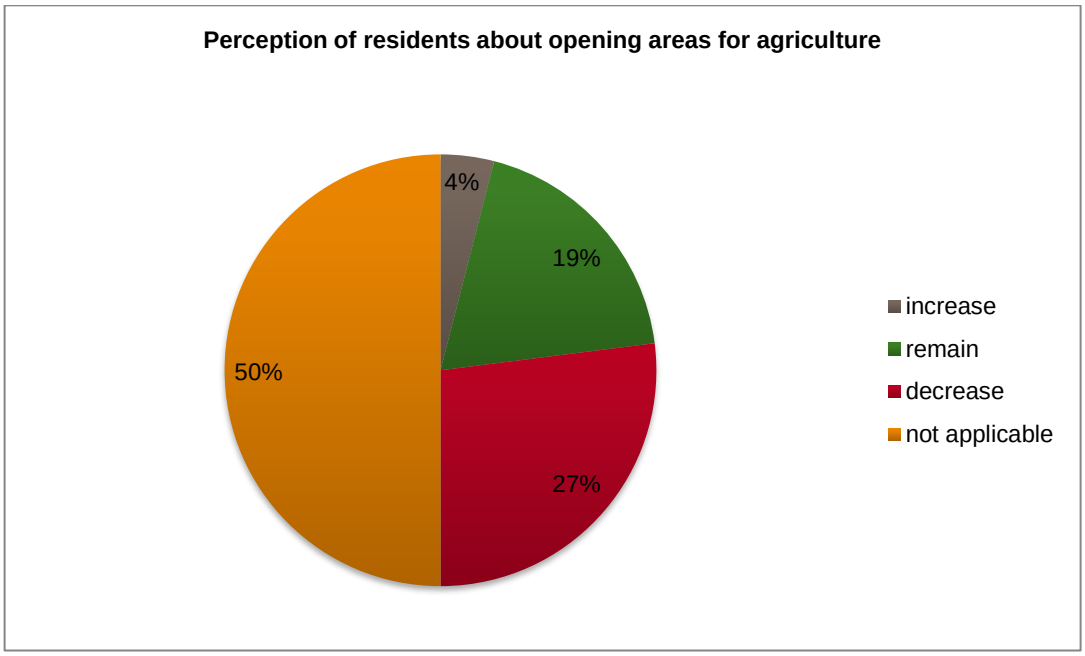


Figure 46. Perception of residents about opening areas for agriculture
Source: Field Survey, 2013.

One of the agreements in the extractive reserve is non-deforestation and no use of fire for the development of agriculture and opening of large areas. The river sector, which have less access to agricultural equipment, need to make more use to fire. From the data collected in the field, 95.65 % of families have used up the encapoeiradas areas, and 28% have adopted the fires as a mean to clear the crops.

Figure 47. Coffee Plantation in community Cabeça de Boi
Photo: database, field work. Dorisvalder Dias Nunes (2013)

The fruit cultivation is done on a small scale and commercialized by only 02 families, but 76 % of households cultivate some kind of species in poultry areas (33.33%) in the yards or orchards.

There is the creation of 08 heads of cattle by a single family in RESEX, focused exclusively on milk production for their own consumption.

Extractivism

As for the extraction, 64% of families realize collecting forest products brazilian nut, açaí and copaiba - both for subsistence and commercial purposes as medicinal use.

The forest products occur at different times and suffer a variation of a growing season to another. In general, it has the following manufacturing table:

Table 46. Extraction in non-timber Resex

Product	Harvest	Number of Families that commercialize	Annual Production	Annual Gross Revenue (R$)
Brazil Nut	September to February	07	1,885 Kg	4,488
Açaí	February	01	4,140 liters	1,955
Andiroba/copaíba	August to September	09	11,400 liters	10,000

In the process of selling products of Table 46, there is participation Asmorex and Cooperex, unlike the other products. However, middlemen operate large portion of the products, and in the case of acai 100% is sold to middlemen.

The extraction of natural syringe, even with government subsidies, was abandoned without prevision of return. There are signs of interest from residents of resuming this activity if there is the structure of the chain with guaranteed best rates and market.

Overall, the difficulties in the commercialization of extractive products are justified by the low prices charged and the difficulties of flow and storage of goods. It is clear that forest production, like agriculture, is almost exclusively to meet family subsistence needs, even among those products that are marketed to the capitalization of the residents.

Even with the difficulties presented, it is clear from the RESEX residents who develop vegetable extraction activities that the income increased considerably to 23% of families and remained the same for 31% (). The conclusion is that the activity is still attractive and that could be enhanced with adjustments in production mechanisms, presentation and sale of the product, the formation of partnerships and consolidation of markets.

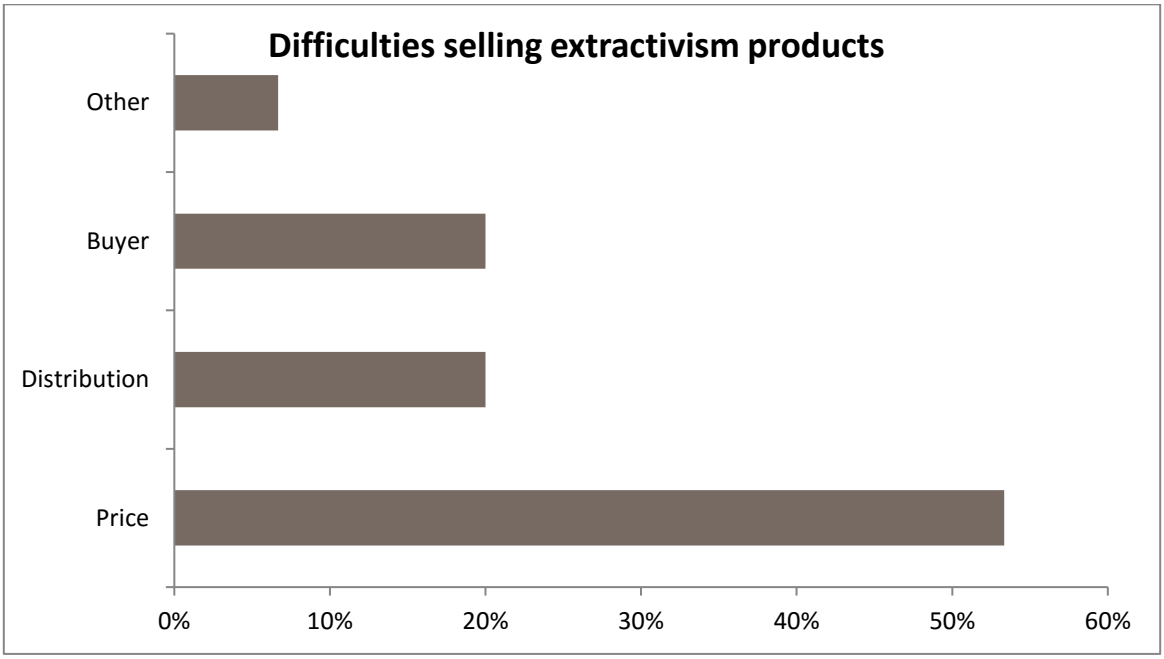


Figure 48. Difficulties encountered by Resex residents in the marketing of extraction products
Source: Field Survey, 2013.

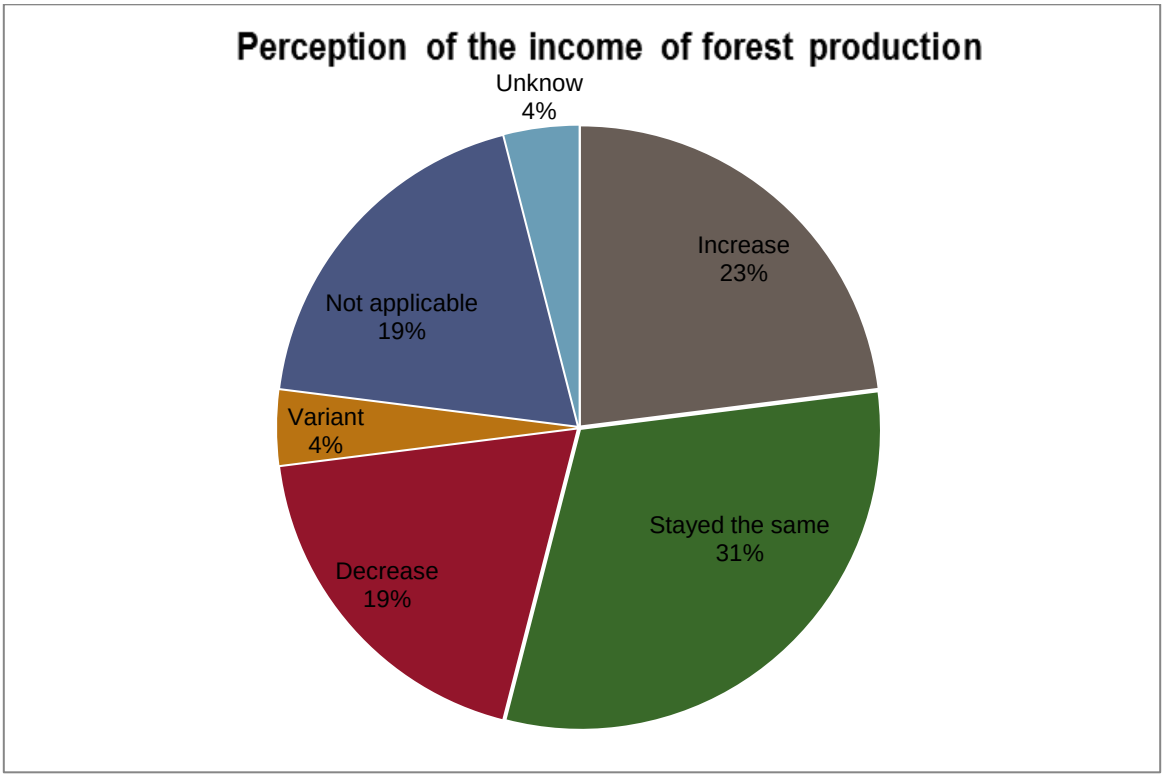


Figure 49. Perception about income of products from the forest.

Source: Field survey, 2013.

Timber Management

Upon socioeconomic diagnosis it was not possible to estimate the figures for the volume of timber extracted by the company Wood Shopping which has a contract with Asmorex / Cooperex, due to the timber management plan in the area, or the exact amount that each family gets benefit - one of the residents said that would be approximately R $ 4,000.00/year - variable annually according to the production of cubic meters of wood UPA (Annual Production Unit).

The reality in the interviews showed that residents do not have enough information about this operation. However, they recognize that the installation of forest management operations guarantees certain physical presence in the area that inhibits the action of invaders.

Breeding, hunting and fishing

With regard to breeding, it was found in the diagnosis that most families do not develop this activity, but the birds are most representative both effective as for the number of farmers. The creation of 08 head of cattle is carried out by a single family RESEX. All these creations serve the consumption of their own families.

In relation to the animal extraction it was evident that 96.15% of families engaged in fishing activities sporadically and/or continuously, being 65.52% within the RESEX and 34.48% out of it. The survey was found that in the period the total value of fish sold was R $ 3,000.00, and the dourado is the fish with the highest market value, with an average of R $ 5.50 / kg.

To 60% of the residents, there is the perception that there was a significant reduction of fish stocks, the main causes being: a) overfishing by poachers; b) deforestation in the surrounding area affecting the riparian vegetation; c) the changes in the climate. They also claim that many species have become extinct or disappeared from the region, especially dourado and tambaqui.

Hunting is practiced by 88.46% of families. Locals use wild animals (agouti, armadillo, tapir, peccary, alligator, tapir, capybara) for food, so it is not permitted even by law to commercialize. The Multiple Use Management Plan will include clearer rules regarding this activity, already provided including participatory zoning held in one of the REDD + project workshops.

Education and Access to Services of Education

In general, the level of education of RESEX residents is low (Figure 50), with almost 50% of residents having studied only until the fourth grade and ¼ of the residents having no schooling whatsoever. Only four people have completed high school and one respondent reported having higher education.

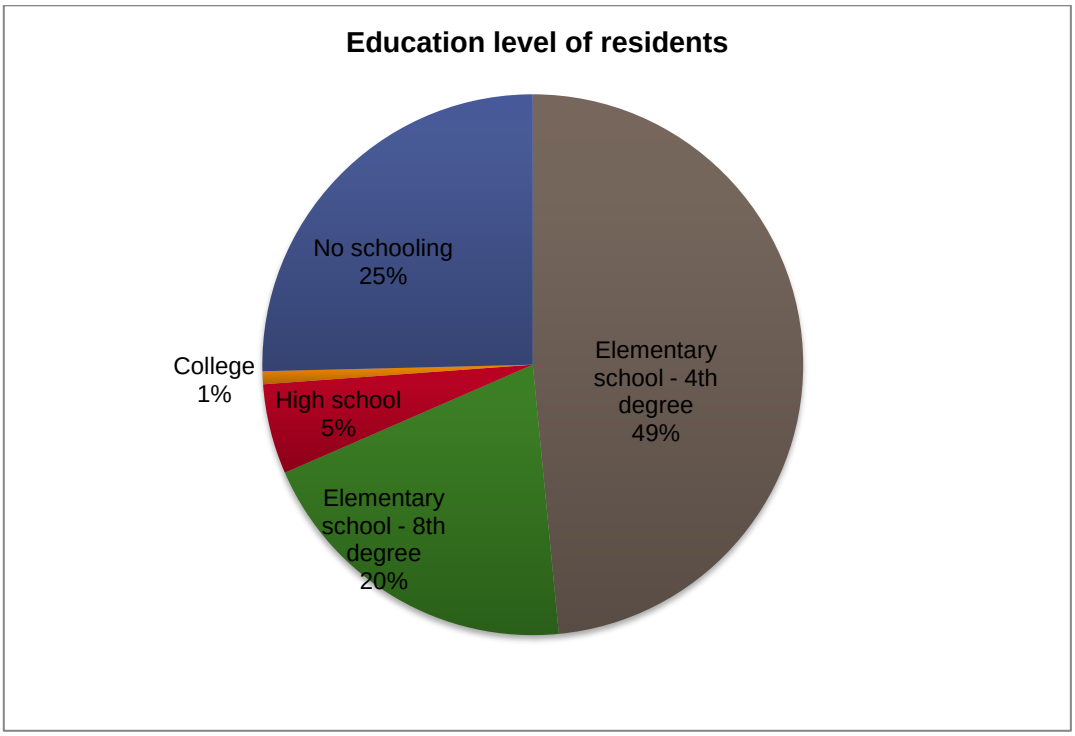


Figure 50. Level of education of residents
Source: Field Survey, 2013.

In the workshop of the Community Life Plan, the demand for education for youth and adults reflects the contents above, since there is also this type in the vicinity of Resex.

In the coastal sector 17 people attend school, ie 31% of the population living in this sector. In the mainland sector 35 people attend school, approximately 47% of the residents of that sector. The DSEA showed that eight people of school age from 7 to 18 years are not attending schools, including many who have finished elementary school and did not continue to secondary education.

The fundamental level schools are relatively close to communities, one in the vicinity of the community in RESEX Água Azul, and another in the coastal sector in Jatoba community. For the first it's used a bus, and in the second there is a speedboat that serves students in early grades. Students in higher grades are without transportation, so they are not attending classes.

To attend high school, residents need to go the city of Machadinho d'Oeste, which implies, to many, in residence changes, especially for the river people who have a difficult logistical access to the city.

Health

The situation of health services in RESEX and its surrounding reflects the precariousness found in the municipalities of Machadinho d'Oeste and Cujubim, where only 11% of the residents of

Resex claim to have access to the health post service. Many residents are already forwarded directly to the Porto Velho base hospital.

Health Units are in town. There is an association of transportation for those who live in the mainland, however, the riverside are the ones who have difficulties in accessing, through hours of tail (small boat with low capacity motor) up the Machado River and a few hours by road to the city of Machadinho.

Among men, women and children the most common disease is malaria, in which more than 50% of residents have been contaminated already. The flu comes next with 39 % (Figure 51).

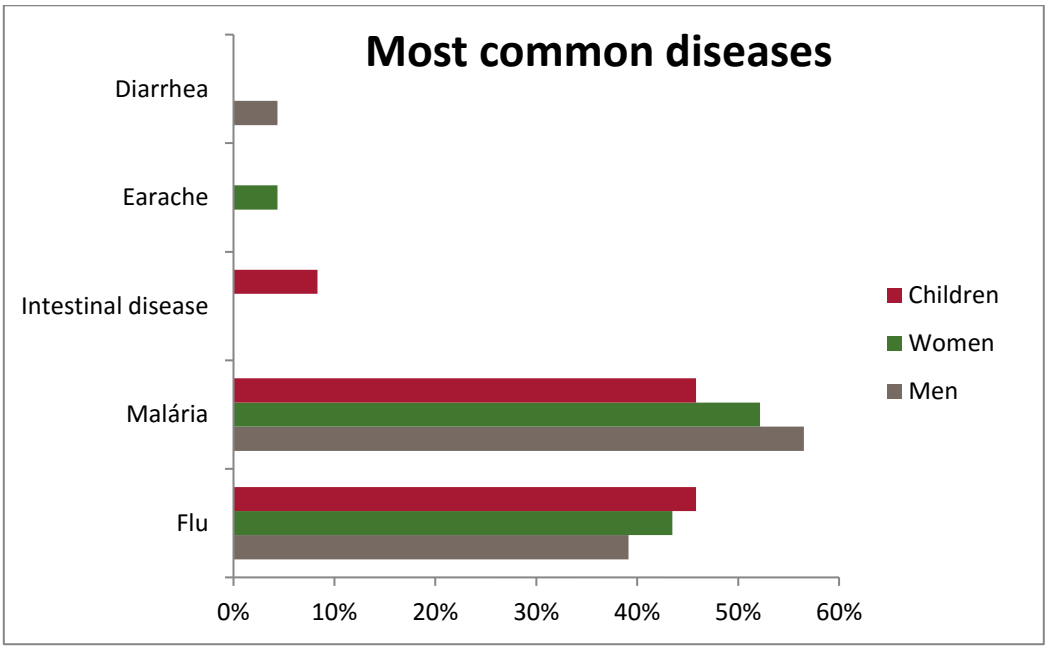


Figure 51. Most common diseases among the inhabitants of Resex
Source: Field Survey, 2013.

The situation of children deserves attention since both malaria and influenza indicated a percentage similar to that of adults, with nearly half of the children of Resex being contaminated.

Communication Systems

The expansion of the electricity network in the municipalities of Cujubim and Machadinho D'Oeste among many improvements made possible the expansion of the communications network for expanded accessibility of residents of more remote rural areas to information channels, such as television sets, communication systems (rural telephony), computers with internet connection via radio in various properties.

The DSEA has the radio as their primary means of communication in RESEX reaching a percentage of 96%. There are currently 1 unit in each community, all interconnected with a device in Asmorex headquarters in Machadinho d'Oeste.

There is currently no cell phone signal in the area of Resex. There are plans to install an internet antenna meeting the need of timber management and facilitating access of residents to educational tools.

Gender and women participation

In terms of the social relations of gender and the condition of extractive women, the diagnosis made by the ESC Rioterra (2013) shows that they are still a minority in social organizations (association, cooperative). Their bond in these movements aims often to facilitate access public policies to rural workers and benefits policies such as maternity pay, retirement, auxílio defeso (government support for fishers) and Bolsa Familia, this last being very present in the surveyed families.

Upon social diagnosis there was only one woman on the board of Asmorex. One of the reasons we can highlight regarding the low participation of women in organizations is the distance between the villas making it difficult to meet to discuss collective problems they experience. Not all can attend meetings and assemblies, as the headquarters of the organizations are in the city of Machadinho.

When there is participation of women in these meetings, it is one a few interventions, only when it comes to issues such as children's education and health. When it comes to production issues, marketing and relationship with institutions, assignments are with men.

The study results show the general dissatisfaction of women when there is the absence of many public services that should be present in RESEX, listed in order of priority: education, health, income, infrastructure and security.

Of the universe surveyed, 87% of women have difficulties to access public policies and benefits. Health is presented as the most difficult of access, followed by education and access to income. Fact verified is that although the benefits are in the name of women, who manages them are often the partners and some of them do not know how much they receive of benefit.

Cultural Aspects

In RESEX Rio Preto-Jacundá the characterization of social groups allowed some considerations on the cultural aspects of the residents. The first is the residence time on site, generally little, that is, the group is still in the process of building its relations with the place.

The closest relationships are with neighbors, usually having kinship ties and no collective activities.

Both women and men have in the "conversations with neighbors " their main cultural activity. Other activities are linked to religious actions such as church services, worship and religious festivals.

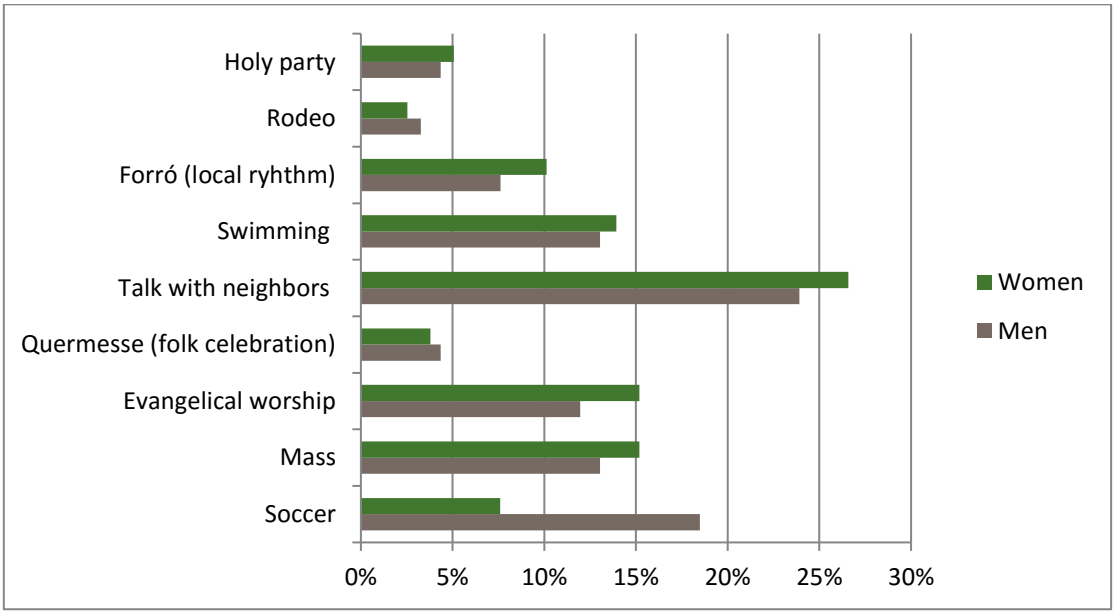


Figure 52. Cultural activities carried out by the residents of Resex
Source: Field Survey, 2013.

The parties of which the inhabitants of RESEX participate occur almost exclusively in the surrounding region of RESEX in Estrela Azul, Tabajara and municipal offices.

6.1.2. High Conservation Value Attributes

The Socio-Economic Diagnostics conducted at Resex in 2013 identified the need for a better future understanding of the social "High Conservation Value Attributes" through specific participatory ethno-zoning and multiple use management plan. Although for the final establishment of HCVs is still needed a better delimitation of the concept with the community and consultations with experts, with the community and other stakeholders own the Zoning Workshop conducted by the project (section 2.6.2) served guidance for pointing potential HCVAs.

For this preliminary assessment of High Conservation Value Attributes was used the document "Assessment, management and monitoring of High Conservation Value Forest: A practical guide for forest managers" produced by Proforest. Based on the guide and the results of the Workshop II - Zoning been identified that the key attributes of high value for RESEX are directly linked to the social aspects involving the areas of economic interest, social, religious, touristic, environmental, among others, they should be defined from the participatory development.

In this workshop the main issues raised by the community were important areas for subsistence them, especially hunting, fishing and extraction of natural resources (non-timber forest

products) and two sacred areas regarded as ancient cemeteries of rubber tappers, or potentially the HCVs 5 and 6 are present in RESEX (Figure 53. These potential attributes are described in Table 47.

After identifying the areas of the main Community uses an action plan was developed collectively for each zone (Hunting Zone, Production Zone, Sacred Zone, Ecotourism Zone, Forest Management Area, Social and Community Interest Zone and Fishing Zone). The action plan includes actions to be taken to maintain and improve the attribute in the short, medium and long term, the specific objectives and possible partners involved.

The security measures to potential attributes of high conservation value are primarily linked to itself containing deforestation itself, since most of the attributes especially related to HCVs 5 are dependent on the presence of forest cover for their maintenance and improvement. However, the results of the workshop II described above bring specific measures to be adopted for each defined area (Figure 53), which also promoted the consolidation of the Resex Multiple Use Plan guiding measures such as monitoring the fauna with focus in relevant species for hunting and conservation measures who has the ultimate goal of maintaining and improving the biodiversity of relevance to the livelihood of communities (HCVs 5).

The workshop report II "Zoning Plan and Use of Resex Rio Preto-Jacundá" is available in the annex to this document. The draft of Multiple Use Management Plan is still in the final consolidation phase will be made available to project auditors.

Table 47. Initial identification of high conservation value attributes.

Value	Present	Potential	Absent	Justification
HCV 5 – forest areas fundamental to ensure the basic needs of local communities (eg. livelihoods, health, etc.)	x			The existence of the extractive reserve is justified by the existence of the forest in line with the traditional communities, where they derive their livelihood and maintain the way of life. Forest, residents of RRPJ extract products to obtain income, food, medicines and materials for housing construction and community structures. Possible zones that set this attribute are the Hunting Zones, Fishing, Production and Community Interest Zone (Figure 53). Actions for improvement and better management of these resources are planned between the project activities as a result of the workshop II "Zoning and Use Plan Resex Rio Preto-Jacundá" attached, and the Multiple Use Management Plan to be implemented.
HCV 6 – Forest areas critical to the cultural identity of traditional communities (eg. areas of cultural significance, ecological, economic or religious).		**X**		At the time of the participatory zoning was to appoint two points in RESEX with possible sacred areas or "historical" for the rubber tappers: a chapel attached to community belief located next to a known nut, and a cemetery with approximate location where residents have interest in identification and restoration. The area that sets this attribute is the Holy Zone, pointed in Figure 53. Measures to maintain and improve this attribute is described as a result of the workshop II "Zoning Plan and Use of Resex Rio Preto-Jacundá" attached, and the Multiple Use Management Plan to be implemented

In areas of HCV 6, there is the intention of residents expressed in the Plan of Use in an identification and recovery of these points, by use of the same location and celebrations, integrating HCVs to the local culture.

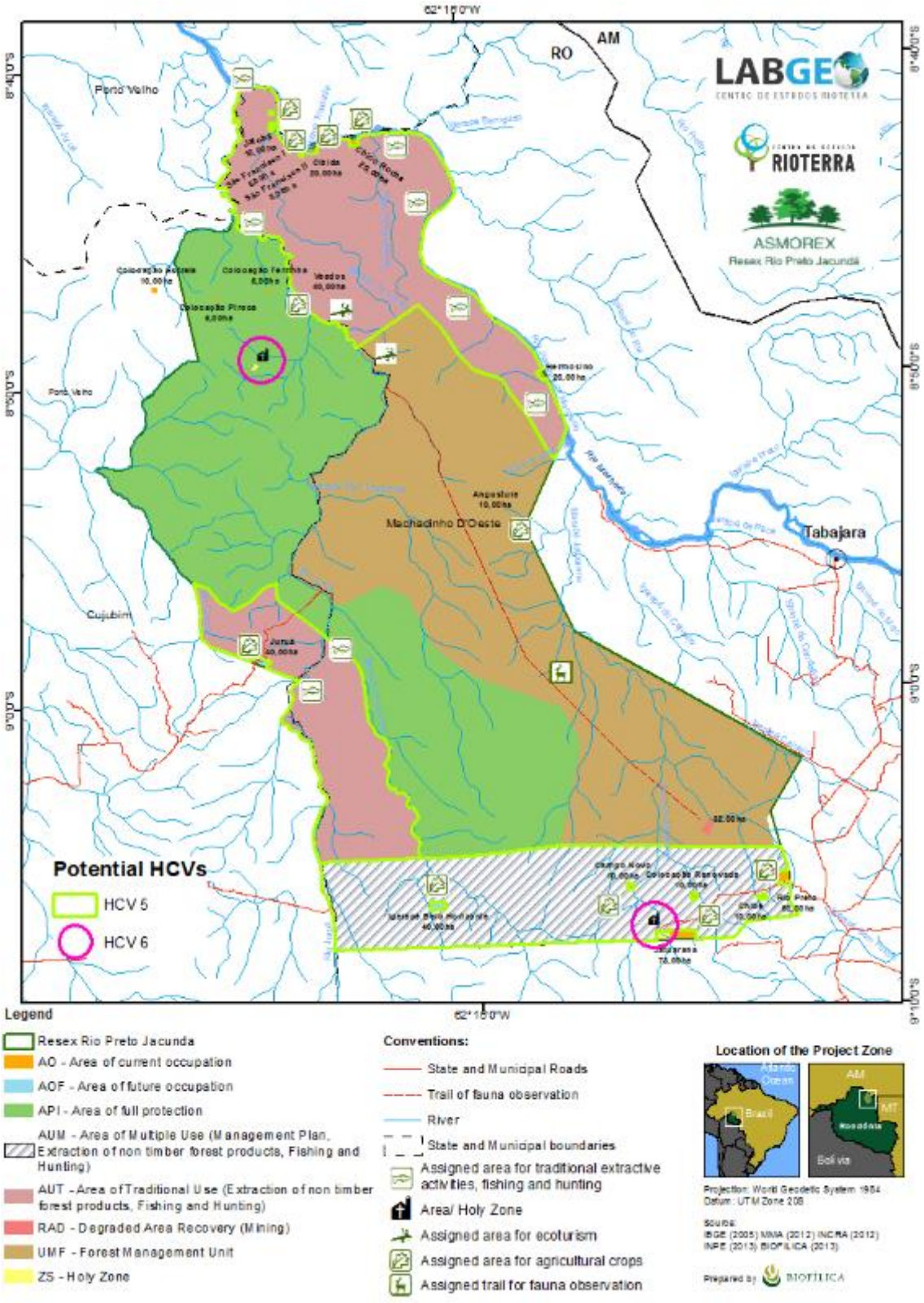


Figure 53. Potential High Conservation Values for Resex Rio Preto-Jacundá residents

6.1.3. Future Without Project Scenario for community

The continuity of the land-use scenario in the absence of the project will foster developments and impacts on social, some of them previously diagnosed in the 2013 Socioeconomic Study.

The expansion of soybean crops, if confirmed the scenario, implies the incorporation of areas that are currently used for cattle ranching and agriculture, resulting in marketing and real estate speculation with consequent rural exodus or the withdrawal of family farmers to new areas crop and/or livestock, which could result in pressure (grabbing, encroachment) on RESEX and restrict the way of life of the families that live there, causing the expulsion of rubber tappers in extreme cases.

It has been noted throughout the state that protected areas and indigenous lands are areas with better conservation and that, by having raw material quality for the timber industry, have suffered the most diverse types of pressure (invasion, wood serve, loss of biomass and biodiversity), and that residents are threatened, including physical integrity.

We also note that public agencies have not acted in its role of monitoring and land use planning, which favors the action of the various drivers of deforestation; soon these protected areas in greater or smaller extent will continue to suffer some kind of pressure, and RESEX RPJ will not be immune in this process.

Regarding the non-implementation of the REDD+ project in RESEX Rio Preto-Jacundá (scenario "business as usual"), the most likely hypothesis is that communities (mainland and riverside) will no longer count on the partnership of important collaborators in defense UC and consequently, in the struggle for conservation and preservation of natural resources.

At best the situation of the communities will be the continuation of the status quo which is depending on the state, and projects and contracts as is the case submitted to the extraction of timber (management).

In the event of a catastrophic scenario, it is possible that the situation of RESEX deepen the deterioration indicators in the categories:

a) social (education, health, housing, communication, housing, leisure and culture, and other infrastructure);

b) economic (employment, income, agriculture and alternatives to promote diversification and vertical integration of production);

c) environmental (potentiation of raids and looting of natural resources);

d) political and associative (with the weakening of their representative bodies, in the case Asmorex and Cooperex, which may result in the governance of impossibility).

This condition presented in this scenario may have as consequences the rural exodus and the return of residents to the cities, which are at risk of marginalization, or proceed to other rural areas (and farms), so that will without reference to their place of origin.

6.2. Net Positive Community Impacts

In the scenario with the REDD+ project, it is expected that the social, economic, environmental and governance significantly improve the Resex Rio Preto-Jacundá, following the logic of Table 5. Project activities and their processes, results and impacts.

It is considered as positive impacts the results of long-term interventions aimed at health issues, improved rent and distribution of resources and strengthening the extractive culture and associations.

The risks related to the project and mitigation measures are presented in Section 2.3. As a negative impact, it is expected that in the scenario with the project there is increasing interest in participating in generating the entry of outsiders to the extractive reserve.

The population increase in Resex, despite anticipated and desired due to parts of the territory that need occupation, can generate negative impacts if it is uncontrolled. For this, the common practice established in Asmorex is the selection of new families that will be established in RESEX according to the extractive and small farmer current profile in the area, also having an initial approval period of the same. Following the established logic, improvements built in the community can make this clearer and fair procedure.

About the potential attributes of High Conservation Value related to the communities with the main activities of the project are linked to reducing deforestation no negative impact is expected as a result of project activities. On the contrary, the project has among its activities to the climate responsible use of the forest by the communities conserving their attributes that are now essential to their way of life, promoting the maintenance of parallel forest cover sustainable use of resources (HCVAs) according to the use of rules established by the community themselves and the rediscovery of ancient sites related to beliefs of the ancestors of the inhabitants.

Some indirect negative impacts, however, may materialize, as overhunting and overfishing of natural resources by the community due to the settlement of new regions in RESEX the Community, population growth and migration pressures for RESEX due to improving conditions of life and greater knowledge and access to information from the community that can lead to more aggressive techniques of hunting and fishing. To mitigate these possible negative impacts of the use Multiple Management Plan proposes activities and monitoring measures of species relevant to Community consumption and awareness actions for sustainable wildlife management.

The existence itself of the potential HCVAs still depend on further validation with community, experts and other interested parties when such consultations are conducted potential negative impacts to the attributes will also be discussed aiming refine this analysis.

The activities will be monitored in order to follow the possible negative impacts that may arise for communities and for HCV. The Dispute Resolution procedure will also bring to the knowledge of implementing and managing instance the negative impacts that are affecting the residents, giving the necessary referrals. The mitigation measures have robust governance present in the project, which will rely on guides such as SBIA.

6.3. Negative Offsite Stakeholder Impacts

There is expected indirect net positive impact on the communities living in the communities near Resex Rio Preto-Jacundá. Currently the hand labor for the development of agricultural activities in the extractive reserve is almost exclusively the site or surrounding communities of RESEX (approximately 85%). Purchases of food and other materials are made in nearby communities, Estrela Azul and Tabajara, considering that the municipal headquarters is far away. Thus, even with the little savings generated in RESEX in the planting and harvesting of production the surrounding residents benefit in some way.

Following logic, as the project promotes successful activities in the project area, such adjacent communities will also benefit with a larger drive the local economy.

Otherwise, there are not expected negative impacts to other actors. All positive impacts related to conservation and protection of forest cover, will benefit all local communities.

6.4. Exceptional Community Benefits

6.4.1. Community Participation (GL2.1)

As described in item 3.2 Evidence of Use Rights, residents, traditionally rubber tappers and extractive in the extractive reserve Rio Preto-Jacundá, have traditional and statutory rights over the project area, as ensures the State Decree 7336, of January 17, 1996. Accordingly, the dominion of Resex is public, but its use granted to traditional population that has the power to decide on the implementation of any project in the area to the extent permitted by law, including the REDD + project. Thus, the Asmorex, which represents residents of RRPJ, is REDD + project proponent with Biofílica.

Complementing the indicators of this criterion, it is estimated by the socio-economic diagnosis made in 2013 that the monthly per capita income in RESEX RPJ is R $ 19.00, well below the poverty line defined in Brazil, of R$ 70.00 per capita a month. Ie the population in RESEX is considered extremely poor according this indicator.

6.4.2. Net Positive Impacts (GL2.2)

According to Table 5. Project Activities and Their Processes, results and impacts, the project has activities for the community and is designed in a participatory way in various workshops as Section

2.6.2 Structure of the decision-making engagement. As possible immediate benefits the communities of RESEX RPJ will:

a) have instruments that enable the protection and conservation of RESEX, with defined roles and responsibilities on the part of residents of Asmorex and partners;

b) generate jobs and diversification in income;

c) stay in RESEX with the support of partners who seek to improve communities and are involved in environmental causes.

In the short term, it is expected to improve the social capital in RESEX, with training and capacity building in management to improve the administration of Asmorex, as well as improvements in homes in need of basic structures, providing more immediate results among many long-term measures.

The projected impacts, as mentioned above, are related to the activities and involve aspects of medium and long term, such as diversification in income, land use, crop maintenance and improvement in well-being. The Board Project Manager includes one member from each community, as the Asmorex, so there is a comprehensive assessment of project impacts on communities that have different realities. Involving all the residents semiannual review meetings and project alignment will be spaces for dialogue on the effectiveness of interventions and the positive or negative impacts on the community.

6.4.3. Participative Indication of Risks (GL2.3)

With no restrictions on the current use of the soil model developed by the communities and timber forest management, residents did not identify risks associated with the project, as they understand it as improvement of current practices and fostering the extractive practices.

Thus, the right of opening 5 hectares per family is planned in the project favoring agriculture and seeking to optimize these spaces with agroforestry. The purpose of this action is to ensure the food security of families, diversify income and occupy the area of RESEX prevented the action of invaders.

6.4.4. Identification of vulnerable groups (GL2.4)

According to Socioeconomic Diagnosis conducted by CES Rioterra in 2013 (6.1.1 Characteristics of Resex Rio Preto-Jacundá) residents of the coastal sector have greater difficulty in accessing public policy and less influence in decision-making because transport to the municipal headquarters and the Community infrastructure is more difficult. The villas there are poor and distant from each other, and mechanization for the use of clearings is not enough. These factors have meant that there is an internal movement of constant migration to the communities of the mainland.

The REDD + project will have its efforts aimed at this sector of the RESEX seeking to cause an initial positive impact on the advancement of this community by improving the housing of riverside

families and rural technical assistance. So still and medium / long term, there will be the facilitation of access of this vulnerable group to public policies, markets, training and decision-making processes.

The annual meetings of forecast investment and the semi-annual evaluation, the riverside community will have its not only encouraged participation, but also facilitated the issue of transportation, so there is an increasing trend of empowerment of this specific group regarding the governance of RESEX and REDD + project.

The initial way to manage the risks that this group will not receive the benefits of the project equitably was to design participatory management of the project including a representative of that sector in the Steering Board by monitoring the actions and investments to ensure that the benefits are being equitably distributed.

6.4.5. Women participation (GL2.5)

The Socioeconomic Diagnosis conducted by UNIR and Rioterra CES 2013 (6.1.1 Characteristics of Resex Rio Preto-Jacundá) highlighted gender relations currently established. Overall, the residents of Resex women have higher educational level than men (single community member enrolled in higher education are women) and has clarity of needs related to public policies such as education and health.

On the other hand, they have little or no participation in decision making. With this, in the workshop "Life Plan", one of the themes raised by the residents was the "Strengthening Youth and Women", considering activities aimed at this audience (Table 5). The intention of the REDD + project in this sense, is not only empowers them in ways traditionally focused on women, such as crafts and access to rights, but also awaken managerial and leadership skills to exercise a more central role in family and community level.

In the educational aspect, it was from the women of the community that emerged the need for a school for youth and adults in Resex, which would facilitate the access of residents and would study opportunities for those who could not study.

6.4.6. Mechanisms for benefit sharing (GL2.6)

The Resex Rio Preto Jacundá REDD+ project had the opportunity in workshops in the community (2.6 engagement structure and decision-making) to create a participatory manner the project benefit-sharing mechanism. These moments, the following flow was created and approved in plenary:

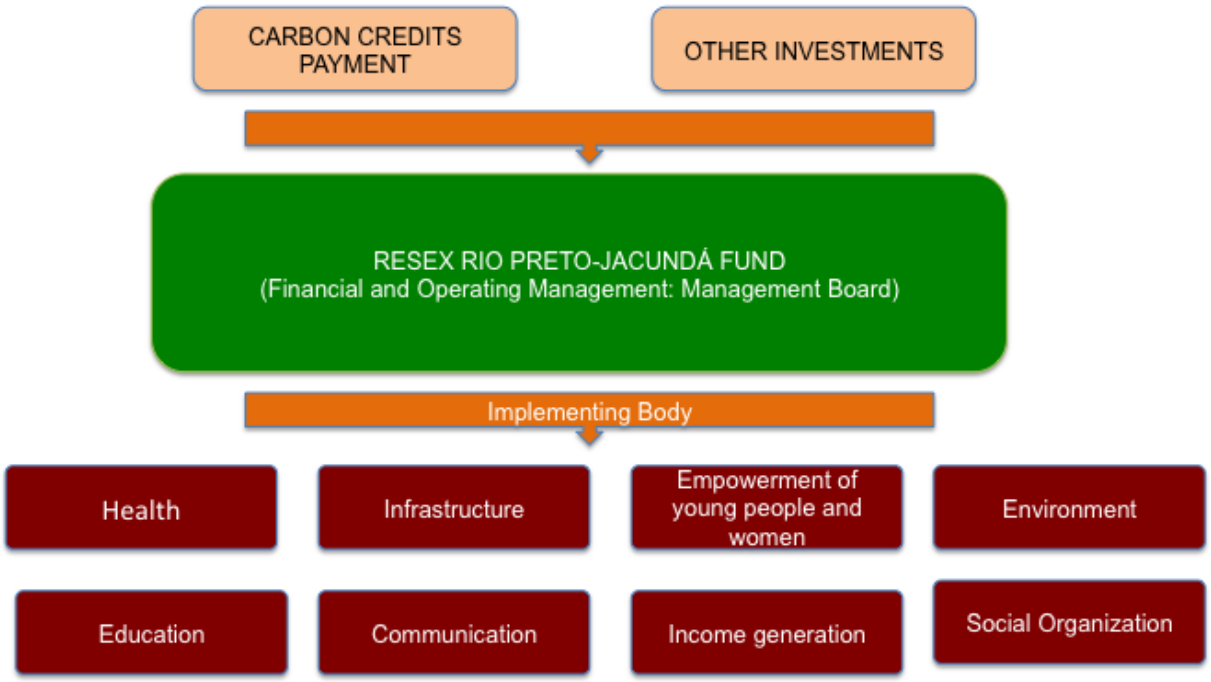


Figure 54. Structure of the Fund Resex Rio Preto- Jacundá

The execution and implementation of this structure are now dependent on resource input, which will allow the activities to occur. In addition, a second stage is the joint prioritization of activities to receive investment, scheduled to take place annually with all the locals, in order to ensure transparency and equitable distribution of benefits.

6.4.7. Adequate transfer of Project information (GL2.7)

The project design workshops had moments of clarification of cost and revenue provided by crop carbon credits. Because it is a new topic on the reality of the communities, such questions are reaffirmed every meeting and understanding has been improved in every meeting.

Each verification of VCUs crops there will be an ongoing process of engagement of communities on issues related to cost, carbon credit markets and project revenues. Furthermore, the Managing Board will be a space for deepening this type of discussion.

6.4.8. Structures of governance of the Project (GL2.8)

In a particular workshop held in 2014, residents of RESEX RPJ defined aspects related to governance of the REDD + project, including:

- fund management bodies;
- principles for the distribution of benefits and governance.

As detailed in item 1.6 Management and Governance of the Project, project proponents are Asmorex and Biofílica, relying directly with CES Rioterra entity in the planning and execution of activities. For a participatory and transparent management of the project, the resident community in RRPJ chose to create an instance of management / resolution entitled "Management Board".

The entities that make up the Board have been set at an appropriate workshop in order to diversify the group and balance the public entities, private and third sector (Figure 55). The most representative is the part of the residents of RESEX, which will include a representative from each community (Cabeça-de-Boi, Jatuarana and Jatoba) plus a board member of Asmorex.

An additional document to better define the procedures of governance and background, will be drawn up after the event validation/verification together with the community and the representatives of the Collegiate entities.

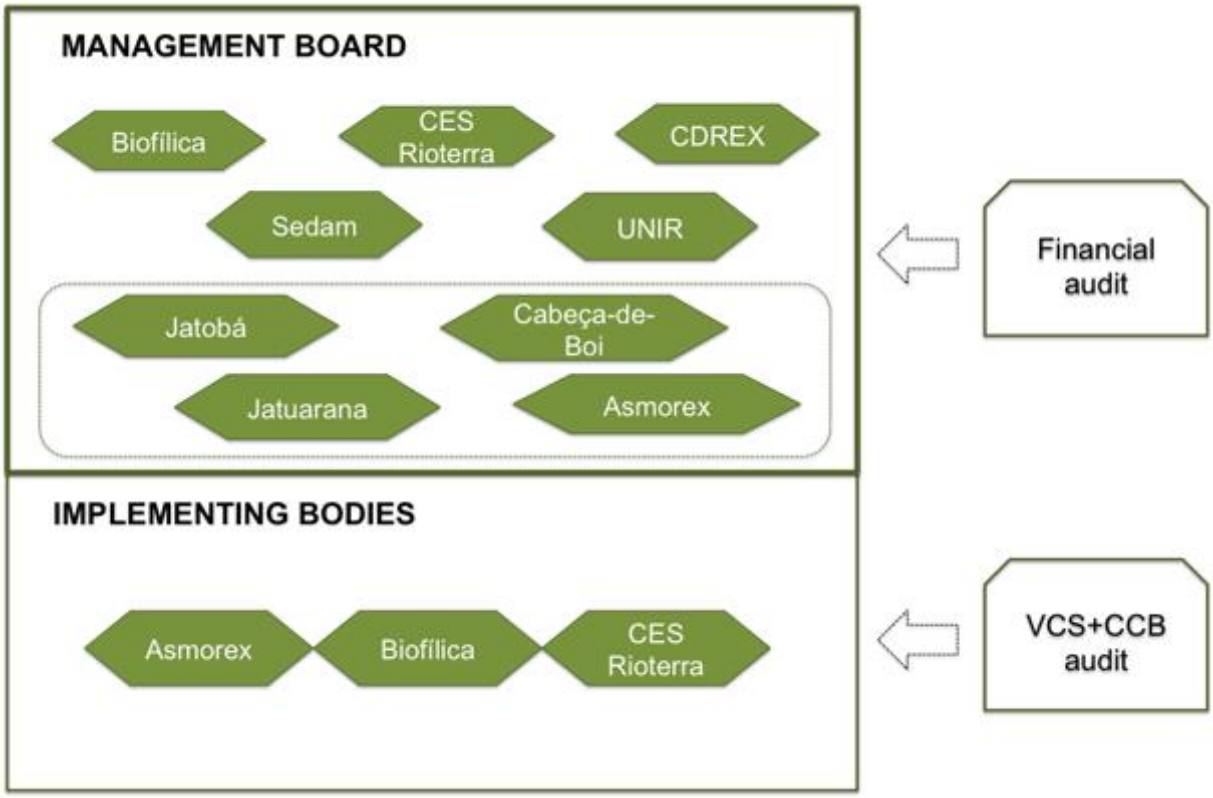


Figure 55. Structures of governance of the Project RRPJ

6.4.9. Capabilities of the community

Among the themes of investment, training activities are planned on several fronts, whether in training health workers or in improving the managerial skills of the board of Asmorex.

According to section 2.5.1, the capacity of RESEX residents will be improved in the following aspects:

• Human capital: the issues related to health and basic education will have the investments in specific training, such as family planning, health workers training and microscopist to detect malaria. Many adults are illiterate or have limited training in basic education, and it is also a focal problem to be worked on the project through education aimed at young people and adults. Still in the guarantee of rights, residents engaged in activities in the timber and non-timber forest management will undergo training on health and safety at work, aiming to reduce the occurrence of accidents.

•Social capital: training and capacity building focused on leadership training and management with emphasis on women and young people, currently under-represented groups in leadership positions in associations and cooperatives. Board members of Asmorex and Cooperex will feature training workshops in management and finance and can apply this knowledge in the common good administration.

• Financial Capital: are listed the skills related to income generation, as operation and pulp agribusiness management, production and sanitary conditions of cassava flour and extractive products, training in carpentry and rural technical assistance geared to the cultures performed in family plots by stimulating entrepreneurship.

• Natural capital: the axis "environment" has a number of demands regarding the allocation and utilization of waste and agroecology. In addition, the institution responsible for monitoring biodiversity provides specific training to residents in order to have a team in place empowered and involved in the process.

7 BIODIVERSITY

7.1. Biodiversity Scenario Without Project

The State of Rondônia has much of its territory extension located in the “Endemism Center Rondônia”, considered one of the most important areas of bird endemism in South America (CRACRAFT, 1985), for their area has extreme complexity due to the fact that almost all interfluve rivers flow to river Madeira (WILLIS, 1969).

The biogeographical region of RESEX Rio Preto- Jacundá was included on the map of Priority Areas for Conservation, Sustainable Use and Sharing of Benefits from Brazilian Biodiversity. Classified also as, according to the list of Priority Areas of the MMA (Ministry of Environment), an area of Biological Importance “Very High”, and of urgency in the “Extremely High” actions (Figure 56), being also limitrophe with other priority areas for conservation of biodiversity.

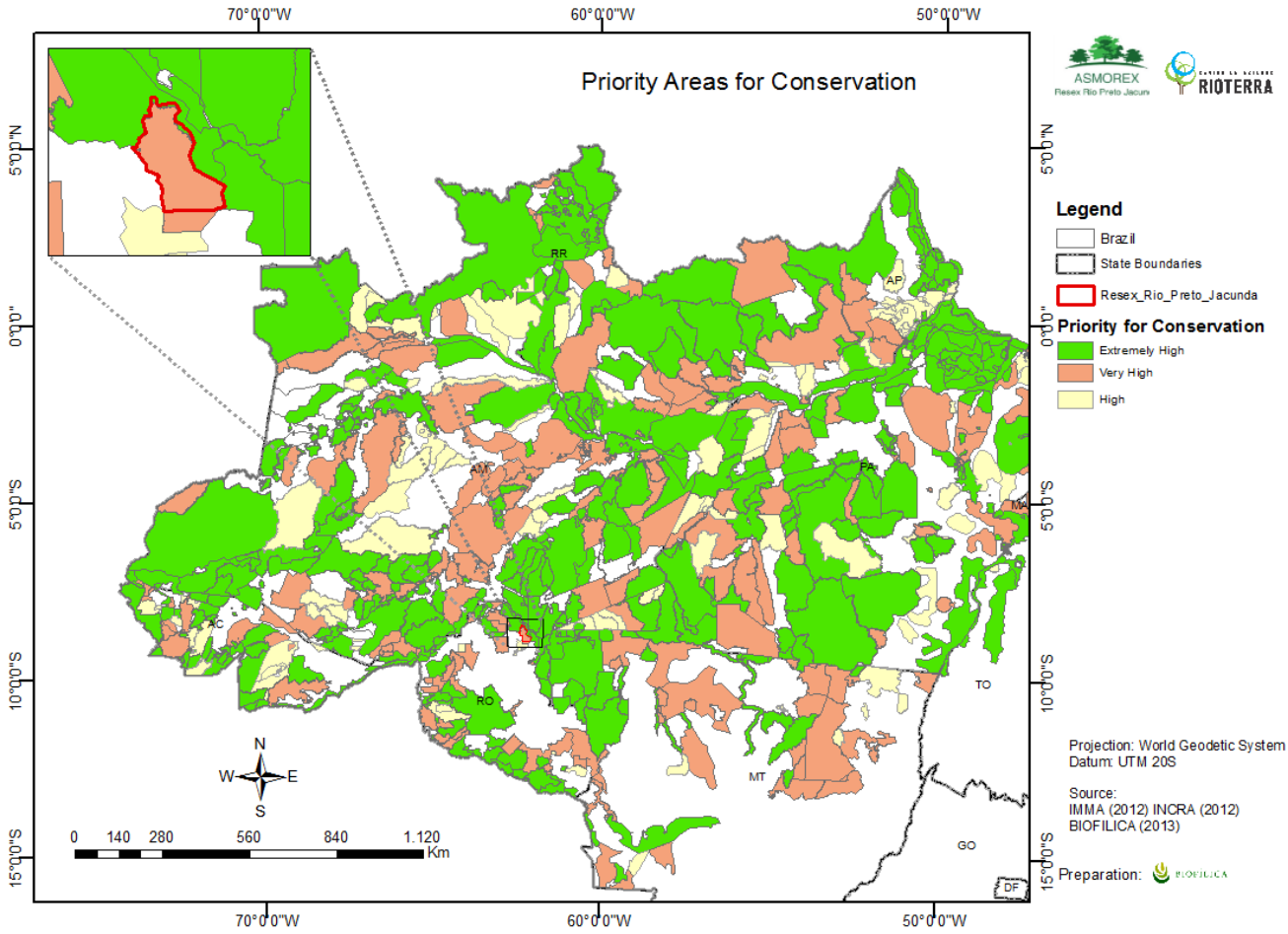


Figure 56. Map of location of Resex Rio Preto-Jacundá and priority areas for Biodiversity Conservation according to the Ministry of Environment.

In general, environmental diagnoses in Resex Rio Preto-Jacundá indicate a high biological diversity in a relatively preserved area. In March 2014, a participatory zoning was carried out with the community defining the areas of interest for fishing, forest management, full protection and hunting. In addition to the zoning, the community had the opportunity to define jointly work plans for each of the skills set within the Resex Rio Preto- Jacundá.

7.1.1. Flora

The phytosociological analysis in the diagnostic study sampled 100 plots identifying 11,328 individual trees belonging to 51 botanical families and 273 species identified. The complete list of species and their families are in Annex I.

Fabaceae is the botanical family that contributed with the largest number of individuals selected in the inventory (15%). On the other hand, the botanical families Anisophylleaceae and Solanceae were less present, with one (1) individual tree each.

The Fabaceae family was also the one that presented the highest richness with 50 species identified, followed by Sapotaceae (18 species), Euphorbiaceae (13 species), Lecythidaceae (12 species) and Malvaceae (11 species). Other 16 botanical families, about 31%. Other 16 botanical families, about 31% present only one kind each.

Table 48. List of the 10 main families with greater Importance Value (IV).

Botanical Family	N. of Individuals	Basal Area	AbsDen	AbsDom	AbsFreq	IV%
Fabaceae	1689	116.2	67.6	4.6	100	13.5
Sapotaceae	985	52.4	39.4	2.1	99	7.5
Moraceae	863	39.0	34.5	1.6	100	6.3
Lecythidaceae	749	43.5	30.0	1.7	97	6.2
Burseraceae	911	31.3	36.4	1.3	99	6.0
Arecaceae	827	33.4	33.1	1.3	95	5.8
Euphorbiaceae	668	21.3	26.7	0.9	95	4.6
Chrysobalanaceae	537	23.8	21.5	1.0	96	4.4
Malvaceae	440	17.8	17.6	0.7	93	3.7
Myristicaceae	372	15.4	14.9	0.6	90	3.3

Absolute Density (Abs. Dens.); Absolute Dominance (Abs. Dom.); Absolute Frequency (Abs. Fre.); Importance Value (IV%)

The 10 species with the largest number of individuals represent 35.4% of the total inventoried trees. Protium amazonicum was the species with largest number of sampled individuals (825 trees) and can be considered a generalist species, because its frequency is well distributed in the Resex area (99%

of the sampled plots). The other species listed in the top 10 are present in over 60% of the plots, and may also be considered generalist species.

Table 49. List of the 10 main families with greater Importance Value (IV).

Scientific Name	N. of Individuals	Basal Area	AbsDen	AbsDom	AbsFreq	IV%
Protium amazonicum	825	27.9	33	1.1	99	4.8
Pouteria sp.	574	28.4	23	1.1	98	4.1
Maquira guianensis ssp. guianensis	665	23.8	26.6	1.0	98	4.1
Attalea speciosa	362	21.9	14.5	0.9	78	2.9
Eschweilera bracteosa	341	13.9	13.6	0.6	89	2.4
Macrolobium sp.	292	18.1	11.7	0.7	67	2.4
Desconhecida	250	15.3	10	0.6	90	2.3
Inga sp2.	250	11.8	10	0.5	80	2.0
Licania sprucei	200	11.1	8	0.4	78	1.8
Micrandra sp.	237	4.4	9.5	0.2	70	1.4

Absolute Density (Abs. Dens.); Absolute Dominance (Abs. Dom.); Absolute Frequency (Abs. Fre.); Importance Value (IV%)

Of all the species identified in forest inventory, 6% (16 species) are in some category with usage restrictions or some degree of threat (as the lists of IUCN, CITES and IBAMA). On Table 50 are presented the species of occurrence of restricted use. The Brazil Nut (Bertholletia excelsa Bonpl.) and the Rubber Tree (Hevea spp.), for example, are species of prohibited cutting (PC) and require special attention. These two species correspond, respectively to 2.61% and 29.53% of the total of inventoried trees with use restriction (Hdom, 2013).

Table 50. List of probable species from Resex that have usage restriction according to IUCN, CITES and IBAMA.

Species	Botanical Family	Common Name	List	Threat Category
Cedrela odorata L.	Meliaceae	Cedro	CITES/IUCN	RS/VU
Aniba ferrea Kubitzki	Lauraceeae	Louro Rosa	IUCN	VU
Inga suberosa T.D.Penn.	Fabaceae	Ingá Peludo	IUCN	EN
Lecythis prancei S.A.Mori	Lecythidaceae	Castanha Jarana Folha Grande	IUCN	EN
Pradosia decipiens Ducke	Sapotaceae	Casca Doce	IUCN	CR
Pouteria petiolata T.D.Penn.	Sapotaceae	Abiurana Cutite	IUCN	VU
Mezilaurus itauba (Meisn.) Taub. ex Mez	Lauraceeae	Itaúba	IUCN	VU
Bertholletia excelsa Bonpl.	Lecythidaceae	Castanheira da Amazônia	IBAMA/IUCN	PR/VU

Species	Botanical Family	Common Name	List	Threat Category
Micropholis cylindrocarpa (Poepp.) Pierre	Sapotaceae	Abiurana Branca	IUCN	LR
Minquartia guianensis Aubl.	Olacaceae	Acariquara Roxa	IUCN	LR
Helicostylis tomentosa (Poepp. & Endl.) J.F.Macbr.	Mortaceae	Inharé	IUCN	LR
Trichilia areolata T.D.Penn.	Meliaceae	Gitó Vermelho	IUCN	VU
Hevea guianensis Aubl.	Euphorbiaceae	Seringueira	IBAMA	PR
Eschweilera atropetiolata S.A.Mori	Lecythidaceae	Ripeiro Branco	IUCN	LR
Hevea sp2.	Euphorbiaceae	Seringa Vermelha	IBAMA	PR
Guarea convergens T.D.Penn.	Meliaceae	Gitó Branco	IUCN	VU

Vulnerable (VU); Endangered (EN); Critically Endangered(CE); Restricted Use (RU); Prohibited Cut (PC); Low Risk (LR).

7.1.2 Fauna

For the development of conservation strategies, it is critical to understand the habitat requirements of species of resident animals and determine which ones are most vulnerable to human activities disorders. From this perspective, there was a survey of the area Fauna RESEX Rio Preto-Jacundá comprising four faunal groups: avifauna, Mastofauna, Herpetofuna and Ichthyofauna. The choice of these groups to compose the study is due to the fact they are considered flags species, umbrella and/or good bio-indicators of environmental quality, in addition to delivering results in short sampling periods and still being strictly related to food consumption communities traditional and other rural populations living in the surroundings of protected areas.

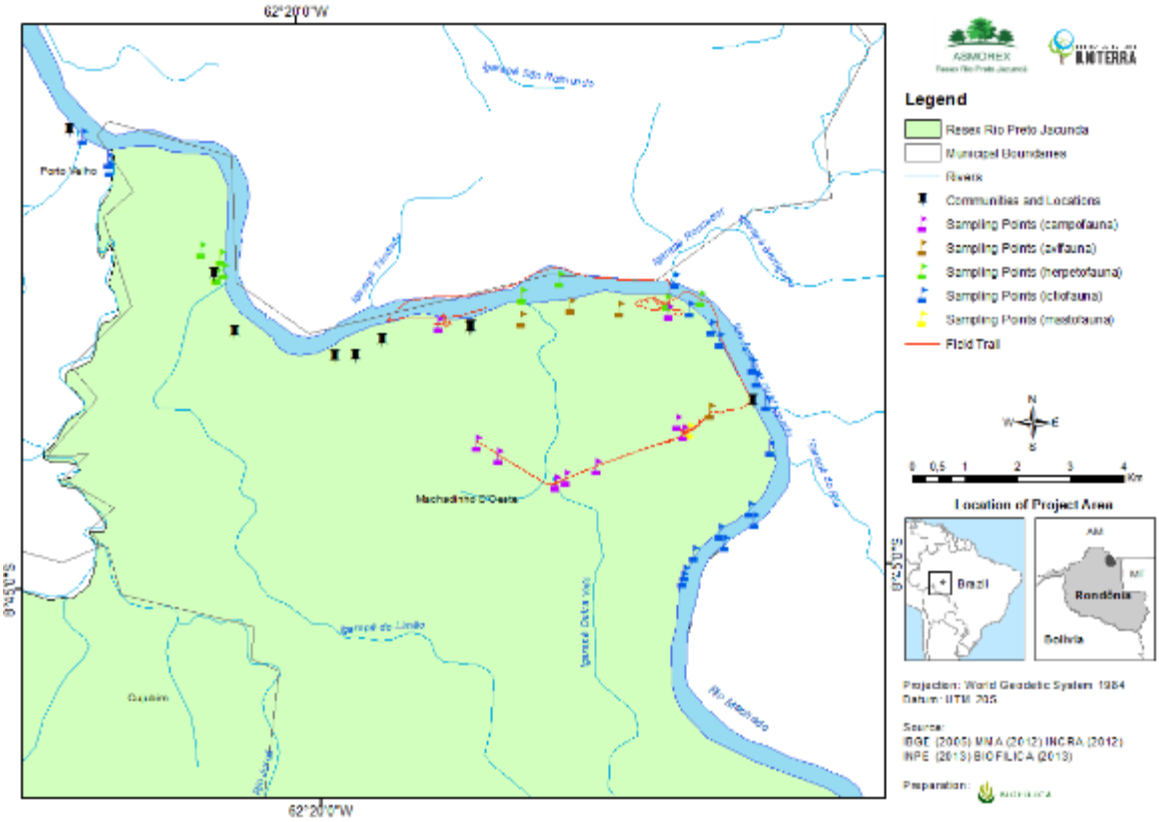


Figure 57. Map of the study area highlighting the data collection points in RESEX Rio Preto-Jacundá

Avifauna

In RESEX Rio Preto-Jacundá were recorded 105 species in 41 families, based on the Environmental Diagnosis, which in the case had a small sampling effort and did not consider nocturnal birds. However, when made a comparison with lists of other records it is suggested that the RESEX area can contain more than 300 species of birds.

The most representative families as for wealth were *Thamnophilidae* with ten species, followed by psittacidae families with seven species and tinamidae with six species (Figure 58).

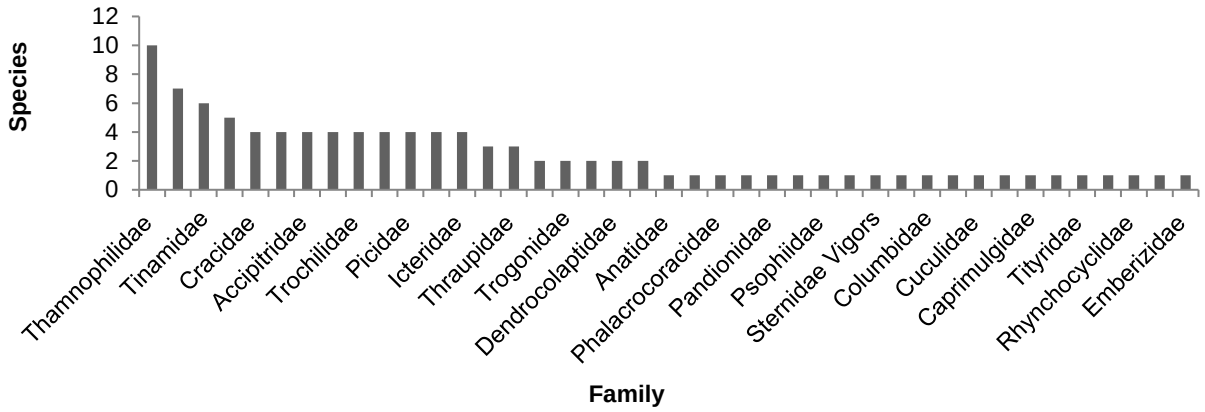


Figure 58. Graphical representation of the wealth of species per family of birds recorded in RESEX Rio Preto-Jacundá.

Regarding the type of foraging, the most abundant groups were: frugivorous with 21 species, followed by the ones that feed themselves and large insects and small vertebrates with 14 species. The use of guilds is an efficient way to analyze the community of birds and changes in environments (Terborgh & Robinson 1986). Removing the food source, these species may become locally extinct, as they are intrinsically associated with the forest structure (Aleixo 1999).

Of the 105 species, considering the classification made by Stoz (1996), 25.74% are considered high sensitivity to environmental disturbances, among them there is the Tinamidae family (Nambu tona), Cracidae family (mutum) and Thamsophilidae family (mãe-de-taoca). The average sensitivity of species account for 35.64%, total, being distributed in most of the families found. Finally, 38.61% of the species are considered of low sensitivity, because they present greater adaptability to disturbed habitats.

As for the degree of conservation of the species, only the species *Psophia viridis* (jacamim) is present in the international list (IUCN, 2013) with status EN = Endangered. Of the rest of the recorded species, 2% of species appear with the status VU = Vulnerable, these being: *Tinamus tao* – nambu-tona, *Amazona festiva* - papagaio-castanho, *Amazona farinosa* - cacao; 2% of the species are similar to the near threatened, them being: *Tinamus major* - nambu-galinha, Harpia *harpyja* - gavião-real; *Rhegmatorhina hoffmannsi* - mãe-de-taoca-papuda.

It was possible to observe various levels of endemism and 15% (10 ssp.) of the observed species are endemic to the Amazon, where the species *Rhegmatorhina hoffmannsi* - mãe-de-taoca-papuda is restricted to the zoogeographic sub region Madeira-Tapajós. The list of total identified species is in the Table 51.

Table 51. List of avifauna species with some degree of threat

Species	Common Name	Status
Rhegmatorhina hoffmannsi	Mãe-de-taoca-papuda	Near Threatened Endemic of Rondônia
Psophia viridis	Jacamin	Endangered/Vulnerable
Tinamus tao	Nambu tona	Vulnerable
Amazona festiva	Papagaio castanho	Vulnerable
Amazona farinosa	Cacao	Vulnerable
Tinamus major	Nambu-galinha	Near Threatened
Harpia harpya	Gavião-real	Near Threatened

Mastofauna

Mammals play important ecological functions in the rainforests such as half of dispersion and predation. The extinction of some plant species could lead to population decline of mammal species. Mammal species present in Resex more sensitive to human disturbance, such as Ateles Chameck (spider monkey), Panthera onca (spotted jaguar) and Taipiris terrestres (anta) need large areas to survive, a very restricted diet and have little resilience.

Were identified 24 species of medium and large mammals. The no confirmation from other species likely to occur in the same zoogeographic region of the study area does not mean its absence, especially during rapid surveys with small sample effort.

Figure 59. Mastofauna research team during primate mammals sighting in RESEX Rio Preto-Jacundá

From the species identified, it was found that 4% of the registered species have some degree of threat or are endangered, such as Ateles Chameck (black monkey) with status EN and very important for seed dispersal. 17% of the registered species appear as vulnerable, among them: Tayassu pecari – Queixada, Priodontes maximus – Tatu Canastra, Taipirus terrestris – Anta and the Mico rondoni – Soim Branco that is endemic in the state of Rondônia. And two species appear as near threatened which are

Saimiru ustus – Macaco Mão de Ouro and Panthera onca – spotted jaguar, top of the chain predator. All these species are extremely relevant for the maintenance of ecosystems.

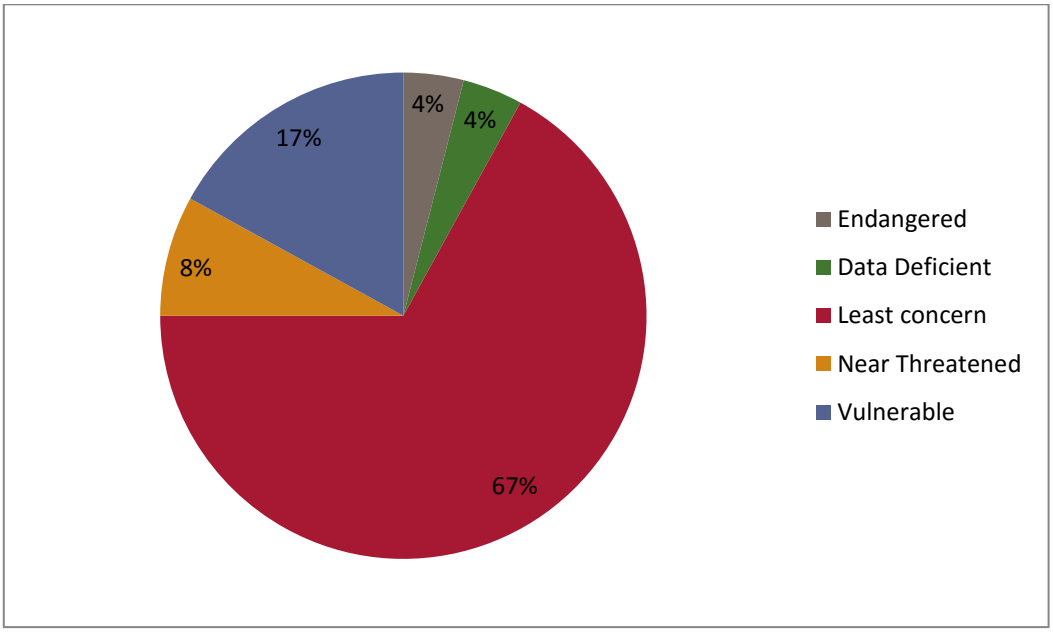


Figure 60. Percentage of recorded species according to conservation status (IUCN 2013), for RESEX Rio Preto- Jacundá.

Table 52. List of mastofauna species with some degree of threat

Species	Common Name	Status
Ateles chamek	Macaco preto- ou spider monkey	Endangered
Tayassu pecari	Queixada	Vulnerrable
Priodontes maximus	Tatu Canastra	Vulnerrable
Taipirus terrestris	Anta	Vulnerrable
Mico rondoni	Soim Branco	Vulnerrablee and endemic of Rondônia
Saimiru ustus.	*Macaco Mão de Ouro*	Near Threatened
Panthera onca	Spotted jaguar	Near Threatened
Callicebus brunneus	Zogue zogue monkey	Endemic of Rondônia

For RESEX Rio Preto-Jacundá there are two major rivers that limit the distribution of mammals, Ji-paraná (or Machado) River and Rio Madeira River, more distant. In this interfluve we found some species with restricted distribution, for example, the Mico rondoni (Soim Branco), which is a newly described species (Ferrari et al, 2010), however, other studies have found it previously and erroneously identified it as a similar and parapatric species, the Mico nigriceps. It is worth mentioning that the Mico rondoni appear as Vulnerable to extinction by IUCN redlist.

Another species that is described as being unique to the state of Rondônia is Callicebus brunneus – Zogue-zogue (Figure 61). According to Roosmalen et all (2002), this species has a limited distribution between the right bank of the river Guaporé; right bank of the river Madeira; and the left bank

of Ji-Paraná river. There are some studies that speculate that the distribution of Callicebus brunneus extends to the Department of Pando, northern Bolivia, however, further studies are still required to identify correctly the primates to the aforementioned region. Nevertheless, several studies areas without gaps are found in the Amazon, making it difficult to identify the correct distribution of primates.

Figure 61. Individual of *Callicebus brunneus* – Zogue-zogue in Resex Rio Preto-Jacundá. Picture: Paulo Henrique Bonavigo

Herpetofauna

Combined with the efforts of the methodologies employed in the environmental assessment, the result was the registration of 24 species of amphibians belonging to 06 families, 07 species of snakes from 05 families and 07 species of lizards of 05 families.

For anuran amphibians, species varied according to the time of sampling of the research, an already expected result seen the seasonal difference in the activity of species. The most abundant were *Hypsiboans lanciformis* – Perereca - (26 individuals), *Pristimantis fenestratus – Rãzinha – (17 individuals) and Hypsiboans boans - Rã canoeira - (12 individuals)*. The species *Adelphobates quinquevittatus -Sapo venenoso-, Dendropsophus marmoratus* – Perereca de árvore – presented a specimen each.

IN reptiles, the most abundant species were *Bothrops atrox* - Jararaca (young individuals found), *Gonatodes humeralis* - Briba*, Tupinambis teguixin* - Teiú *and Norops fuscoauratus* - Lagarto marrom, all three sampled specimens. All other species sampled presented only one individual.

The flood of River Machado provides a considerable decrease in land, affecting the space being used by some species. *Bothrops atrox* - Jararaca, for example, three juveniles were found at a distance of twenty meters, all on the margins of the igapó formed by the river. Moreover, these individuals were in an area used by residents, which requires some care to avoid ophidian accidents. This behavior

is common in juveniles, as they are looking for small amphibians and other prey, while adult individuals use land forest away from water bodies to forage.

No During the dry season of the river, the situation changes, with some species being able to use areas of floodplains for foraging beyond formed beaches and trays can be used as spawn, thermoreguation of alligators, lizards and turtles.

Thus, among the 38 registered species, only two of them appear only in the appendices of CITES, 2012, meaning that for now they are not endangered species. Being both from the Iguanidade family, the Iguana species (Linnaeus, 1758) – Camaleão and Tupinambis teguixin (Linnaeus, 1758) - Teiú.

Figure 62. Young individual of Iguana iguana, registered in Resex Rio Preto-Jacundá. Picture: Marcelo Ferronato

Ichthyofauna

The fish fauna in the region of Resex Rio Preto-Jacundá is characterized by presenting species of high commercial power, considering the existence of species for consumption as well as for creation (ornamental fish), an important factor that characterizes the preservation of the area, even if it is in small scale.

Of the fish specimens, 620 were registered, distributed in seven orders, 20 families and 41 species. Being that Characiformes was the most representative order with 25 species, followed by Siluriformes with 10 species and Tetraodontiformes, Perciformes, Cluperiformes, Beloniformes and Oesteoglossiformes with one species each.

Ichthyofauna has a great significance because it is a relevant resource of consumption for the community. All registered species are suitable for consumption by the community, but there were more prominent species according to the Table 53. There was no reported use of species for other purpose.

Table 53. List of species most commonly used for food by the community of RESEX Rio Preto-Jacundá.

Species	Popular Name
Phractocephalus hemioliopterus (Bloch & Schneider, 1801)	Pirarara
Pseudoplatystoma fasciatum (Linnaeus, 1766)	Pintado
Ageneiosus ucayalensis (Castelnau, 1855)	Mandubé
*Hemidoras stenopeltis (*Kner, 1855)	Camborja ou Tamoatá
Leporinus fasciatus (Bloch, 1794)	Piau flamengo
Schizodon fasciatus (Spix & Agassiz, 1829)	Piau
Laemolyta taeniata (Kner, 1858)	Piau
Myleus cf. Micans (Lütken, 1875)	Pacu
Myleus pacu (Jardine, 1841)	Pacu
Mylossoma duriventre (Cuvier, 1818)	Pacu mafurá
*Myleus romboidalis (*Cuvier, 1818)	Pacu
Piaractus brachypomus (Cuvier, 1818)	Pirapitinga
Potamorhina latior (Spix & Agassiz, 1829)	Branquinha
Hydrolycus scomberoides (Cuvier, 1819)	Peixe- Cachorro
Rhaphiodon gibbus (Agassiz, 1829)	Cachorra
Semaprochilodus brama (Valenciennes in Cuvier & Valenciennes, 1850)	Jaraqui
Semaprochilodus taeniurus (Valenciennes, 1821)	Jaraqui escama fina
Serrasalmus rhombeus (Linnaeus, 1766)	Piranha
Serrasalmus sp.	Piranha
Triportheus angulatus (Spix & Agassiz, 1829)	Sardinha
Triportheus elongatus (Günther, 1864)	Sardinha
Brycon sp.	Matrinxã
Ctenobrycon spilurus (Valenciennes, 1850)	Tetra prata
Hoplias malabaricus (Bloch, 1794)	Traíra
Plagioscion squamosissimus (Heckel, 1840)	Pescada
Cichla ocellaris (Bloch & Schneider, 1801)	Tucunaré
Pellona castelnaeana (Valenciennes, 1847)	Apapá
*Osteoglossum bicirrhosum (*Cuvier, 1829)	Aruanã

7.1.3 Attributes of High Conservation Value

The forests contain environmental and social values as habitat for wildlife, watershed protection and provision of essential ecosystem services. The forests where these values are considered of outstanding significance or critical importance can be defined as High Conservation Value Forest – HCV, Jennings et al. (2003).

As it's a protected area, due to its endemic species recorded for mammalian fauna and avifauna, as well as endangered, vulnerable or endangered species both for fauna and for flora, RESEX

can be classified as an area that gathers attributes of high conservation value. In addition, extractive and riverside population has a close relationship with biodiversity, either for food, medicinal or source of income purposes.

Of the vegetation types present in RESEX Rio Preto- Jacundá (Figure 2), the Campinarana can be considered ecologically differentiated due to the adaptability to poor and acid soils. The richness and abundance of species of this environment when compared to other ecosystems is relatively low. However, it possesses a high number of plants (Anderson 1981), invertebrates (Marini-Filho 1999) and vertebrates, such as birds (Alonso e Whitney 2003, Borges 2004, Poletto e Aleixo 2005 Guilherme & Borges 2011) that are endemic, occurring only in this type of vegetation.

Endangered species or with use restriction of flora is a point of attention in RESEX that depends on extractive activities in the area. They are: Inga suberosa T.D.Penn. and Lecythis prancei S.A. Mori (threatened), Pradosia decipiens Ducke (endangered), Cedrela odorata L. (restricted use); Bertholletia excelsa Bonpl. and Hevea sp. (forbidden cut). And the Mogno (Swietenia macrophila) and the Cerejeira (Torresia acreana Sin. A. cearenses or acreana) are classified as vulnerable on the IUCN redlist, the first being also forbidden to cut and both classified as vulnerable on the IUCN list.

There is a special attention indication with seven species of birds and eight mammals present in the Extractive Reserve Rio Preto-Jacundá. The specie Rhegmatorhina hoffmannsi – Mãe-de-taoca-papuda (Figure 63) found in the region of RESEX Jacundá sets the area as biogeographically important, where according to Cracraft (1985) the transition areas between the centers of endemism should house a very heterogeneous fauna. We can face the same way the endangered Psophia Viridis.

Figure 63. Species *Rhegmatorhina hoffmannsi* – Mãe-de-taoca-papuda, male (Image 1) and female (Image 2)

Species such as the spotted jaguar, largest predator of top chain in the region has extremely important paper on biological control, it is an animal that needs vast territory for their survival, indicating

the needs for conservation of forests seeking its existence. Another species of mammalian fauna and that puts the RESEX region in an important scenario for conservation is the Mico Rondoni (Soim branco), an endemic species of Rondônia and in danger of extinction.

According to Rosa e Lima, (2008), the Normative 05/04 and its alterations Normative Rulling 52/05 contain 135 endangered species of freshwater fish, all belonging to the class Actinopterygii, and other seven in the category of Overexploited or Threatened Overexploitation: the pirarucu (Arapaima gigas), the tambaqui (Colossoma macropomum), two species of jaraqui Semaprochilodus taeniurus and S. insignis), the piramutaba (Brachyplatystoma vailantii), the dourada (Brachyplatystoma rosseauxii) and the jaú (Zungaro zungaro). This information corresponds to the importance of the preservation of the study are, given that one of the species (S. Taeniurus) was collected and other (Colossoma macropomum) was reported by community residents as present in lakes.

Dasyprocta sp – Cutia, cultivates a close relationship with nut trees (Bertholletia excelsa) and its considered the largest dispersal of their seeds. However, the intensive exploitation of these seeds by man, together with poaching of these species, is leading to an aging process of the nut trees plantation, with remote chances of renewing themselves and consequently it also threats the survival of the agouti.

Primates are also important in seed dispersal, especially the large primates like spider monkey (*Ateles chamek)* and the old monkey (*Pithecia irrorata*), these animals are dispersing small seeds. The presence of large primates in forest areas is a strong hint of preservation and forest maintenance. Furthermore, these animals require large areas for their survival, causing large routes performed by them in the search of food helping in seed dispersal. The feeding preference of these primates is related, in many cases, to the forest species of economic value.

Another important consideration for conservation is the existence of natural pits, beaches and lakes within RESEX, which may also be considered attributes for conservation, since these areas are highly relevant for maintaining the species. On the case, for example, of natural pits (Figure 64), which are areas of depression, with little vegetation coverage and humid soils, visited by many animals, soil consumption (geophagia) in these locations is known for several species of vertebrates in various regions of the world, suggesting that the pits are important components of the habitat of these organisms. In the Amazon, these places are highly sought by traditional human populations for hunting, due to the fact that many species such as deer, peccaries, tapirs, curassows, agouti and others are easily spotted.

Figure 64. Natural pit in Resex Rio Preto-Jacundá

In addition, the local population (extractive) has a close relationship and use of this biodiversity is for food and medicinal purposes, among others. It is the case of artisanal fishing of turtles (tortoises and tracajás), where we can see through conversation with residents that they collect eggs and animals as a food source in the ponds formed near River Machado. Performed by hand (using nets, harpoons, hooks and traps), this fishing practiced near the houses are small-scale and controlled (subsistence) in some way by the residents of RESEX. What is really concerning is the turtle fishing and eggs gathering in the passage outside the UC, practiced by fishermen equipped with greater ability to boats, this practice being prohibited by law. This uncontrolled fishing can indeed be causing a population decline of turtles and tracajás in River Machado.

7.1.4 Future scenarios for biodiversity without project

From the description of the initial conditions of biodiversity and of the attributes of high value for conservation prior to the project, here are the likely scenarios without project for biodiversity in the zone of Resex Rio Preto-Jacundá Project, considering the main threats now and in the future.

Resex Rio Preto-Jacundá has been receiving, over the decades, threats to the maintenance of biodiversity. According to the Ministry of Education, timber theft, invasions, land grabbing and expansion of the urban area in the municipality of Machadinho d'Oeste are the main threats weighing on the Resex. Wood Extraction: In the area that comprises the geographical boundaries of RESEX there is logging performed through forest management. Despite management being considered a system designed to production with the preservation and conservation of many timber products, medicinal products, environmental services and environmental functions of forests, Guilherme e Cintra (2001)

states that Birdlife undergoes changes in its richness, abundance and age to the selective logging carried out in the 4-hectare plots of different ages and cuts intensities. From this perspective one should pay special attention to this area in future surveys.

However, the big problem is the influx of illegal loggers on the outskirts of Resex, causing degradation and endangering the activity planned by concessionaries and affect biodiversity due to not meeting the minimum requirements of forest management.

When it comes to the Amazon, what is known is that the uncontrolled logging has a number of impacts on the herpetofauna and other groups mentioned. For example, the effect of clearing production provided by the cutting of large trees has affected the thermoregulatory mechanisms of some species of lizards and snakes, direct loss of environment of lizards and arboreal lizards, increase of temperature that might be harming some species of amphibian frogs, loss of pools used for oviposition eggs and tadpole by amphibians, among others (Vitti & Caldwell, 2001).

Advance of Agriculture and Cattle Raising: The loss and eventual conversion of habitats to pasture and related pose a great threat to all forest species of Neotropics, directly affecting fauna representatives, such as ungulates (antas and queixadas), because they are animals that require large areas for their survival. Such changes in habitat represent a much more significant threat in the medium and long term, increasing the level of threat.

However, what worries is the advance of deforestation towards RESEX, which is slowly being pressured by external factors such as the scarcity of natural resources outside its boundaries, which generates a scenario of pressure on existing resources within RESEX.

Illegal hunting and fishing: It was found during research activities in the field the presence of both sports and professional fishermen in the project area. However, this activity is carried out without any control, which can potentially affect the fishing potential of the region. According to residents of RESEX, it is common the presence of fishermen in the vicinity which in the pursuit of fish, often enters illegally into RESEX, in special in Juruá River, and even in the lakes formed by River Machado in the search for difficult species to be found in other rivers region, such as Tambaqui.

HPP Tabajara: The environmental situation in the surrounding region of RESEX is worrying because the probable construction of another hydropower plant, the HPP TABAJARA in River Machado, also known as River Ji -Paraná. Required studies are already underway. The construction of this project will directly impact the Extractive Reserve by changing the normal level of the River Machado which will affect the lakes, floodplains and all biodiversity found in that area.

Species of Subosque will have their territories threatened by the project, many may die drowned or need to migrate to other environments that will bring conditions for feeding, nesting and reproduction (ELETROBRÁS, 1999). Also it becomes extremely necessary further studies in areas that will be affected by the plant to know the real impact of this on existing resources in RESEX Rio Preto-Jacundá.

7.2. Net Positive Impact on Biodiversity

In the scenario with REDD+ project, the activities described in Section 2 – Design, will positively impact aspects of biodiversity, as they will assist in the maintenance of species described in an area that is already in appropriate environmental conditions, diverse and with good conservation standards. Thus, the permanency of the forest in RESEX will provide the ideal environment for the species and for high-value attributes for conservation, in a context of deforestation and degradation in the region.

The social aspect of the use of biodiversity by residents in community groups in Resex will be covered in the management activities of resources and in monitoring. These axes will generate positive impacts on local biodiversity, barring external groups and ensuring the continuity of resources, intensifying the feeling of appropriation of natural resources.

With the prosperity of extractive activities in Resex Rio Preto- Jacundá, it is identified as a possible negative impact on the project area the increase pressure on species of low abundance, especially on the flora. In this case, it is envisaged as a mitigating measure the establishment of management plans for non-wood products, as for timber it already exists.

It is not expected that the project activities introduce invasive species or increase its population and is not foreseen the use of genetically modified organisms. The community makes small crops with exotic species of coffee, rice, corn and beans just for subsistence, however they are not used in the deforestation reduction activities in the project area, being held in the vicinity of homes of residents in open areas or capoeiras.

The use of fertilizers and chemical inputs is not intensive in the limits of Resex.

Table 54. Summary table of the preliminary assessment of the Project's impacts on biodiversity of REDD project area Resex Rio Preto- Jacundá and its surroundings.

Impacts	Potential impacts on biodiversity in the Project Area	Potential impacts on biodiversity outside the project zone
Positive	• Maintenance of the levels of biodiversity and conservation status of flora and fauna; • Maintenance of specialists, rare and endemic species; • Decrease of illegal hunting and fishing by non-residents who exert strong pressure from hunting and fishing; • Continuity of the species that serve as food source for the resident community of Resex.	• Greater knowledge of the status of biodiversity in the region; • Increase of connectivity with other protected areas and forest areas.

Impacts	Potential impacts on biodiversity in the Project Area	Potential impacts on biodiversity outside the project zone
Negative	• Overhunting and/or overfishing of species with low abundance for community subsistence.	• Increased hunting and fishing pressure in areas adjacent to RESEX (leakage of activities).

7.3. Negative Offsite Biodiversity Impacts

As shown in Table 54, as a likely negative impact outside the project area is considered the leak of illegal hunting and fishing activities carried out by external agents within the limits of Resex.

Resex Rio Preto-Jacundá has an important regional role in biodiversity as it is in a context of massive deforestation and degradation, and shelter species of endemic and regional importance of the state of Rondônia, specifically in the Madeira-Tapajós interfluve. The maintenance of this habitat favors the conservation scenario and connectivity with the surrounding forest fragments and has the potential to attract the attention of scientific research on site.

Thus, it is considered that the benefits generated by conservation area Resex Rio Preto-Jacundá, mainly related to the facilitation and improving the lives of extractive and riverside, given his vocation of sustainable use, is a great advantage over the threat of leakage of predatory activities.

Such activities currently have brought danger of scarcity of resources to the community and even the physical threat in the case of removal of timber.

In conclusion, even that empirically, that net impacts will be positive in this region.

7.4. Exceptional Biodiversity Benefits

As previously mentioned, the biogeographical region of Resex Rio Preto-Jacundá was included on the map of Priority Areas for Conservation, Sustainable Use and Sharing of Benefits from Brazilian Biodiversity as biological importance "Very High", and urgency in the actions "Extremely High".

In addition, RESEX region (Ji-paraná River), is considered a key area for Biodiversity Conservation (ACB), established with the criteria of presence of globally threatened species, species of restricted distribution or congregants' species.

7.4.1 Vulnerability

The Resex Rio Preto-Jacundá area has regular presence of globally threatened or vulnerable species, according to the Environmental Assessment conducted in the project area and in the IUCN Red List. The triggering species selected by researchers at diagnosis was Ateles chamek (Spider Monkey),

registered during the fauna diagnosis carried out under the REDD+ project in Resex Rio Preto- Jacundá in 2013. It is a specie of biological importance for conservation of the area due to criteria such as endemism, sensitivity and degree of threat of extinction, present in the Endangered Category (EN) of the IUCN Red List.

Figure 65. *Ateles chamek* (Macaco Aranha), Resex Rio Preto-Jacundá.
Picture: Paulo Bonavigo

7.4.2. Recent Population Trends

Its presence on the IUCN Red List is justified by the decline estimated at least 50 % of the population in the last 45 years, which means three generations, due to hunting activities and habitat loss (IUCN, 2008), mainly attributed to the states Mato Grosso, Acre and Rondônia.

Iwanaga and Ferrari (2002) recorded average rates of sighting of 0.69 individuals / 10 km (range 0:11 to 2:40) in 33 sites in the state of Rondônia. Considering the expected changes in land use in the scenario of the absence of the project, the population of Ateles chameck would be deeply affected locally and globally.

According to IUCN (2008), the population trend for the species is decreasing.

The forest of the state of Rondônia, in particular, is said to be in a situation of intense devastation when the new agricultural frontier, mainly for soybean, occupation model that seems to

perpetuate as it is only the beginning of a cycle. Locally, in the region of Resex Rio Preto- Jacundá Project, deforestation has similar behavior, making room for cattle ranching and extensive monocultures.

The primate ecology is disadvantaged in the scenario of the land use in the absence of the project, since it lives mainly in emerging trees from the top of the forest canopy. They are highly frugivorous and feed on wide variety of fruits, which comprise 83% of your diet (Van Roosmalen and Klein 1988).

Their late mature to reproduction and long intervals between births (IUCN, 2014) hinder the recovery of the species in the face of so many threats. In conclusion, it's found that this specie is sensitive to human disturbances necessitating large areas for survival.

7.4.3. Project measures to improve conditions of population of the species

Resex Rio Preto-Jacundá REDD+ Project will act mainly in maintaining the habitat of the species, controlling the threats that the forest in the project area suffers, through the activities described in item 2.2 Description of Project Activities.

The community will be greatly empowered on biodiversity issues in the context of the territory where they live, mainly in the preservation of large trees and in the physical presence of inhabitants, which inhibits wooden looters from entering the area.

Another proposed measure is to perform constant monitoring to generate more data about the status of conservation in loco, comparing the forest management areas to the areas not managed, with a more precise estimate of abundance and population trend of the species in Resex and thus, allowing to formulate more conservation activities focused on said primate.

7.4.4. Monitoring and indicators for GL3

The selected indicators and monitoring plan for the species Ateles chameck are described in Item 8 Monitoring.

8 MONITORING

8.1. Description of the Monitoring Plan

8.1.1 Organizational structure, responsibilities and competencies

The REDD+ Project Monitoring Plan will cover three components: climate, community and biodiversity. As a proponent and partner implementer of the project, Biofílica will coordinate the monitoring process during the project lifetime. The climate aspects will be monitored directly by the Biofílica team. Social and biodiversity aspects will be monitored by the CES Rioterra staff and contracted partners with expertise in the subject.

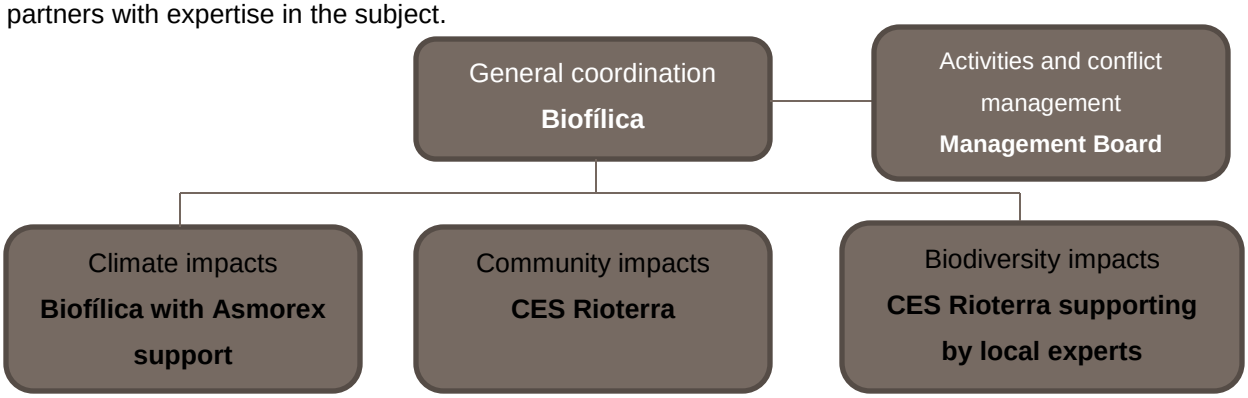


Figure 66. Organizational Structure of Monitoring Plan

- Biofílica:

  a) Responsibilities: general coordination of the socioeconomic and environmental assessment (DSEA) and baseline studies and carbon stock; PD (Project document) development and financing; credits validation/checking and trading; Project co-management throughout the Project lifetime; implementation of conservation activities; general coordination of monitoring activities and climate impacts monitoring.

  b) Competencies: It has technical skills for monitoring activities with experts trained in GIS tools with full dedication to REDD+ projects.

- CES Rioterra:

  a) Responsibilities: coordination of socio-economic and environmental studies; planning of conservation activities; support in the validation/verification; implementation and monitoring of social and biodiversity REDD+ Project activities.

  b) Competencies: It has experience in implementation and monitoring indicators of social and environmental projects with traditional communities in the Amazon. It has an agreement with researchers from the Federal University of Rondônia to hire expert researchers in regional biodiversity.

- Amorex:

a) Responsibilities: responsible for developing and implementing, in a participatory manner, REDD+ Project, and to ensure execution of the project and maintain all documentation needed for the project; monitoring and co-management of the REDD+ Project activities.

b) Competencies: official representative of Resex residents. As project developer, it will manage financial resources and ensure its proper use and the impact generated by the projects activities.

- Management Board:

a) Responsibilities: Monitor the targets, outcomes and impacts of project activities; Manage the resources of RESEX Rio Preto-Jacundá Fund in accordance with the principles, with the planning and priorities established collectively; Making public data, information, reports, deliberations and rendering of accounts in accessible language; Mediate unresolved conflicts with the first instance among the community.

b) Competencies: project forum for discussion and follow-up activities, as well as being space presentation and disclosure of the results of monitoring.

8.1.2 Procedures for handling internal auditing and non-conformities

Internal Audit procedures will be examinations and investigations, including compliance tests which allow the internal auditor to obtain enough information to substantiate its findings and recommendations to the project management.

In its application, the following will be considered:

a) inspection - verification of records and documents;

b) observation - monitoring process or procedure;

The evidences shall be sufficient, reliable, relevant and useful to provide solid basis for the conclusions and recommendations to the project coordination.

Internal audit staff with sufficient knowledge of techniques that require the use of information processing technology resources will be hired in order to implement their own procedures or, if necessary, guide, supervise and review the work of experts.

Table 55. Internal audit Plan

Data/Parameter	Procedure	Unit	Source	Frequency	Responsible	In case of non conformity
Income and expenses spreadsheet	Project's budget follow up	R$	Biofilica Investimentos Ambientais	Monthly	Project Coordinator	Consult accounting documents and general budget of

Data/Parameter	Procedure	Unit	Source	Frequency	Responsible	In case of non conformity
						the company
$AUDPA_{icl,t}$	Areas of unplanned deforestation in forest class in the project area	ha	Calculated through remote sensing images.	Quarterly	GIS Analyst	Perform accurate review
$APDPA_{icl,t}$	Areas of planned deforestation in forest class in the project area	ha	Calculated through remote sensing images, technical maps, and specific field cards.	Quarterly	GIS Analyst	Perform accurate review
$\Delta CPLdPA_t$	Total decrease in carbon stock due to planned logging activities in the Project Area	tCO_2-e	Calculated	Quarterly	GIS Analyst and Project Coordinator	Perform accurate review
$\Delta CUDdPA_t$	Total carbon stock decrease due to unavoided unplanned deforestation within the project area	tCO2-e	Calculated	Quarterly	GIS Analyst and Project Coordinator	Perform accurate review

8.1.3 Monitoring plan of the Climate Impacts

The Monitoring Plan of the Climate Impacts contain the essential aspects for demonstrating the reduction of emissions from deforestation and degradation due to avoided unplanned deforestation (according to the methodology VM0015) and changes in carbon stock over the lifetime of the resulting project changes in land use within the project area and leakage belt.

Part 1 – Application of Methodology VM0015

Task 1: Monitoring changes in carbon stocks and GHG emissions for periodic checks.

1. Monitoring of current changes in carbon stocks and GHG emissions within the project area.

a) Technical description of the monitoring tasks

The monitoring of carbon stock changes and greenhouse gas emissions within the project area will be done by monitoring the avoided unplanned deforestation. Monitoring the effectiveness of REDD + activities that aim to prevent unplanned deforestation will be developed by Biofílica by monitoring areas of forest cover from satellite images and field checks in the project area.

b) Data to be collected:

Table 56. Data to be collected for monitoring changes in carbon stocks and GHG emissions for periodic checks

Data/Parameter	Description	Unit	Source	Frequency
$AUDPA_{icl,t}$	Unplanned deforested area in ICL forestry class in year t in the Project area	Hectares (ha)	Calculated through remote sensing images	Annual
$APDPA_{icl,t}$	Planned deforested area in ICL forestry class in year t in the project area.	Hectares (ha)	Calculating using remote sensing imagery, maps and technical data, information field and post-harvest handling.	Annual
$\Delta CPLdPA_t$	Total decrease in carbon stocks due to harvest activities planned in year t in the Project area.	Carbon dioxide equivalente ton (tCO_2-e)	Calculated	Annual
$ACPA_{icl,t}$	Annual area within the Project area affected by catastrophic events in icl class in year t.	Hectares (ha)	Calculated through remote sensing images	Every time a catastrophic event occurs.
$\Delta CUCdPA_t$	Total decrease in carbon stock due to catastrophic winds in year t in the Project area.	Carbon dioxide equivalente ton (tCO_2-e)	Calculated	Every time a catastrophic event occurs.
ΔCUDdPAt	Total current change in carbon stock due to planned	Carbon dioxide equivalente	Calculated	Annual

Data/Parameter	Description	Unit	Source	Frequency
	deforestation not avoided in year t in the project area	ton (tCO_2-e)		

c) Summary of the data collection procedure

Monitoring of changes in land use and land cover:

The main activities developed by the Project to collect and process data are:

- Selection of satellite optical images with less cloud cover, and date of next shot near the Amazon dry season and adequate radiometric quality;
- Satellite image georeferencing with topographic maps at 1:100,000 or MrSID of NASA images on orthorectified format;
- Generation of a specific mixture model f the percentage of vegetation, soil and shade component for each pixel of the image;
- Application of segmentation technique that identifies the image regions spatially adjacent satellites (segments) with similar spectral characteristics;

Classification of segments class to identify forest, non-forest vegetation and deforestation.

- Monitoring carbon stocks and emissions of non-CO_2:
- Monitoring of changes (reductions) in carbon storage will be performed by forestry inventory, measuring the diameter at breast height (DAP = 130cm) for each tree with DAP greater than or equal to 15cm within the forest inventory plots. DAP is the main variable used to estimate carbon storage and changes in the stock of carbon in REDD + RRPJ Project.

d) Procedures for control and quality assurance

Monitoring of changes in land use and land cover:

In order to validate the information obtained from satellite images, deforestation occurrence of mapped information will be checked through data collected in the field with a GPS navigation. The minimum accuracy in the classification of land use and land cover is 80%. For areas with cloud cover SAR sensor images, such as RADRSAT – 2, Cosmo SkyMed and TerraSAR-X will be used.

The original data (raster) and processed (vectors) of satellite images, coordinates, technical maps, photos and field files will be stored by Biofílica Investimentos Ambientais throughout the project. Maps showing the installed infrastructure, satellite pictures and deforestation reports will be made available to the verification body in each event check.

Monitoring of carbon stocks and of emissions of non-CO2:

The procedure of control and guarantee the quality of forest management is conducted by Woodshopping in the pre-harvest inventory, during and after harvest. The reports and original field records will be accessed by Biofílica through Asmorex, which seek to keep the copy of these documents throughout the project lifecycle. Spreadsheets and inventory reports and monitoring of permanent plots will be made available to the verification body for each verification event.

e) Data Archiving

All data and reports produced by REDD + RRPJ Project will be stored by Biofílica Investimentos Ambientais through digital files during the project life cycle. Original reports (physical) and field records produced by forest management activity will be stored by Asmorex. Biofílica Investimentos Ambientais will keep a copy of these documents in digital format throughout the project. All relating to the monitoring of REDD + RRPJ documents will be gathered in physical and/or virtual files and made available to the verification body in each check event.

1.1. Project Implementation Monitoring

Implementation of REDD + activities will be monitored through the financial spreadsheets, performance and quality reports, reports of social management, land cover maps, meeting reports, reports on the occurrence of raids and other relevant document.

1.2. Monitoring of land use change and land cover within the Project area

The monitoring of planned and unplanned deforestation will be performed by mapping of forest cover in the Project area using satellite images with a spatial resolution of 30 meters or more. The monitoring of deforestation to implement social activities infrastructure will be done through specific field data sheets and for the construction of roads, extensions and cargo handling areas within the project area the Post-Exploration Reports and maps and satellite imagery will be used containing information of forest cover areas converted to non-forest class. Seeking greater flexibility in deforestation mapping process, different techniques for classification and visual interpretation of SAR images using field data and cartographic quality standards can be used.

Data about deforestation events will be compared to baseline scenarios. Values of reduced emission on the deforestation period will be based on the comparison between the predicted and actual deforestation.

1.3 Monitoring of changes in the carbon stock

Within the Project Area:

It is expected that the ex-ante estimate of carbon stock by forest class does not change during the baseline period. However, the VCS Methodology VM0015 requires monitoring of carbon from stock in the project area subject to significant loss of carbon stock in the scenario with the project according to the ex-ante evaluation due to controlled deforestation and planned management activities or areas subject to the unplanned and significant reduction in the carbon stock in the baseline scenario.

The total change in carbon stock due to not avoided unplanned deforestation within the Project area is calculated as follows:

$$\Delta CUDdPA_t = \sum_{y=1}^{t}\left(\sum_{icl=1}^{icl} AUDPA_{icl,y} * \Delta Ctot_{icl,t-y} - \sum_{fcl=1}^{fcl} AUDPA_{fcl,y} * \Delta Ctot_{fcl,t-y}\right)$$

Where:

$\Delta CUDdPA_t$ Complete change in carbon stock due to not avoided unplanned deforestation within the project in year t.

$AUDPA_{icl,y}$ area of not planned deforestation in the initial forest class icl year t within the Project area in the scenario with the project.

$\Delta Ctoticl_{,Ac}$ Carbon stock loss in the initial forest class icl at the time of AC change (number of years after the LU/LC change).

$AUDPAfcl_{,y}$ Area of fcl non-forest class at time t within the Project area after unplanned deforestation the scenario with the Project.

$\Delta Ctotfcl_{,Ac}$ Carbon stocks gain on in final fcl non-forest class at the time of AC change (number of years after the LU/LC change).

If there is significant reduction in carbon stocks due to sustainable forest management activities, this reduction will be reported in verification processes, using Table 29 Methodology VCS VM0015 version 1.1.

Within leakage management areas:

No area will be subject to loss of planned carbon stock in the areas of leakage management in the project scenario.

Monitoring of non-CO2 emissions from forest fires:

Emissions from biomass burning are not considered in this Project.

1.4 Monitoring of natural disturbances impacts and other catastrophic events

Losses in carbon stock and increased GHG emissions due to natural disturbances and catastrophic events will be controlled by monitoring the forest cover satellite using the same methods applied to the monitoring of forest cover in the project area (section 1.1.2).

The main activities to be developed for collection and processing of data are:

- Selection of optical satellite images with less cloud cover, taken in future seasons close to Amazon dry season and with radiometric quality;
- georeferencing of satellite images with topographic charts at a scale of 1: 100,000 or NASA images on the MrSID format ortorretificado
- Mapping of areas of forest cover affected.

Emissions from natural catastrophic events or disturbances will be estimated by multiplying the loss of forest area mapped by the average forest carbon stock. If there is a significant reduction in carbon stock due to natural disturbances and catastrophic events, such reductions will be reported in verification processes using the tables 25e, 25f and 25g of the approved methodology VCS VM0015 version 1.1.

2. Leakage monitoring

a) Technical description of the monitoring tasks

REDD+ RRPJ Project will involve two monitoring activities of leakage sources:

I. Monitoring of reduction in carbon stocks and / or increases in greenhouse gas emissions associated with leakage prevention measures if the project proponents implement activities such as tree planting, agricultural intensification, fertilization, production of fodder and / or other measures improvements to agricultural land and livestock. If these activities cause reduction in carbon stocks and / or increases in greenhouse gas emissions in the areas of management of leakage, these changes in carbon stocks and / or greenhouse gas emissions are estimated by Biofílica Investimentos Ambientais.

II. Monitoring of forest cover in the leakage belt through satellite images will be performed by Biofílica Investimentos Ambientais.

b) Data to be collected

Table 57. Data to be collected for leakage monitoring.

Data	Description	Unity	Source	Frequency
$\Delta CLPMLK_t$	Reduction in carbon stock due to the leakage prevention measures	tCO_2-e	Calculated	Annual
$EgLK_t$	Emissions from grazing animals in leakage management area in year t	tCO_2-e	Calculated	Annual
$ELPMLK_t$	Total annual increase in GHG emissions from the leak prevention measures in year t	tCO_2-e	Calculated	Annual
$\Delta CabBSLLK_t$	Total changes in carbon stock in the area of the leakage belt	tCO_2-e	Calculated	Annual

c) Short description of the data collection procedures

Monitoring of changes in carbon stocks and GHG emissions associated with the leak prevention activities

The main activities developed for data collection and processing for monitoring changes in carbon stock due to the implementation of activities in leakage management areas are:

- leakage prevention activities will be listed
- A map showing the areas of intervention and type of intervention will be prepared;
- Areas where leakage prevention activities have shocked the carbon stock will be identified;
- Existing non- forest classes within these areas will be identified;
- The carbon stocks in the identified classes will be measured or literature estimates will be used;
- Changes in carbon stock in the areas of leakage management in the project scenario will be reported through the table 30b of the VM0015 methodology;
- Net carbon stock changes caused by leak prevention measures during the fixed period of the baseline and the project's crediting period will be calculated;
- Results of calculations are reported in Table 30c of the VM0015 methodology.

Monitoring the reduction in carbon storage and increase in GHG emission due to leakage of displacement:

Monitoring changes in carbon stock

Procedures for the collection of data used are the same applied in monitoring deforestation in the project area (section 1.2).

Monitoring the growth of GHG emissions

Emissions from forest fires are not counted at baseline.

d) Procedures for control and quality assurance

Monitoring changes in carbon stocks and GHG emissions associated with deforestation prevention activities:

To be determined depending on the activity if implemented.

Monitoring the reduction in carbon storage and increase in GHG emissions due to leakage of displacement:

Procedures for control and quality assurance will be used the same applied to the monitoring of deforestation in the Project area (section 1.2).

e) Data archiving

Original reports and field files will be stored by Asmorex. Biofílica Investimentos Ambientais will keep a copy of these documents in digital form throughout the life time of the project. The original digital data (raster) and processed vector) of satellite images T, coordinates, technical maps, field photos and records will be stored by Biofílica Investimentos Ambientais during the life time of the project. Annual statement of deforested areas, satellite images and reports will be made available for each verification body in each verification event.

2.1. Monitoring of changes in carbon stocks and GHG emissions associated with the leak prevention activities.

The reduction in carbon stocks due to the activities developed in leakage management areas are not expected since no activity of t improved farming techniques or areas of management for grazing could alter carbon stocks and increasing GHG emissions compared to the baseline scenario has planned implementation.

The following activities in leakage management areas may occasionally cause decrease in carbon stock or increase in GHG emissions:

- Changes in carbon stock due to activities implemented in the areas of leakage management;
- According to the most recent VCS standard emissions of nitrous oxide (N2O) derived from nitrogen fertilization are always considered insignificant. Consumption of fossil fuels is always considered insignificant in AUD project activities and should not be considered.

2.2 Monitoring of reduction in carbon storage and increase in GHG emissions due to displacement leak

Activity data in the leakage belt area will be determined by the same methods used to monitor deforestation in the project area (section 1.2). If during the monitoring process one deforestation event higher than expected in the baseline scenario is identified in the leakage belt, and such deforestation is attributed to deforestation agents in the project area, losses in carbon stock will be accounted for and reported using the table 22c and 21c of the approved methodology VM0015.

The total change in carbon stock due to non-avoided unplanned deforestation within the leakage belt area is calculated as follows:

$$\Delta CBSLLK_t = \sum_{y=1}^{t} \left(\sum_{icl=1}^{icl} AUDLK_{icl,y} * \Delta Ctot_{icl,t-y} - \sum_{fcl=1}^{fcl} AUDLK_{fcl,y} * \Delta Ctot_{fcl,t-y} \right)$$

Where:

$\Delta CBSLLK_t$ Complete change in carbon stock due to unplanned not avoided deforestation within the leakage belt area.

$AUDLK_{icl,y}$ unplanned deforestation area in icl class in year t within the area of the leakage belt in the scenario with the Project.

$\Delta Ctoticl,_{Ac}$ Loss in carbon stock in the initial icl forest class at the time of the AC change (number of years after LU/LC).

$AUDLK_{fcl,y}$ fcl non-forest class area at time t within the leakage management belt area post unplanned deforestation.

$\Delta Ctot_{fcl,Ac}$ Gain in carbon stock in non-forest end fcl class in changing AC period (number of years after the LU/LC change).

2.3 total ex post estimated leakage

Results will be presented to the verification body in ever verification event through table 35 of the VM0015 methodology.

3. Net reduction ex post GHG gases

a) Technical description of the monitoring tasks

In the verification process the results will be presented through the table 36 methodology VM0015 version 1.1 along with the spatial data (deforestation maps when available).

b) Data to be collected

Table 58. Data to be collected to monitor the ex post net reductions of GHG gases.

Data	Description	Unity	Source	Frequency
$\Delta REDD,_t$	Net reduction of anthropogenic GHG emissions attributed the project AUD activities in year t	tCO2-e	Calculated	Annual
VCU,t	Number of Verified Carbon Units (VCUs) to be placed as available for sale at time t	tCO2-e	Calculated	Annual

c) Short description of the data collection procedure

The number of Verified Carbon Units (VCUs) to be generated by the activities of REDD + RRPJ in year t is calculated using the equation 19 and 20 of the approved methodology VM0015 version 1.1.

d) Procedures for control and quality assurance

All tasks and tools set out in Part 2 of VM0015 methodology will be used to ensure that the data are suitable for the verification process and the number of VCUs is reliable.

e) Data archiving

All data and REDD + RRPJ project reports will be stored by Biofílica Environmental Investments into digital files throughout the project. All documents relating to the project monitoring will be compiled and made available to the verification body to at each verification event.

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

These activities are the responsibility of Biofílica Investimentos Ambientais.

Task 2: Revisiting the baseline projections for future periods of baseline fastening

1. Updated information about the agents, drivers and underlying causes of deforestation

Statistical and spatial data, studies and information on the agents, vectors and underlying causes of deforestation needed to carry out the steps 2 and 3 of the VM0015 methodology will be updated and used in reviewing the projections of the baseline after the fixed period of 10 years. When available, the monitoring of forest management data and other activities developed by the project will be used.

2. Component setting change and use and land cover at baseline

In the case of a line or sub- national basis to become available during the period fixed as baseline, this will be applied in the following period. In case of no national or subnational baseline made available, step 4 of the VM0015 methodology will be recalculated considering the 10-year period (2013-2022) using the variables updated on the agents, vectors and adjacent causes of deforestation in the reference region. The two main components to be revisited are: annual area of deforestation and the location of deforestation in the baseline.

The assumptions and hypotheses considered in the modeling of future deforestation dynamics (socioeconomic data), as well as data used in the projection space (upgrade roads, locations and distance of new deforestation) will be reviewed and updated.

3. Adjustments in the carbon component of baseline

The spatial estimate of the carbon component can be revisited in accordance with the results obtained for changes in stock monitoring processes of carbon according to the methodology VM0015 Version 1.1 Part 3, item 1.1.3. During the lifetime of the new design techniques and methodologies may be analyzed for spatial estimation of biomass, for example, LIDAR or SAR data.

8.1.2 Initial Monitoring Plan of Impacts to the Communities

The Plan of Initial Monitoring of Impacts to the Communities contains at its core process indicators and indicators of results as well as indicators of impacts related to specific optional criteria CCB conditions. For submission of the Full Monitoring Plan of Impacts to the Communities the plan presented here will be evaluated and validated by stakeholders, the process indicators and results will be completed and impact indicators will be established.

Following the same logic of strategic activities, monitoring aims to access the effectiveness of interventions described in item 2.2 Description of Project activities through the Theory of Change.

a) Data to be collected

The data and parameters to be collected are in Section 8.3 of this document.

b) Summary of data collection procedure

Data will be collected during and after the activities with community and/or through specific interviews. The semi-annual evaluation of the project aims to meet part of this demand. Complementarily annually structured household's interviews will be conducted.

This information will be systematized and presented through social activity reports the annual project at its meeting on definition of investment priorities.

c) Procedures of control and quality assurance

The data collected and portrayed in the reports will be presented and validated during meetings with stakeholders, to which all actors with interest in the project are invited to attend.

d) Data Archiving

All data and REDD + RRPJ project reports will be stored by Biofílica Investimentos Ambientais through digital files throughout the project. Original reports (physical), reports from meetings and minutes of the files will be stored by Asmorex and CES Rioterra during the execution of social activities. Biofílica Investimentos Ambientais will keep a copy of these documents in digital format throughout the project. All documents relating to the project monitoring will be gathered in physical and/or virtual files and made available to the verification body in each verification event.

e) Organization and responsibilities of the parties involved in the above

The social monitoring activities are the responsibility of Biofílica Investimentos Ambientais and CES Rioterra.

8.1.3. Initial Monitoring Plano of the Impacts on Biodiversity

In REDD + RRPJ project are expected net positive impact on biodiversity and the attributes of high conservation value.

It comes following a Monitoring Initial Plan Impacts of Biodiversity, containing at its core process indicators and of the results indicators. For the presentation of Biodiversity Impacts of Full Monitoring Plan, the plan presented here will be evaluated and validated by stakeholders, process and outcome indicators will be complemented and impact indicators will be established.

The Initial Plan Monitoring Impacts on Biodiversity focuses on the monitoring of activities related to monitoring of project impacts on biodiversity and monitoring of species of relevance. The evaluation of the effectiveness of measures taken to maintain and improve HCVs will be incorporated into these tasks since the HCV1 is linked to the monitoring of species of relevance.

a) Data to be collected

The data and parameters to be collected are in Section 8.3 of this document.

b) Summary of data collection procedures

The parameters related to the impacts of project activities will be monitored annually. The parameters related to fauna diagnostic will be collected at least once a year by choosing the Amazon climate season (summer and winter). This information will be systematized and presented through fauna monitoring reports for one year of monitoring, verification before each event.

Data from the relevant species will be collected during the studies. This information will be systematized and presented through fauna monitoring reports for one year of monitoring, verification before each verification event.

c) Procedures of control and quality assurance

The procedures of control of quality assurance linked to data collection will depend on the internal procedures of the organization responsible for field surveys of each study.

Surveys based on ethnozoology will be presented and validated during meetings with stakeholders, to which the residents of the communities Resex will be invited to participate as members throughout the project life cycle.

d) Data Archiving

All data and REDD + RRPJ project reports will be stored by Biofílica Investimentos Ambientais through digital files throughout the project. Original reports (physical), reports from meetings and minutes of the files will be stored by Asmorex and CES Rioterra during the execution of social activities. Biofílica Investimentos Ambientais will keep a copy of these documents in digital format throughout the project. All documents relating to the project monitoring will be gathered in physical and/or virtual files and made available to the verification body in each verification event.

e) Organization and responsibilities of the parties involved in the above

All monitoring activities are the responsibility of Biofílica Investimentos Ambientais, the partner organizations in biodiversity studies and CES Rioterra.

8.2. Data and parameters available at validation

Unity of Data/Parameter:	**Deforestation**
Unity:	Hectare (ha)
Description:	Maps of forest coverage areas to non-forestry coverage areas.
Source of data:	Measured through data of Project PRODES/INPE.
Value applied:	2,1%/year in average (2000-2012).
Justification of the choice of data or description of measurement tools and procedures applied.	For mapping deforestation and production Map of Forest Cover Excellence Brand were used Digital PRODES program data (Satellite official mapping of deforestation of the Brazilian Amazon). A total of 33 Landsat images were used during the analysis period. The ISOSEG method of unsupervised classification was used in the classification of images to map the forest classes, non- forest vegetation, hydrography and deforestation.
Purpose of the data:	• Determining the baseline scenario • Calculation of leakage
Comments	See documents: • Câmara *et al*. 2006. *Metodologia para o cálculo da taxa anual de desmatamento na Amazônia Legal*

	• *Determinação da Linha de Base e Dinâmica de Desmatamento para o projeto Resex Rio Preto-Jacundá*

Unity of Data/Parameter:	***Ctot***
Unity of data:	$tCO_2e\ ha^{-1}$
Description:	Average of carbon stock per hectare in all carbon pools in the forest class used in the baseline scenario.
Source of data:	Calculated by allometric equations, literature growth factors and data measured in the field.
Value applied:	458 $tCO_2e\ ha^{-1}$
Justification of the choice of data or description of measurement tools and procedures applied.	Above and below ground biomass estimates were performed by forest inventory data, allometric equations developed in similar areas the project area (Silva 2007). The dead wood reservoir was estimated based on data from forest inventory and Silva equations (2007).
Purpose of data:	• Calculation of baseline emissions • Calculation of Project emissions • Calculation of leakage
Comments	See documents: • Estimation of forest carbon stock for the Resex Rio Preto-Jacundá Project.

Unity of data/parameter:	**DAP**
Unity of data:	cm
Description:	Diameter at breast height (130 cm) for each tree with DBH equal to or greater than 15 cm in each plot of forest inventory
Source of data:	Measured in the field by Hdom
Value applied:	See spreadsheet with field data
Justification of the choice of data or description of measurement tools and procedures applied.	Requirement of the VCS Methodology VM0015. The forest inventory data collected for less than 10 years ago in multiple plots located on a large spatial distribution
Comments	Main variable for carbon stock estimates

Unity of data/parameter:	$BGB_{fw} = 0{,}0469 \text{x} DAP^{2{,}4754} \text{x} fc_1$ $AGB_{fw} = 2{,}2737 x DAP^{1{,}9156} \; fc_1$
Unity of data:	Kg (fresh weight of biomass)
Description:	Equation to convert DBH into fresh biomass
Source of data:	SILVA, 2007
Value applied:	$BGB_{fw} = 0{,}0469 \text{x} DAP^{2{,}4754} \text{x} fc_1$ $AGB_{fw} = 2{,}2737 x DAP^{1{,}9156} \; fc_1$
Justification of the choice of data or description of measurement tools and procedures applied.	Equation developed for forests with similar characteristics to the forest in the reference region.
Comments	

Unity of data/parameter:	**CF**
Unity of data:	t
Description:	Carbon content in dry biomass
Source of data:	Nogueira, E.; Fearnside, P.; Nelson, B., et al., 2008. Estimativas de biomassa florestal na Amazônia Brasileira: Novas equações alométricas e ajustes da biomassa dos inventários de volume de madeira. Forest Ecology and Management, 256 (11), pp.1853-1867
Value applied:	0.485
Justificativa da escolha do dado ou descrição dos meios de medição e procedimentos aplicados	Value found in scientific literature.
Comments	

Unity of data/parameter:	**44/12**
Unity of data:	tCO_2e
Description:	Carbon mass for mass conversion factor of CO_2e
Source of data:	From scientific literature: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 AFOLU.
Value applied:	44/12

Justification of the choice of data or description of measurement tools and procedures applied.	Default value of IPCC
Comments	

Unity of data/parameter:	**Area opening for management of infrastructure**
Unity of data:	Percentage
Description:	Open area for construction of the necessary infrastructure for sustainable forest management activities, such as patios, primary and secondary roads.
Source of data:	Post-exploratory report and expert opinion
Value applied:	8%
Justification of the choice of data or description of measurement tools and procedures applied.	Data are collected in the field after harvest activity.
Comments	

8.3. Data and parameters monitored

8.3.1. Climate

Unity of data/parameter:	**Deforestation in the Project area and leakage belt**
Unity of data:	Hectare (ha)
Description:	Forest cover areas converted into non-forest cover areas within the Project area and leakage belt of Resex Rio Preto-Jacundá REDD+ Project.
Source of data:	Calculated by remote sensing images with GPS data collected in the field.
Description of measurement methods and procedures to be applied.	The monitoring of forest cover in the Project area and leakage belt will be done through satellite images analysis. When data from the PRODES system is not available, the monitoring of forest cover will be done by automatic classification and visual interpretation of images of other optical sensors of SAR data.
Frequency of monitoring/recording:	Annual
Value Applied:	N/D
Monitoring equipment:	Remote sensing image digital processing program, geographic information systems and navigational GPS.
GQ/CQ procedures to be applied:	Images with spatial resolution of 30m or more will be used in the mapping. The minimum mapping unit is 1ha. The evaluation of classification will be done through data collected in the filed using GPS navigation. The minimum accuracy of use and land cover classification map is 80%.
Calculation Method:	In the case of unplanned deforestation areas being detected, the map of Forest Cover Excellence Brand will be updated by map algebra.
Comments	Project PRODES Digital: http://www.dpi.inpe.br/prodesdigital/prodes.php

	More information on control and quality assurance available in: • (CÂMARA et al., 2006). *Metodologia para o cálculo da taxa anual de desmatamento na Amazônia Legal*

Unity of data/parameter:	***Ctot***
Unity of data:	$tCO_2e\ ha^{-1}$
Description:	Carbon stock average per hectare in all forest carbon pools in the class used in the baseline scenario.
Source of data:	Calculated by allometric equations, the scientific literature growth factors, and measured data in the field Hdom.
Description of measurement methods and procedures to be applied.	Above and below ground biomass estimates will be developed through forest inventory data, allometric equations developed in similar areas to the project (Silva, 2007). The timber shell life is estimated from the reference Feldpausch et al (2005).
Frequency of monitoring/recording:	Data collected in the forest inventory periods of up to 10 years in multiple installments.
Value Applied:	N/D
Monitoring equipment:	N/D
GQ/CQ procedures to be applied:	Further information on QA/QC available in: "Hdom#12_Relatório Tecnico Final_PT_v4.0", section 5.3 of the document.
Calculation Method:	Comparisons between the average stock of total carbon value in the forest class used in the baseline scenario, according to forest carbon stock estimation for Resex Rio Preto- Jacundá REDD+ project.
Comments	Mandatory requirement of VC0015 Methodology for areas of logging.

Unity of data/parameter:	**DAP**
Unity of data:	cm
Description:	Diameter at breast height (130 cm) for each tree with DBH equal to or greater than 15 cm in each plot of forest inventory
Source of data:	Calculated from the circumference at breast height as the field Hdom
Description of measurement methods and procedures to be applied.	DBH is calculated from data in circumference at breast height (CAP) of each tree as monitored in the field.
Frequency of monitoring/recording:	Data collected in the forest inventory periods of up to 10 years in multiple installments.
Value Applied:	N/D
Monitoring equipment:	Calculated from the circumference at breast height data measured in the field using tape.
GQ/CQ procedures to be applied:	Mandatory monitoring in accordance with the Methodology VM0015. The forest inventory data collected over periods of up to 10 years in multiple installments.
Calculation Method:	DBH is calculated from data in circumference at breast height (CAP) of each tree as monitored in the field.
Comments	

Unity of data/parameter:	**Planned deforestation for infrastructure of Forest Management**
Unity of data:	Hectare (ha)
Description:	Map of forest cover areas converted into non-forest coverage areas due to construction of roads, trails and forest yards needed for forest management.
Source of data:	Remote sensing images, technical maps, and specific field of cards to monitor the construction of roads, forest paths and patios of forest management.
Description of measurement methods and procedures to be applied.	The monitoring of forest cover areas will be carried out through satellite image analysis, building maps of roads, paths and patios for forest management, and verification in the field. If planned deforestation occurs Forest Cover Benchmark Map will be updated through the algebraic map. The reduction in carbon stocks in the project area will be reported during the verification procedures.
Frequency of monitoring/recording:	During handling of each UPA.
Value Applied:	N/D
Monitoring equipment:	Field records and geographic information system.
GQ/CQ procedures to be applied:	Analysis of planned deforestation areas due to Forest Management Infrastructure performed by high resolution images from Google Earth and Landsat 8 images without cloud interference.
Calculation Method:	If planned deforestation areas are identified the Forest Cover Benchmark Map will be updated through the algebraic map.
Comments	N/D

Unity of data/parameter:	**ΔCabBSLLKt**
Unity of data:	tCO2-e
Description:	Changes in the total carbon stock in the area of the leakage belt.
Source of data:	Calculate
Description of measurement methods and procedures to be applied.	• Leak prevention activities will be listed; • A map showing areas of intervention and the type of intervention will be prepared; • areas where leakage prevention activities impact carbon storage will be identified; • Existing non- forest classes within these areas if the baseline will be identified; • carbon stocks will be measured in the identified classes or literature conservative estimates will be used; • Changes in carbon stock in the areas of leakage management under the project scenario will be reported using Table 30b of VM0015; • Changes in net carbon stock caused by preventive measures during fixed period from the baseline and optionally in the project crediting period will be calculated; • Calculation results are reported in Table 30.c of the VM0015.

Frequency of monitoring/recording:	To be determined depending on the activity
Value Applied:	n/a
Monitoring equipment:	To be determined depending on the activity
GQ/CQ procedures to be applied:	To be determined depending on the activity
Calculation Method:	To be determined depending on the activity
Comments	N/D

8.3.2. Community

Unity of data/parameter:	**Gross revenue from each use of land within Resex**
Unity of data:	R$/family
Description:	Gross revenue for each source of income for families' resident in the Resex
Source of data:	Monitoring report
Description of measurement methods and procedures to be applied.	• Interviews with each family • Documents and sales invoices
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Number of courses and training**
Unity of data:	Number
Description:	Number of courses and training within the themes of the Project.
Source of data:	Report of monitoring and of project activities.
Description of measurement methods and procedures to be applied.	To be established.
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Number of households managing non timber forest products**
Unity of data:	Number
Description:	Quantity of families involved with extractive activities
Source of data:	Report of monitoring and of project activities.
Description of measurement methods and procedures to be applied.	To be established
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Family income**
Unity of data:	R$
Description:	Average monthly income per family
Source of data:	Report of monitoring and of project activities.
Description of measurement methods and procedures to be applied.	Structured interviews and proof of income documents.
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Training for women**
Unity of data:	Number
Description:	Number of qualified women in management and leadership courses
Source of data:	Report of monitoring and of project activities.
Description of measurement methods and procedures to be applied.	Structured interviews and documents presence in courses
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a

GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Number of women in leadership positions in Asmorex and Cooperex**
Unity of data:	Number
Description:	Number of women on the board of the Resex organizations
Source of data:	Report of monitoring and of project activities.
Description of measurement methods and procedures to be applied.	Documents and possession of minutes
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Participants in courses**
Unity of data:	Number
Description:	Number of people attending the courses offered within the themes.
Source of data:	Report of monitoring and of project activities.
Description of measurement methods and procedures to be applied.	Structured interviews and documents presence in courses.
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Agricultural production**
Unity of data:	Kilograms/liters/cans
Description:	Measure the impact of Project activities in agricultural production of families
Source of data:	Report of monitoring and of project activities.

Description of measurement methods and procedures to be applied.	Structured interviews
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

Unity of data/parameter:	**Families benefited by REDD+**
Unity of data:	Number of families
Description:	Number of families benefited from social investment project
Source of data:	Field surveys and interviews
Description of measurement methods and procedures to be applied.	Structured interviews to determine the benefits generated by REDD +
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	Search format
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	Statistical analysis
Comments	N/D

Unity of data/parameter:	**Strengthening governance**
Unity of data:	Number of initiatives implemented by governance (e.g. cash management, management plans, etc.)
Description:	Asmorex should keep records of the activities that occur monthly, such as assemblies and meetings.
Source of data:	Minutes of meetings and management plans.
Description of measurement methods and procedures to be applied.	Digital and physical media.
Frequency of monitoring/recording:	Monthly
Value Applied:	n/a
Monitoring equipment:	Physical and digital records
GQ/CQ procedures to be applied:	Validation of systematic information on the draft of the Project Monitoring Report with tenderers before the official publication of the report.
Calculation Method:	n/a
Comments	N/D

8.3.3. Biodiversity

Unity of data/parameter:	**Number of animal species monitored**
Unity of data:	Numeric
Description:	Quantidade de espécies de animais monitorados
Source of data:	Sheets field, data sheet and fauna monitoring report
Description of measurement methods and procedures to be applied:	To be established
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	n/a
GQ/CQ procedures to be applied:	To be established
Calculation Method:	Data sheet
Comments	N/D
Unity of data/parameter:	**Diversity of plant community in permanent plots**
Unity of data:	n/a
Description:	Variety of species found in the plant community within the permanent plots.
Source of data:	Field sheets, data sheets and post-exploratory report
Description of measurement methods and procedures to be applied:	To be established
Frequency of monitoring/recording:	A year before the harvest. At intervals of one, three and five years after the harvest of the UPA.
Value Applied:	To be established
Monitoring equipment:	To be established
GQ/CQ procedures to be applied:	To be established
Calculation Method:	Data spreadsheet
Comments	N/D

Unity of data/parameter:	**Monitoring of *Ateles chameck*** *(spider monkey)*
Unity of data:	Plenty
Description:	Monitoring of the species ***Ateles chameck*** *(*spider monkey)
Source of data:	Survey in the field
Description of measurement methods and procedures to be applied:	The survey data must be carried out periodically by the local community during the whole year, and once a year for specialist team.
Frequency of monitoring/recording:	Annual
Value Applied:	n/a
Monitoring equipment:	To be established.

GQ/CQ procedures to be applied:	To be established.
Calculation Method:	Linear Transect.
Comments	

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