

MONITORING REPORT OF

REDD+ PROJECT

RESGUARDO INDÍGENA UNIFICADO – SELVA DE MATAVÉN

(RIU-SM)



Document Prepared By

ACATISEMA



Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén – ACATISEMA



MEDIAMOS F&M S.A.S.

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DEFINITIONS AND ACRONYMS

DEFIN / ACRON	DESCRIPTION
ACATISEMA	<i>Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén</i> (Association of Indigenous Councils and Traditional Authorities of the Matavén Jungle)
Cabildo / Council	Representative of a sector within Resguardo Indígena Unificado – Selva de Matavén
CONPES	<i>Consejo Nacional de Política Económica y Social</i> (National Council of Economic and Social Policy)
Conuco	Small plot of land under cultivation
CORPORINOQUIA	<i>Corporación Autónoma Regional de la Orinoquía</i> (Regional Autonomous Corporation of the Orinoquía)
DANE	<i>Departamento Administrativo Nacional de Estadística</i> (National Administrative Department of Statistics)
DNP	<i>Departamento Nacional de Planeación</i> (National Planning Department)
DPS	<i>Departamento para la Prosperidad Social</i> (Department for Social Prosperity)
FAPUS	Family Agrifood Production Units System
Fustal	Trees over 10 cm in diameter at breast height (AFE-COHDEFOR, ITTO http://www.itto.int/files/user/pdf/publications/PD47%2094/pd%2047-94-9%20rev%203%20(I)%20s.pdf)
HRP	Historical Reference Period: the historical period prior to the project start date that serves as the source of data for defining the baseline
IDEAM	<i>Instituto de Hidrología, Meteorología, y Estudios Ambientales</i> (Institute of Hydrology, Meteorology and Environmental Studies), attached to Minambiente
IGAC	<i>Instituto Geográfico Agustín Codazzi</i> (Geographic Institute Agustín Codazzi)
INCODER	<i>Instituto Colombiano de Desarrollo Rural</i> (Colombian Institute of Rural Development)
INCORA	<i>Instituto Colombiano de Reforma Agraria</i> (Colombian Institute of Agrarian Reform)
MADS / MINAMBINTE	<i>Ministerio de Ambiente y Desarrollo Sostenible</i> (Ministry of Environment and Sustainable Development) (2011-current)
MAVDT	<i>Ministerio de Ambiente, Vivienda y Desarrollo Territorial</i> (Ministry of Environment, Housing and Territorial Development) (same MADS between 2002-2011)
MININTERIOR	<i>Ministerio del Interior</i> (Ministry of Interior)
MLS	Matrix of Logic Structure
PND	<i>Plan Nacional de Desarrollo</i> (Development National Plan)

DEFIN / ACRON	DESCRIPTION
PNN	<i>Parque Nacional Natural</i> (Natural National Park)
PRA	Participatory Rural Appraisal
RESA	<i>Red de Seguridad Alimentaria</i> (Food Safety Network)
RIU-SM	<i>Resguardo Indígena Unificado – Selva de Matavén</i> (Unified Indigenous Reservation – Matavén Jungle)
SENA	<i>Servicio Nacional de Aprendizaje</i> (National Learning Service)
SIGOT	<i>Sistema de Informacion Geografica para la Planificacion y Ordenamiento Territorial</i> (Geographic Information System for Planning and Land Management)

1 PROJECT DETAILS

The REDD+ Project *Resguardo Indígena Unificado–Selva de Mataven* (REDD+ Project RIU-SM) aims to develop a participatory process to achieve the establishment of a integrated management system of forests and lands of the indigenous reserve, to ensure its sustainability and to mitigate threats of its conservation and recovery, particularly avoiding deforestation and degradation in the territory of RIU-SM, in a forest area of 1,632,788 ha. (in Project Area and Leakage Belt, 2016) of forests through the implementation of a REDD+ Project in the territory of *Resguardo Indígena Unificado–Selva de Mataven*, located in east of the high plain Orinoco colombian region in the transition belt between the savannas of the Orinoco and the Amazon forests, in the eastern part of the Department of *Vichada*, in the municipality of *Cumaribo* ¹.

Illustration 1. Seva de Matavén, Sector Caño Fruta, RIU-SM



1.1 Summary Description of the Implementation Status of the Project

Project's forest protection and conservation activities and tasks have continued throughout the 2016-2017 monitoring period, which correspond to those defined in the Matrix of Logical Structure (PDD, page 45). To avoiding unplanned deforestation in the *Resguardo Indígena Unificado–Selva de Mataven* the following measures have been permanently carried out:

- ✓ Monitoring of territory of Indigenous Reservation: Through implementation of routes of surveillance and control by the indigenous guard in each Zone and Sector of RIU-SM, to watch over the conservation and recovery of RIU-SM's lands and forests. A good degree of organization of the indigenous guards has been achieved, consolidating them as agents of surveillance and control in environmental protection. They have the necessary equipment, tools, food and transport media to carry out their work. Control stations and information hoardings are being implemented, with the financial support of the Project, whose resources have begun to be obtained with the first sales of VCUs generated by the Project. The communities of the RIU-SM know this activity and also offer their support in the surveillance and

¹ PDD, page 17

protection of the territory. Deforestation has been stopped with an efficiency of 88.3% for this Monitoring Period 2016-2017.

- ✓ Revision of early warnings about forest fires and deforestation issued by the IDEAM: Between the months of December to March (both 2016 and 2017) the alerts have increased (with respect to the previous monitoring periods) due to that a higher probability of occurrence of forest fires has been presented, which has led to greater attention and surveillance by indigenous authorities and emergency care authorities.
- ✓ Implementation of communication and information systems in RIU-SM: Multiple meetings and socialization workshops have been held with the Board of Councils, Coordinator Committee, Zonal Coordinators, Captains, Indigenous Guard and other community leaders, where the progress of the Project is presented and a space is provided to discuss the issues that correspond to the Association and to the Reservation. Booklets and posters have been delivered to every indigenous communities to socialize relevant information. A budget line has already been approved to implement the transportation system for the communities.
- ✓ Support to ACATISEMA to improve its governance: The Association is strengthening its organizational procedures of operation and its autonomy, executing actions such as improvement of offices, consolidation of the work staff, search of specialized advice, economic support to the indigenous authorities, articulation of the directors belonging to the previous administration with the new ones, convocation for meetings, generation of internal regulations, resolving its internal differences based on its statutes, strengthening of administrative management capacities, convocations and consolidation of ACATISEMA, execution of budget items, accounting records, work in Life Plans, execution of indigenous cultural events, among others. Also, the continuity of the Project was approved for an additional cycle of others 30 years (from the year 2043 to the year 2072).
- ✓ Strengthening of Family Agrifood Production Units System (FAPUS) to contribute to the food security of the native communities: Indigenous communities implement an updated FAPUS for the production of their food. They have produced, on average, 24.2 tons per community / year of, among others, cassava, banana, corn, cane, rice, potato, cocoa, sweet potato and chili pepper, which allows to infer that in all the communities of the reservation have been produced around 6,316 tonne of food / year. About fruits, it can estimate a production of 287 tons per year. 350 cassava graters have been delivered to strengthen the FAPUS.
- ✓ Training programs plan to administration and management of natural resources of the RIU-SM: Support is being provided to indigenous youth people of RIU-SM so that they can pursue higher education studies. Improvements are also being made to school facilities within the RIU-SM and school supplies have been delivered to children. 4 schools are being built, all with economic resources from the Project.
- ✓ Productive projects to strengthen agri-food production: In the zonal meetings convened by ACATISEMA, carried out in November 2017, the identification, prioritization, design, preparation and budget of proposals and development of productive projects in RIU-SM by indigenous communities was achieved; this includes the purpose of establishing productive chains.

In the zonal meetings the current needs most felt by the communities were defined, for which the corresponding systematization was made, based on which the Investment Plan and the Budgets for the years 2018 and 2019 were defined. The resources for this Plan are those from the first sales of VCUs, generated and certified by the verification of the 2013 and 2014-2015 periods. Some proposals are already being implemented and others are being technically defined to initiate them. Tools have been provided to work and the Project has supported indigenous people from the reservation to attend artisanal exhibitions where they can advertise their products.

- ✓ Marketing of GHG emissions reductions that are being issued gradually. This by having satisfactorily completed the validation, verification and review stages by the VVB, Registry Entity and VCSA. With the resources coming from these first sales of VCUs, the break-even point was achieved in the 5th year (2017), as was programmed (PDD, page 168), and the cash flow designed has been systematized, whose resources have strengthened the development and implementation of the Project. The evaluation of the implementation of the activities of the Project leads to the conclusion that the products and objectives of the Project are being adequately met. This evaluation is made based on the indicators defined in the Matrix of Logical Structure (PDD, page 45).

For more detailed information see section 2.1.1 “Operation of the project activity (s) during this monitoring period 2016-2017”. Below is a list of events related to the processes related to validation, verification and registry of Project and about meetings.

Table 1. Relevant implementation dates about validation, verification and registry of Project

Date (dd/mm/yyyy) and place	Event	Affairs
14/10/2015 Bogotá	Start Validation/ Verification Process	• MEDIAMOS F&M S.A.S. hires to ICONTEC as VVB to carry out the Validation / Verification Process of REDD+ Project RIU-SM.
01/12/2016 Bogotá	Emission of Validation/ Verification Report	• ICONTEC issued the “JOINT VALIDATION & VERIFICATION REPORT: VCS”, Version 1.2, about the REDD+ Project RIU-SM and requested the registration of the project as a VCS project activity.
06/12/2016 Bogotá	Emission of Validation Representation	• ICONTEC issued the “VALIDATION DEED OF REPRESENTATION”
06/12/2016 Bogotá	Emission of Verification Representation	• ICONTEC issued the “VERIFICATION DEED OF REPRESENTATION”
01/12/2016 to 08/12/2016	Completeness review	• REDD+ Project RIU-SM was subjected to process of completeness review by APX-VCS Registry.
03/06/2017 Bogotá	Emission of Adjusted Validation/ Verification Report	• ICONTEC issued the adjusted “JOINT VALIDATION & VERIFICATION REPORT: VCS”, Version 1.3, about the REDD+ Project RIU-SM and requested the registration of the project as a VCS project activity.
16/02/2017 to 28/06/2017	Accuracy review	• REDD+ Project RIU-SM was subjected to process of accuracy review by VCSA.
20/07/2017	Registry in VCS	• REDD+ Project RIU-SM was registered in the VCS Project Database to ID VCSPD1566 and in APX -VCS Registry to code VCSR1235.

Documents about validation, verification and registry of Project are in Annex 1 of this Monitoring Report.

Table 2. Relevant implementation dates about meetings and events

Date (dd/mm/yyyy) and place	Event	Affairs
02/09/2016 Villavicencio	Meeting of Joint Commission	• Presentation of the status of the audit of REDD+ Project RIU-SM: - Revision of documentation submitted to ICONTEC, including secondary sources of information (30/10/2015 – 10/11/2015). - Assessment <i>in situ</i> made by auditor (VVB) (18-22/01/2016). - Findings issued by VVB have been solved by project proponents. • Work schedule 09/2016 - 04/2017: - September 2016: submit final version of PDD and its Annexes to ICONTEC. - Visit to Regional Villavicencio of ICONTEC. - October 2016: Validation/Verification Report by ICONTEC, version 1. - Visit of "El Tiempo" Newspaper to indigenous reservation. - November 2016: Quality Control to Validation/Verification Report by ICONTEC, adjusted and submitted to VCSA. - December 2016: Registration of REDD+ Project RIU-SM in VCS-APX Registry. - January 2017: Elaboration and execution of marketing plan to sale VCUs. - March and April 2017: socialization meeting to show the results of audit and Registration of REDD+ Project RIU-SM. • Revision to the Strategic Alliance Agreement about the need to negotiate and sale VCUs to Project be sustainable. Director was authorized to commercialize VCUs generated by Project. • A marketing plan and an investment plan are required to execute the Project activities, which were remember, having account their importance. • Definition of criteria and management to establish a Fiducia.
27/09/2016 Pueblo Escondido	Ordinary General Assembly of ACATISEMA	Among of internal aspects of ACATISEMA: • Zonal meetings were carried out. • Election of the new Coordinating Committee of the Association. Resolution 137, 2016 of the <i>Ministerio del Interior</i> - MinInterior (Ministry of Interior), by which the [new] Coordinating Committee and the Amendment of the Statutes of ACATISEMA are registered in the "<i>Registro de Asociaciones de Cabildos y/o Autoridades Tradicionales Indígenas</i>" (Registry of Associations of Cabildos and / or Indigenous Traditional Authorities).
23/01/2017 Bogotá	Meeting of Joint Commission	• Report about the status of the Project by the Director: reports and certifications of the validation and verification of 2013 and 2014-2015 periods issued by ICONTEC. Now the Registration phase is being developed. • MEDIAMOS complies with the Strategic Alliance Agreement regarding the commitments acquired. • Definition of organizational aspects of the Project, according to new administration of ACATISEMA for the 2016-2019 period. • Agreement so that the two administrations, the outgoing one as well as the incoming one, work together to continue developing the REDD+ Project RIU-SM. • Reinforcement to the unity of the indigenous peoples of the RIU-SM. • The Joint Commission was expanded, which is now constituted by the General Coordinator and the Secretary General of ACATISEMA of the

Date (dd/mm/yyyy) and place	Event	Affairs
		outgoing and incoming administrations and the Legal Representative of MEDIAMOS and the Administrative Coordinator.
12/05/2017 13/05/2017 Caño Bocón	Meeting with MADS	• <i>Ministerio de Ambiente y Desarrollo Sostenible (MADS)</i> developed the workshop “<i>Fortalecimiento de Capacidades en Cambio Climático y REDD+ con los Pueblos Indígenas de la Selva Matavén</i>” (Strengthening Capacities in Climate Change and REDD+ with the Indigenous Peoples of Selva Matavén), to which ACATISEMA attended: - Delegations from MADS, UN-REDD, FCPF and ONIC attended this workshop. - The General Coordinator and the Secretary expressed that the administration of ACATISEMA supports the REDD+ Project RIU-SM. - The Board of Councils and the Coordinating Committee state that the REDD+ Project RIU-SM remains in the voluntary market.
25/07/2017 Bogotá	Meeting of Joint Commission	• Report by MEDIAMOS about the state of development of the Project: - The REDD+ Project RIU-SM is already validated and verified for the 2013 and 2014-2015 periods. The PDD, the reports and documentation of ICONTEC and VCSA and the Registry in APX-VCS Registry are presented. - Due to the above, the VCUs are ready to be issued and commercialized. - The importance of the Sustainable Management Plan of Land and Forest of the RIU-SM and the activities of the Project are highlighted, associating the people of the indigenous reservation according to their territorial distribution. - It is noted that the construction of internal regulations is required for the actors that participate in the process. - Emphasis is placed to attend the priority needs of the RIU-SM population. - It is agreed to start negotiations to set up the Fiducia. • Report by ACATISEMA about the meeting convened by MADS in Caño Bocón (12-13th May, 2017): (see details in previous date) • Review of the Strategic Alliance Agreement: - ACATISEMA and MEDIAMOS are fulfilling the Strategic Alliance Agreement. - Allusion is made to the stages of the achievement of the object and compliance with the ethnic and environment safeguards. • Work plan and budget: - Train the ACATISEMA leaders in aspects of design and implementation of the Project. - Socialization and training in communities on the status of the Project. - For 2018 the verification of the period 2016-2017 will be carried out. • The management of MEDIAMOS is authorized and supported to market the VCUs, taking into consideration the immediate needs.
19/10/2017- 20/10/2017 21/10/2017 Cali	Meeting of Joint Commission	• REDD+ Project RIU-SM's products. • Economic bases for the Investment Plan and the Operational Plan. • Reports of accounting and audit about investments. • Policies, guidelines, audit, management and execution of the Investment Plan and the Operational Plan. • Return on investment plan since the design until the registration of the REDD+ Project RIU-SM. • The following meetings are scheduled:

Date (dd/mm/yyyy) and place	Event	Affairs
		- Joint Commission on November 6 and 7, 2017. - Board of Councils, Coordinating Committee and Project Zonal Coordinators on November 8, 9 and 10, 2017. - Zonal meetings: November 16 – 29, 2017. • Enlistment tasks for the verification of the 2016-2017 period.
06/11/2017-07/11/2017 Villavicencio	Meeting of Joint Commission	• Progress report about contracts and transactions for the commercialization of VCUs: - Contracts with South Pole and Terra Commodities. - Coordinate the accounting work of ACATISEMA and MEDIAMOS. - Staff vinculations of ACATISEMA. • Review of the schedule for meetings of the Board of Councils, Coordinating Committee, Zonal Coordinators and Zonal meetings: - The conditions to carry out the meetings are given. Some aspects of the REDD+ Project RIU-SM must be clarified as background information, sources of financing, distribution of participation. - The credibility of the REDD+ Project RIU-SM has been strengthened. - These meetings have been sufficiently convened. - The participation of every ethnic groups must be ensured. - The message that will be given in the meetings must be handled well. - The scheduling of meetings is approved.
08/11/2017-09/11/2017 Villavicencio	Meeting of Board of Councils, Coordinator Committee and Zonal Coordinators	• Inform and evaluate the development, current status and perspectives of the REDD+ Project RIU-SM: - Information about the international and national context of the REDD+ Project RIU-SM is presented for its socialization among the participants of the meeting. - Presentation of the management team of ACATISEMA and the professionals of MEDIAMOS. - The background and characteristics of the Agreement ACATISEMA - MEDIAMOS are remembered. - The need that the ACATISEMA members to be trained in the technical, financial and administrative management of the Project is resumed. - The spirit of unity and collaboration within the members of ACATISEMA and between the outgoing and the incoming administration is highlighted. - The distribution of compensation resources is remembered. - The Project Document and a synthesis of the main expected products, the sustainable management plan of lands and forests, the expected results, the Project activities and its benefits, the distribution of the VCUs according to the periods verified and the projections for the next years are presented. - The tasks for the years 2017 and 2018 are explained. - Information on the REDD+ Project RIU-SM is delivered to all attendees in brochures and handouts. - The information of the new actors (leaders) of the association will be updated due to the generational changeover. - The economic bases for the investment plan and its projections are explained. - The administration of resources, accounting, auditing and fiducia are explained. - The policies and guidelines of the operational plan and budget execution by ACATISEMA are presented, with interventions from different leaders that expose some needs and projects in the indigenous reservation.

Date (dd/mm/yyyy) and place	Event	Affairs
		- The programming for the realization of the Zonal meetings that will carry out after this meeting is concluded is presented. - Also, the continuity of the Project was approved for an additional cycle of others 30 years (from the year 2043 to the year 2072). - Councils, members of the Coordinating Committee and Zonal Coordinators express their support for the REDD+ Project RIU-SM and authorize the Board of Directors of ACATISEMA to design and implement the necessary measures for the continuity and strengthening of the Project, taking into account the Strategic Alliance Agreement ACATISEMA-MEDIAMOS.
16/11/2017	Zone 5 meeting	• Inform and evaluate the development, current status and perspectives of the REDD+ Project RIU-SM. - Several of the elements and themes presented and discussed at the meeting carried out between November 8 and 9, 2017 were also presented at the Zonal meetings, as well as the minutes of that meeting. • The participants to each Zonal meeting are presented prior to the start. They show willingness to participate as a team in the consolidation and unity of ACATISEMA and in the development of the Project. • The working groups and the person in charge of each group are defined and are responsible for the task of gathering the needs that require be satisfy, the proposals to generate benefits in the communities and the projects that can be implemented to generate development in the indigenous reservation: - Zone 5: the groups are formed according to the sectors and one more of the indigenous guard. - Zone 4: the groups are formed according to the sectors and others of women, pastors and teachers. - Zone 3: the groups are formed according to the sectors and one more of the indigenous guard. - Zone 2: the groups are formed according to the delegations and their sector: indigenous guard, women, social work, youth and pastors. - Zone 1: the groups are formed according to the delegations and their sector: women, teachers, social work, indigenous guard, youth, health and pastors. The list of needs, proposals and projects presented by the working groups in the Zonal meetings, as well as a synthesis of this information, is presented in the Annex 10 of this Monitoring Report.
19/11/2017	Zone 4 meeting	
22/11/2017	Zone 3 meeting	
25/11/2017	Zone 2 meeting	
28/11/2017	Zone 1 meeting	

Minutes of meetings of Joint Commission, Coordinator Committee, Board of Councils, Zonal Coordinators and Zonal meetings are in Annex 2 of this Monitoring Report.

For this Monitoring Period (2016-2017) the total GHG emission reductions generated is 7,584,460 tCO₂-e, and the total of VCUs is 6,404,775.

1.2 Sectoral Scope and Project Type ²

SECTORAL SCOPE: 14 - Agriculture, Forestry and Other Land Use (AFOLU)

AFOLU PROJECT CATEGORY: Reduced Emissions from Deforestation and Degradation (REDD)

ACTIVITY TYPE: Avoiding Unplanned Deforestation and Degradation (AUDD)

Identification of the Most Plausible VCS-eligible Activity(s) (according to VM0007)

A) Is the forest land expected to be converted to non-forest land in the <u>baseline case</u> , or expected to be subject to authorized conversion to a managed tree plantation in the baseline case?			
YES		NO	
B) Is the land legally authorized and documented to be converted to non-forest or a managed tree plantation?		C) Is the forest expected to degrade by fuelwood extraction or charcoal production, in the baseline case?	
YES	NO	YES	NO
D) Avoided planned deforestation/planned degradation	E) Avoided unplanned deforestation	F) Avoided forest degradation	G) Proposed project is not a VCS REDD activity currently covered by the module framework
H) Is part of the land non-forest land or with degraded forest?			
YES		NO	
I) Suitable for ARR		J) No additional activity	

REDD+ Project RIU-SM is not a grouped project.

1.3 Project Proponent ³

The project proponent is the Strategic Alliance between the *Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén* – ACATISEMA and MEDIAMOS F&M S.A.S.

Contact person	Francisco A. Quiroga Zea
Title	Project Director
Telephone	(57) 314 830 48 69
Email	mediamosfym@hotmail.com

² PDD, page 23

³ PDD, page 23

Illustration 2. Meeting of the Joint Commission (members of ACATISEMA and MEDIAMOS). Main office of MEDIAMOS, Cali



Background ⁴

ACATISEMA and MEDIAMOS F&M S.A.S. celebrated an agreement on July 6, 2012 for the establishment of a Strategic Alliance to offer environmental services with the irrevocable objective to preserve, to improve and to manage natural forest and to restore territories with existing forest land, so they can be useful in reducing greenhouse gas (GHG) emissions from deforestation and forest degradation, as in the conservation and enhancement of forest carbon stocks, under a project to consider the Life Plan, worldview, cultural integrity, autonomy and dignity of their communities, in compliance with the guidelines and rules on forest conservation and protection of the inhabitants rights of the territories inside of the natural forest areas defined by the National Environmental Authority - *Ministerio de Ambiente y Desarrollo Sostenible (MADS)* - taking into account the legal and regulatory framework of the country and the requirements of international standards.

Expressing, therefore, in order to make the necessary management for environmental, social, community and climate benefits generated by the project that is developed and implemented, and to negotiate and to sell in domestic and/or international markets, on behalf of this strategic alliance, the GHG certificates that can be quantified and verified, and to receive the agreed payments for environmental services generated by the Project.

This negotiation and Strategic Partnership should be governed by principles of transparency, loyalty, ethics and equitability.

Ratifications ⁵

This agreement was ratified on July 22, 2012 and unanimously endorsed by the members of ACATISEMA Board of Councils and Coordinator Committee, attending the "The 4th Workshop Training REDD+ Project RIU-SM".

⁴ PDD, page 24

⁵ PDD, page 25

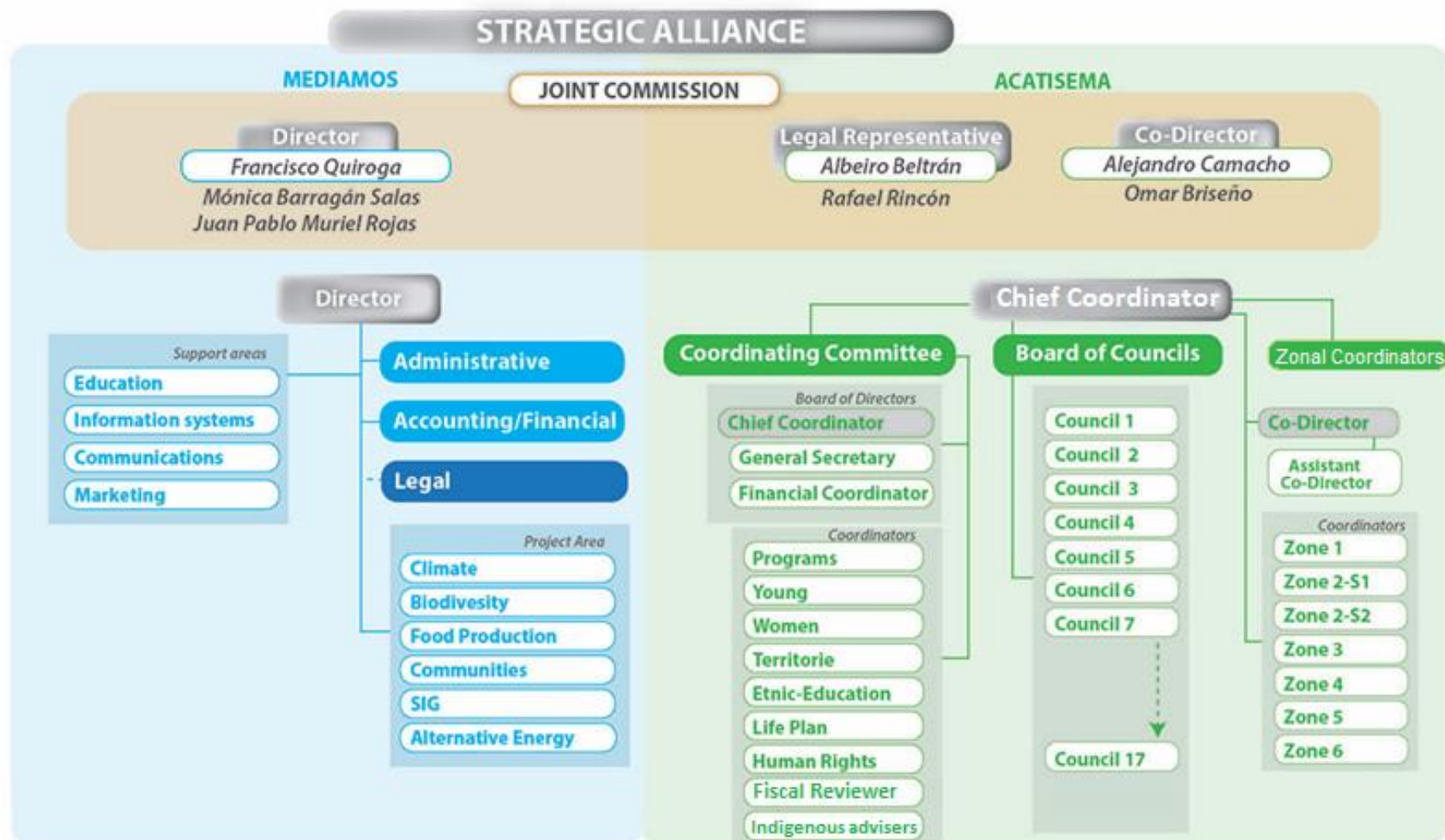
It was also ratified by leaders and captains at meetings of socialization and training, in Zonal meetings of the Reservation and the Summit of Indigenous Chiefs, which is included in their respective records. In ACATISEMA General Assembly, held in Laguna Cacao Community (*Lagunas Negra y Cacao Sector*) on September 7th to 9th 2013 Zonal meetings Proceedings were approved.

On November 22nd and 23rd, 2013, the Board of Councils and the Coordinator Committee, gathered in Laguna Negra Community (*Lagunas Negra y Cacao*), authorized the continuation of the REDD+ RIU-SM Project and the Strategic Alliance Agreement for the Protection, Conservation and Recovery of Natural Forest of the *Resguardo Indígena Unificado – Selva de Matavén* between ACATISEMA y MEDIAMOS F&M S.A.S.

Annex 1 of PDD contains information on the process of socialization, training and consultation that has occurred in the stages of design and implementation of REDD+ Project *Resguardo Indígena Unificado - Selva de Matavén* (REDD+ RIU-SM); in that Annex are also evidence of concerted action that have been placed in a sequence of agreements, up to the current Strategic Alliance Agreement ACATISEMA - MEDIAMOS F&M S.A.S. Annex 1.2.2.2 of PDD includes the text of the final agreement.

The following diagram illustrates the organizational structure of the Strategic Alliance.

Illustration 3 Organizational structure of the Strategic Alliance



Source: REDD+ Project RIU-SM

1.3.1 *Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén – ACATISEMA*⁶

Contact person	Albeiro Beltrán Salcedo
Title	Legal Representative - General Coordinator – ACATISEMA
Address	Cumaribo, Vichada - Colombia
Telephone	3502794004
Email	albeirobeltran@hotmail.es

ACATISEMA is an association formed by Councils and Traditional Authorities of 17 indigenous groups that make up the *Resguardo Indígena Unificado – Selva de Matavén*. It is a public entity of a special nature with legal status, with own assets and administrative autonomy. It has the capacity to acquire, to own and to dispose of property, to accept donations, to hold national and international conventions, scientific and cultural exchanges and generally, to celebrate all kinds of negotiations and agreements with which the Association can achieve its objectives.

The main objective of the Association is to foster the integral development, social and cultural preservation of the indigenous communities in the Matavén Jungle and to consolidate the territory, self-government by partners, the defense, conservation and preservation of the environment and biodiversity of the Matavén Jungle.

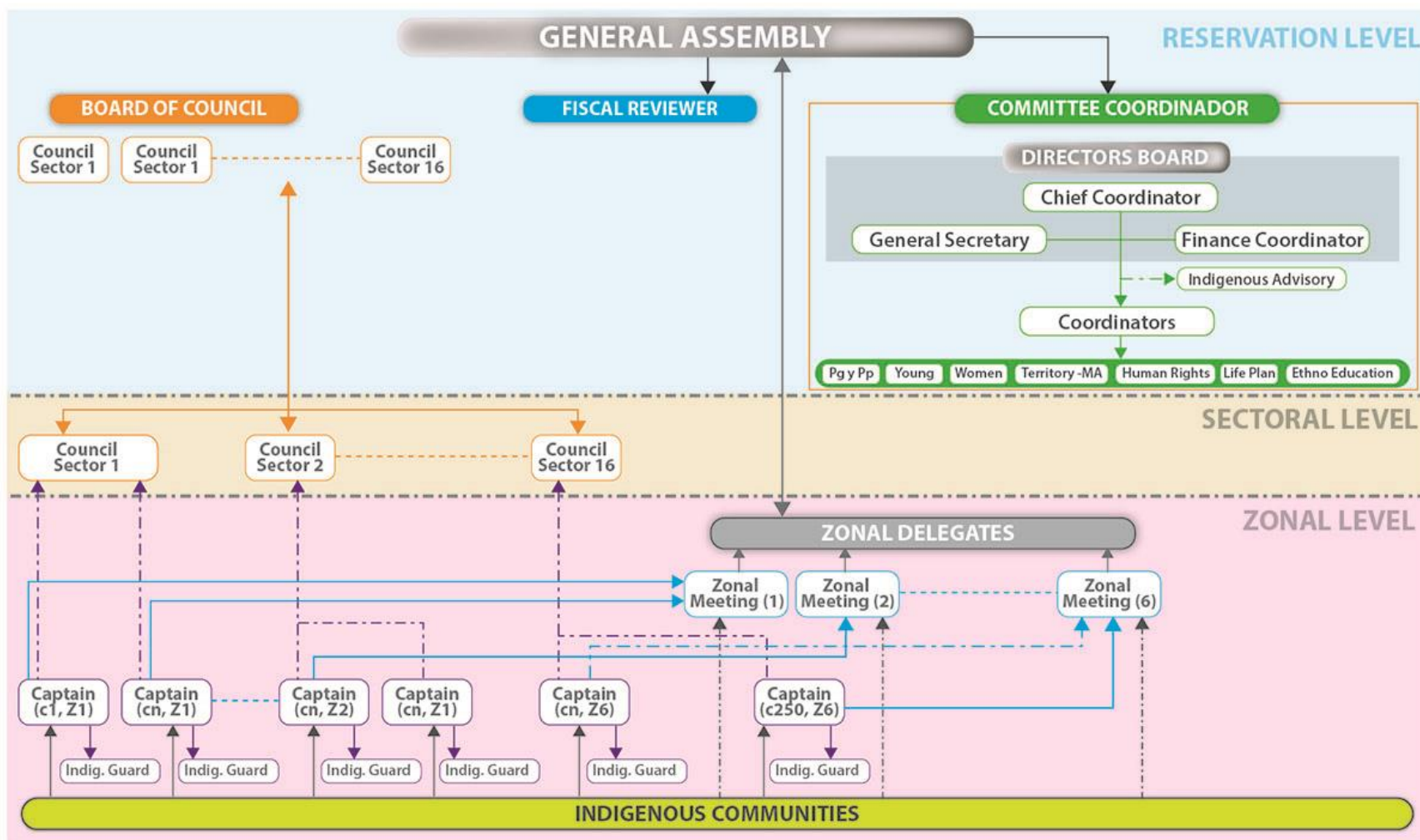
By Resolution No. 0177 of December 9th, 2002, issued by the *Departamento de Asuntos Indígenas, Minorías y ROM* of the *Ministerio del Interior y de Justicia (MinInterior)*, the constitution of the *Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén – "ACATISEMA"* was enrolled and recorded, with jurisdiction in the departments of Guainía and Vichada. Tax Identification Number is 842000174-8.

Annex 2 of PDD "Information about ACATISEMA and the *Resguardo Indígena Unificado – Selva de Matavén*" contains legal, statutory and organizational information related to ACATISEMA and legal and organizational information about the RIU-SM.

The following diagram illustrates the organizational structure of ACATISEMA.

⁶ PDD, page 27

Illustration 4. Organizational structure of ACATISEMA



Source: REDD+ Project RIU-SM

This composition and organization is outlined in the diagram indicating the zonal, sector level and related to the Reservation. Three Management Entities are: The General Assembly, the Coordinator Committee and the Board of Sector Councils. The diagram indicates the form of composition and hierarchical relationships between these entities indicated by the arrows. The details of this organization may be revised in ACATISEMA Statutes on the above points. Annex 2 of PDD is related to information of ACATISEMA and *Resguardo Indígena Unificado – Selva de Matavén*.

1.3.2 MEDIAMOS F&M S.A.S.⁷

Contact person	Francisco Quiroga Zea
Title	Legal Representative - General Manager
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Telephone	(57) 3136041582
Email	mediamosfym@hotmail.com

MEDIAMOS F&M S.A.S. is a Colombian company founded by Deed No. 1555 on May 12th, 1999 of Notary Sixth of Cali, registered at the Chamber of Commerce on May 26th, 1999 under No. 3589 of Book IX, with commercial registration No. 511356-16 on May 26th, 1999 and domiciled in the city of Cali. Tax Identification Number is 805017493-2.

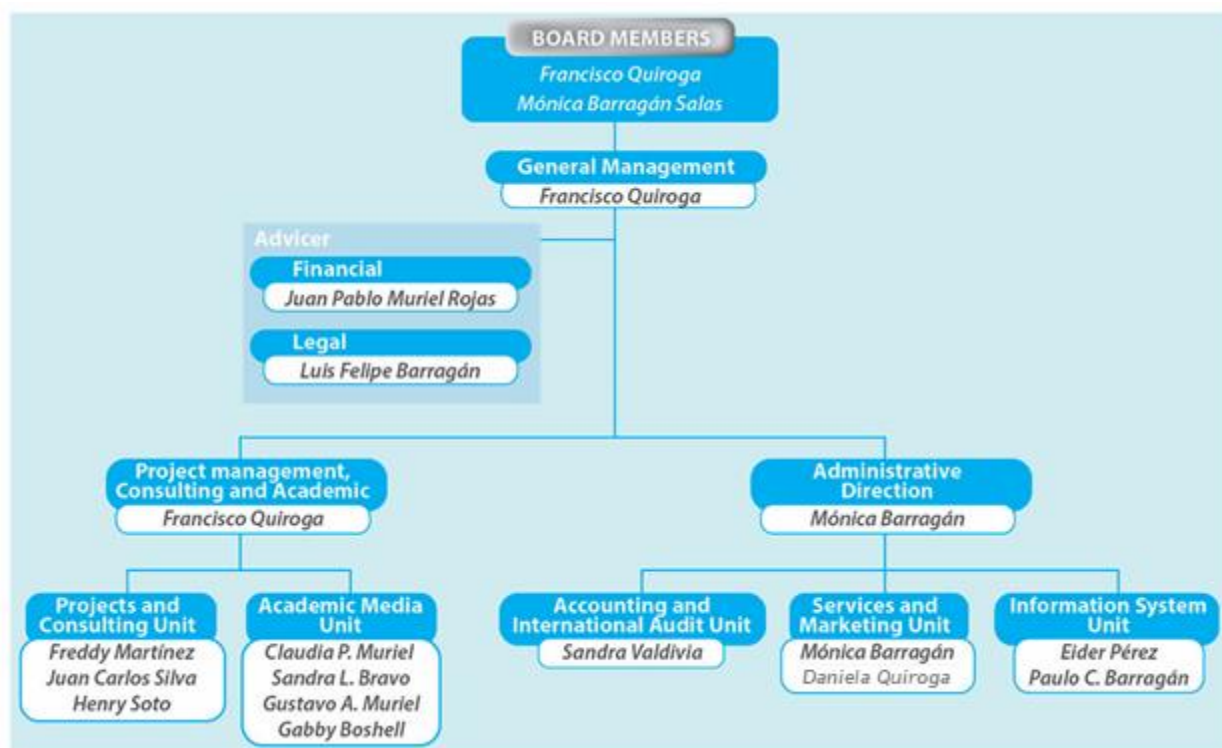
Its social objective is to develop environmental and educational activities, in areas of consultancy, research, development of environmental and productive projects, innovation and technology transfer, including in these structuring, development and marketing of projects that generate reductions of greenhouse gases (GHGs) under any standard of voluntary or compliance market, in particular, projects of Reduction of Emissions from Degradation and Deforestation avoided under the REDD+ scheme.

In the implementation of its social objective, the company may be associated with other natural or legal persons performing the same or similar object or related directly or indirectly with it, and in general can celebrate all kinds of contracts suitable for achieving its social objective.

Annex 3 of PDD contains MEDIAMOS F&M S.A.S. legal, statutory and organizational information.

The diagram below illustrates the organizational structure of MEDIAMOS F&M S.A.S.

⁷ PDD, page 30

Illustration 5. Organizational structure of MEDIAMOS F&M S.A.S.

Source: REDD+ Project RIU-SM

1.4 Other Entities Involved in the Project ⁸

There are no other entities involved in the REDD+ Project RIU-SM.

1.5 Project Start Date ⁹

The project start date was January 1st, 2013.

Project activities began on January 1st, 2013, with the implementation of the Management Plan of Lands and Forests, where this is to reduce deforestation and the consequently generation of greenhouse gases.

This initiation of activities was agreed by ACATISEMA and MEDIAMOS on December 1st, 2012, according to the signed agreement of July 22nd, 2012, and minutes accepted by Omar Briceño and Monica Barragán, who were legal representatives of the two entities (in 2012), in the Inírida city - Guainía. This minutes is attached (Annex 1.4.6 of PDD).

⁸ PDD, page 31

⁹ PDD, page 37

1.6 Project Crediting Period¹⁰

REDD Project crediting period

Start: January 1st, 2013

End: December 31st, 2042

Total number of years: 30 years

Communication addressed by the Board of the Association and the Board of Councils of ACATISEMA, about life and the crediting period of the project. (Annex 2.1.13 of PDD)

"The Association Directive Board and the Cabildos Board of ACATISEMA communicate to all members of different ethnic groups, regions, sectors and communities of the reservation that according to the design of the project with the company MEDIAMOS and knowing the different socialization and training workshops, the project cycle and accreditation period is 30 years.

The different documents and, in particular, the PDD (Project Description Document) shall record this joint decision by ACATISEMA and MEDIAMOS, which is also included in the Strategic Partnership Agreement for the Protection, Conservation and Recovery of Natural Forest of Resguardo Indígena Unificado – Selva de Matavén.

For the record, this document is signed by the General Coordinator of ACATISEMA,

Omar Augusto Briceño Chipiaje

ID. 18.262.305

Date at which the Project baseline will be revised: Each 10 years.

Duration of Monitoring Period: The first period will be annual, and the following periods will be biennials.

The first period annual: 2013.

The second period biennial: 2014-2015.

The third period biennial: 2016-2017, and so successively.

Current monitoring start date: 1st January 2016.

Current monitoring end date: 31st December 2017.

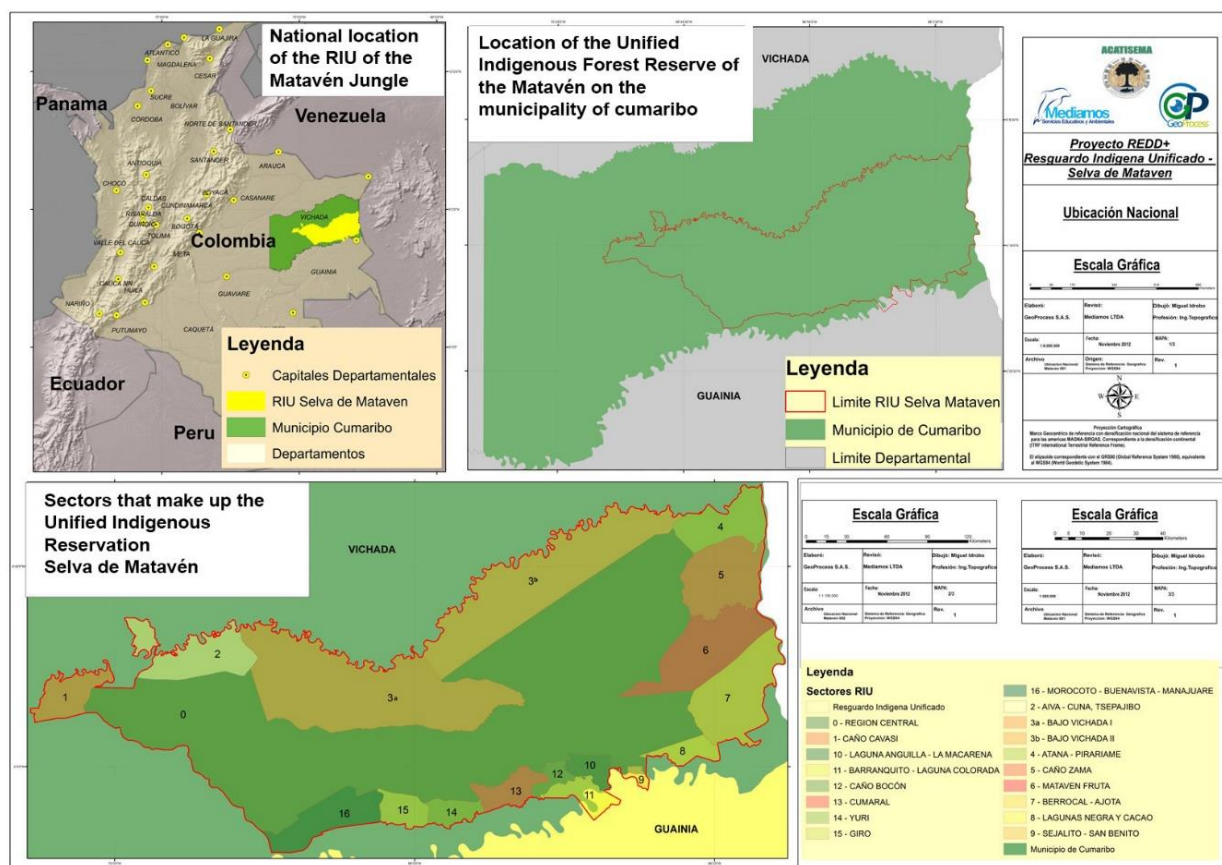
¹⁰ PDD, page 38

1.7 Project Location ¹¹

1.7.1 Location

Resguardo Indígena Unificado – Selva de Matavén (RIU-SM) is located east of the Colombian Orinoco high plain, at the eastern end of the Department of Vichada, municipal jurisdiction of Cumaribo (Illustration 6), between the following geographical coordinates: North: 4°56'23 'N - 3°45'48"N and 70°16'50"W - 67°46'W.

Illustration 6. Geographical location of the *Selva de Matavén*



Source: REDD+ Project RIU-SM - GIS

1.7.2 Geographic boundaries

Vichada River borders the north, Guaviare River to the south, *Orinoco* River to the east and Creek *Chupabe* to the west. It is hydrographically located in the lower basin of Creek *Matavén*. By physiographic and geological characteristics, the Project Area (PA) is part of the western edge of the *Escudo Guayanés* and corresponds to the Matavén Jungle.

¹¹ PDD, page 60

It belongs to the Colombian Orinoco region and is one of its four sub-regions called Transition Fringe between the Orinoco and Colombian Amazon, coinciding with the natural boundary of the transition among natural savannas of the Orinoco and the Amazon rainforest.

The spatial and geographic boundaries of the project will be presented in Section 2.3 of PDD.

The description of biomes and their characteristics will be presented, likewise, in Section 2.3 of PDD.

The following Table 3 presents areas of geographic and spatial limits of REDD+ Project [Project Area (PA) Leakage Belt (LB) and the Reference Regions (RRD and RRL)].

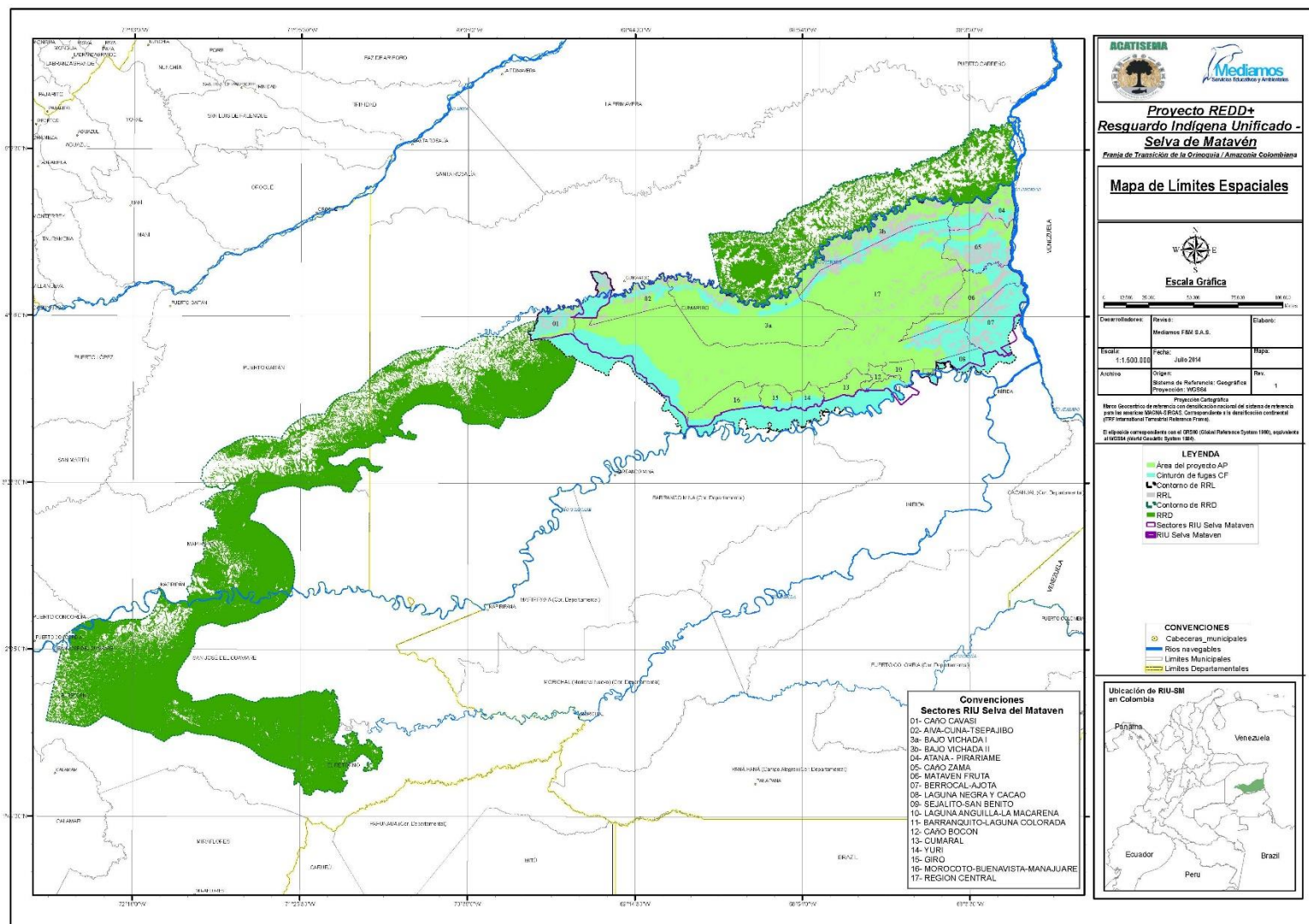
Map 1 shows all Spatial boundaries of the REDD+ Project RIU-SM (RRD, PA, LB, RRL) and map 2 shows specifically the Project Area (PA), Leakage Belt (LB) and RRL.

Table 3. Project Area (PA) Leakage Belt (LB) of the Reference Regions (RRD and RRL)

Space limit	Area (has)	Space limit	Area (has)
PA	1,150,212	RRD	1,444,805
LB	486,211	RRL	2,028,439

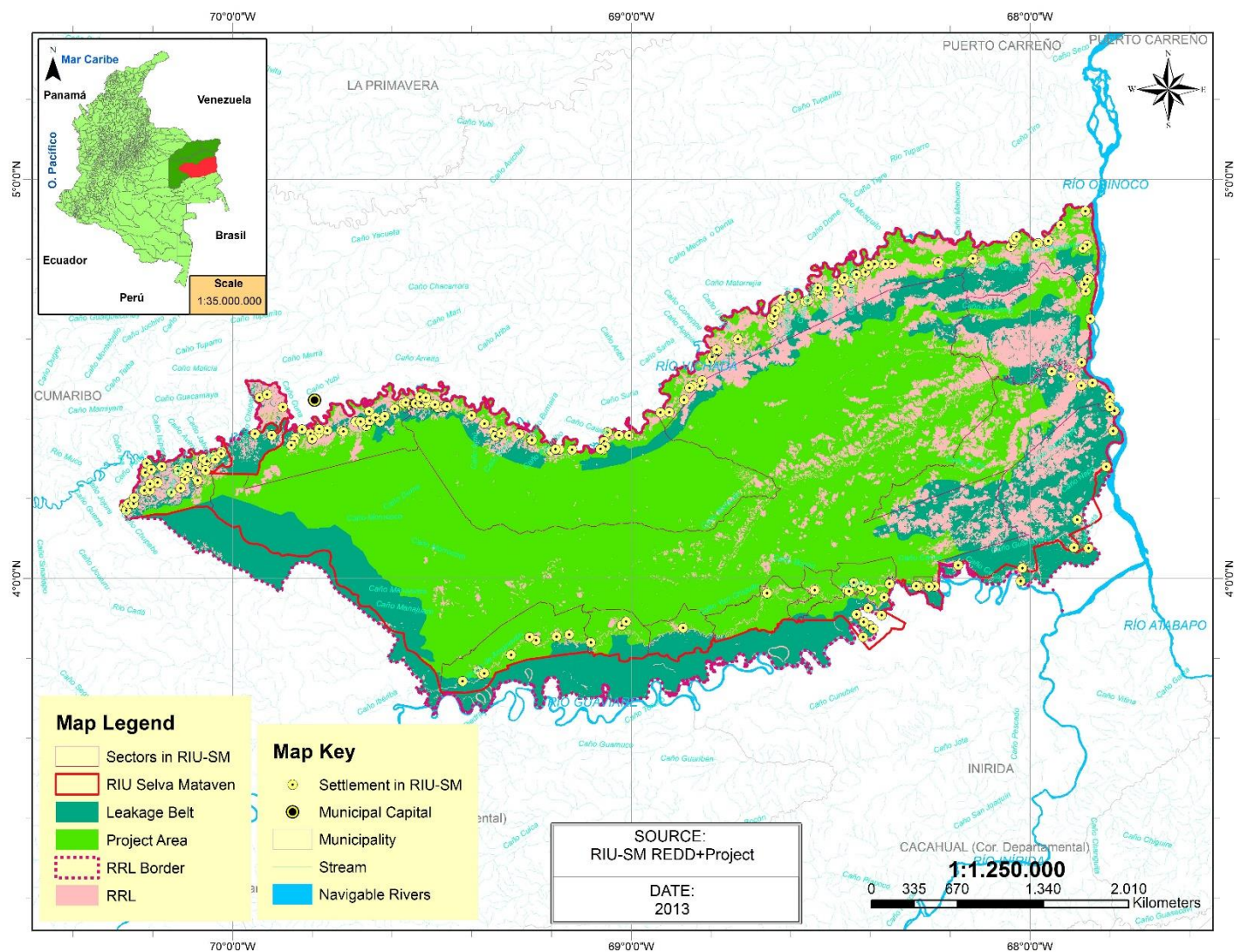
Source: PDD, page 60

Map 1. Spatial boundaries of the REDD+ Project RIU-SM



Source: REDD+ Project RIU-SM – GIS (for more details, see file “map1_RRD_PA_LB_RRL.pdf” in folder “general_maps”)

Map 2. Project Area (PA), Leakage Belt (LB) and RRL



Source: REDD+ Project RIU-SM – GIS (for more details, see file “map2_boundaries_PA_LB.pdf” in folder “general_maps”)

1.7.3 *Resguardo Indígena Unificado – Selva de Matavén (RIU-SM)*¹²

The Project Area consists of 17 sectors corresponding to ancient indigenous reservations, which are now called *Resguardo Indígena Unificado – Selva de Matavén (RIU-SM)*, according to Resolution 037 of July 2003 of the *Instituto Colombiano de Reforma Agraria (INCORA)*¹³, with a total area of 1,856,836 hectares and which are part of the following sectors: (1) *Cawasi*, (2) *Aiwa Cuna Tsepajivo y Warracaña*, (3) *Río Vichada I*, (4) *Río Vichada II*, (5) *Mataven Fruta*, (6) *Atana Pirariami*, (7) *Berrocal-Ajota*, (8) *Caño Zama*, (9) *Laguna Negra y Cacao*, (10) *Laguna Anguilla-La Macarena*, (11) *Caño Bocón*, (12) *Yuri*, (13) *Giro*, (14) *Morocoto-Buenavista-Manajua*, (15) *Cumaral*, (16) *Barranquito-Laguna Colorada* and (17) *Sejalito-San Benito*.

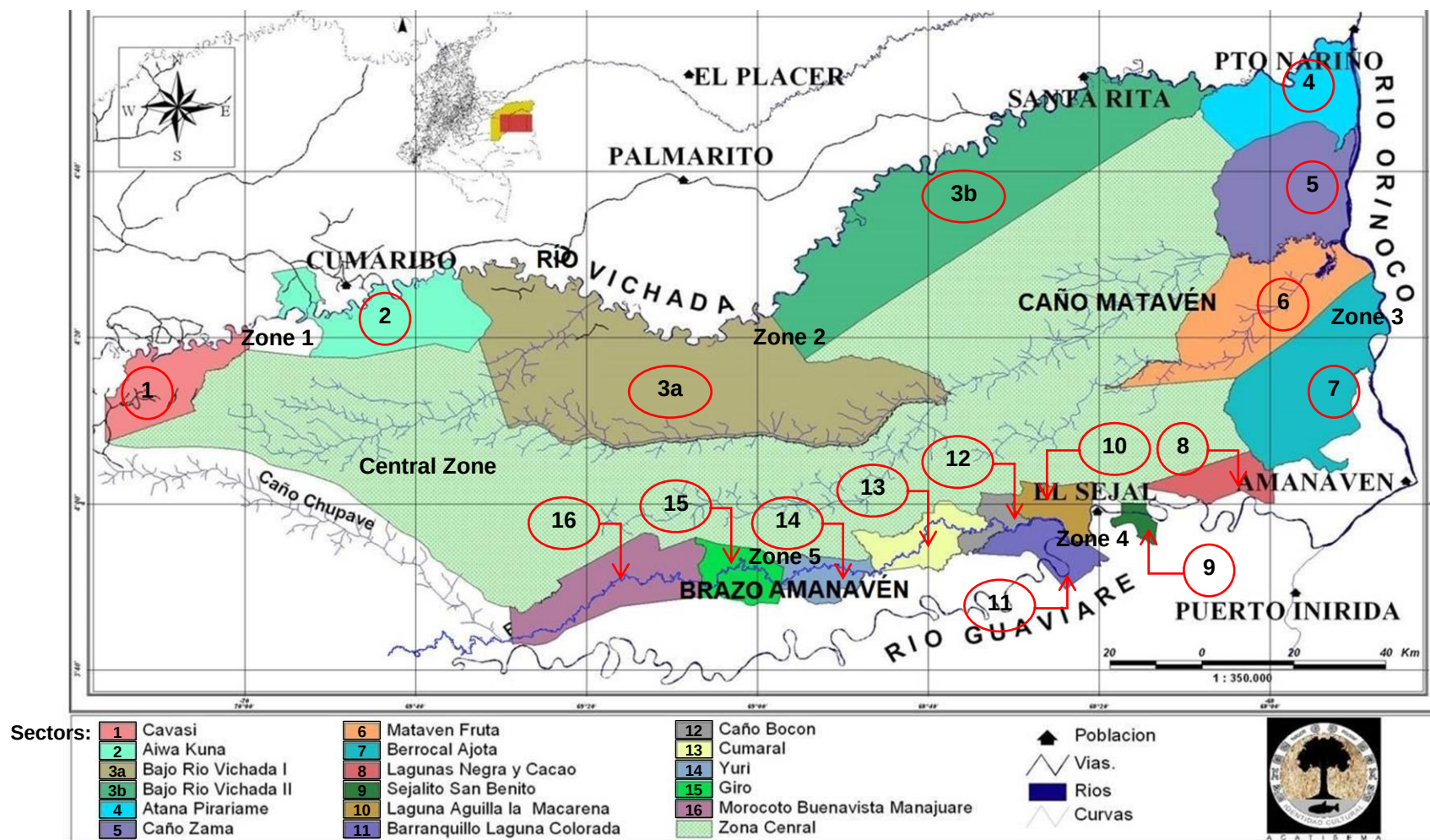
The Map 3 shows the territorial distribution of the RIU-SM according to sectors and areas. This distribution is the basis of the technical and administrative organization of the Project.

Table 4 shows the distribution of area, ethnic groups, population, communities and families of RIU-SM by the sectors.

¹² PDD, page 60

¹³ Annex 2.2.1 of PDD. Also available in http://siatac.co/c/document_library/get_file?uuid=130cb9da-4054-4063-9b58-fde4ec0f5b3d&groupId=762

Map 3. Territorial Division of RIU-SM according to sectors



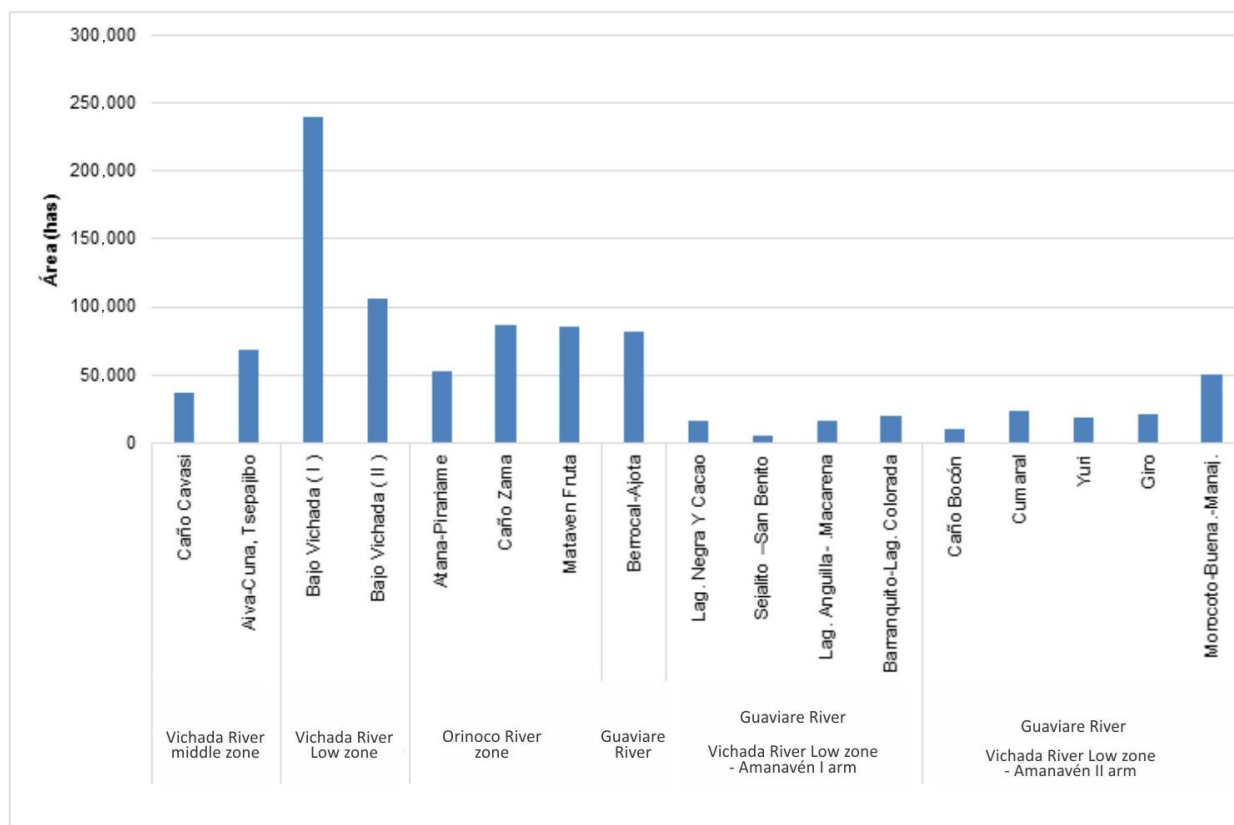
Source: PDD, page 62

Table 4. Distribution area, ethnic groups, population, communities and families of RIU-SM by the sectors

#	Sectors	River	Area (ha)	Ethnic(s)	Population	Communities	Families
ZONE 1 MEDIA RÍO VICHADA							
1	Caño Cavasi	Vichada	36,229	Sikuani	3,480	44	323
2	Aiva-Cuna, Tsepajibo	Vichada	68,861	Sikuani	1,259	25	366
	Subtotal		105,090		4,739	69	689
ZONE 2 BAJO RÍO VICHADA							
3a	Bajo Vichada I	Vichada	239,607	Sikuani	4,212	46	444
3b	Bajo Vichada II	Vichada	105,798	Sikuani		52	475
	Subtotal		345,405		4,212	98	919
ZONE 3 RÍO ORINOCO							
4	Atana-Pirariame	Orinoco	52,335	Sikuani, Piaroa	418	15	106
5	Caño Zama	Orinoco	86,552	Piaroa	50	3	29
6	Matavén Fruta	Orinoco	85,181	Piaroa	152	5	55
7	Berrocal-Ajota	Guaviare	82,302	Piaroa, Puinave	450	8	110
	Subtotal		306,371		1,070	31	300
ZONE 4 BAJO RÍO GUAVIARE - Brazo de Amanavén I							
8	Lagunas Negra y Cacao	Guaviare	16,285	Curripaco, Cubeo, Puinave	321	4	71
9	Sejalito –San Benito	Guaviare	4,669	Sikuani, Piapoco	293	5	77
10	Laguna Anguilla- La Macarena	Guaviare	15,869	Sikuani	516	11	128
11	Barranquito-Laguna Colorada	Guaviare	19,542	Sikuani	421	9	108
	Subtotal		56,365		1,551	29	384
ZONE 5 BAJO RÍO GUAVIARE - Brazo de Amanavén II							
12	Caño Bocón	Guaviare	10,341	Puinave	53	2	24
13	Cumalar	Guaviare	23,636	Piaroa	256	2	17
14	Yuri	Guaviare	18,522	Piapoco	103	1	14
15	Giro	Guaviare	20,619	Piapoco	263	4	22
16	Morocoto-Buenavista-Manajure	Guaviare	49,617	Puinave	567	14	148
	Subtotal		122,735		1,242	23	225
	Subt, Sectores		935,965		12,814	250	2,517
Central Zone		Caño Matavén	920,871				
	TOTAL		1,856,836				

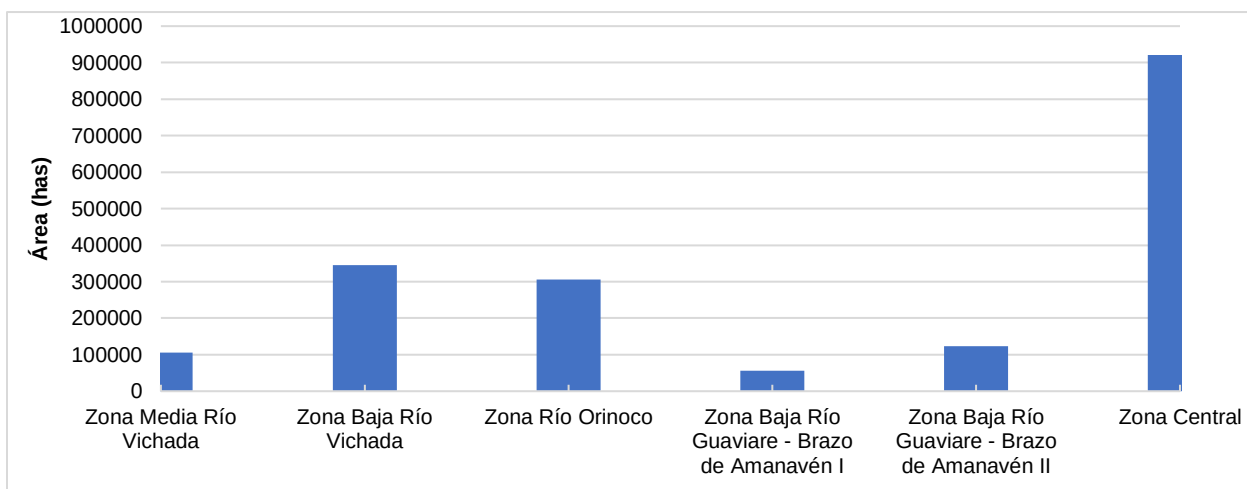
Source: Zones, Sectors and Ethnic Groups by ACATISEMA / Resolution 037, 2003; Area by cartography of the REDD+ Project RIU-SM; Population by Corporinoquía 2012; Communities and Families by socioeconomic survey carried out in the REDD+ Project RIU-SM

Illustration 7. Graph of the distribution of the RIU-SM by sectors and areas



Source: PDD, page 64

Illustration 8. Graph of the distribution of the RIU-SM areas by Central Zone



Source: PDD, page 64

1.8 Title and Reference of Methodology

Verified Carbon Standard (VCS) Program, version 3, 2015

In the following Table 5, the methodology and modules applied in the design and implementation of REDD+ project RIU-SM are presented.

It meets the requirements in VCS VM0007 REDD Methodology Framework (REDD-MF), Table 3 - Avoiding Unplanned Deforestation / Degradation. In the last column of the table below these requirements and their application in the REDD + Project RIU-SM are shown.

Justification and documentation is provided in the relevant sections of the PD and the respective Annexes.

Table 5. Methodology and modules applied. REDD+ RIU SM Project

Title	Reference	Version	Date	Requirements (*)	Applicability RIU-SM		
					A	NA	
METHODOLOGY							
REDD Methodology Modules	REDD-MF	VM0007	1.5	9 March 2015	M	X	
MODULES							
Carbon Pools							
Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools	CP-AB	VMD0001	1.1	11 October 2013	M	X	
Estimation of carbon stocks in the dead-wood pool	CP-D	VMD0002	1.0	11 October 2013	(m) ³		X
Estimation of carbon stocks in the litter pool	CP-L	VMD0003	1.0	11 October 2013	O		X
Estimation of stocks in the soil organic carbon pool	CP-S	VMD0004	1.0	11 October 2013	O	X	
Estimation of carbon stocks in the long-term wood products pool	CP-W	VMD0005	1.1	20 November 2012	(m) ¹		X
Baseline							
Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation and planned degradation	BL-PL	VMD0006	1.2	3 May 2013	-		X
Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation	BL-UP	VMD0007	3.2	3 May 2013	M	X	
Estimation of baseline emissions from forest degradation caused by extraction of wood for fuel	BL-DFW	VMD0008	1.0	11 October 2013	-		X
Estimation of baseline carbon stock changes and greenhouse gas emissions in ARR project activities on peat and mineral soil	BL-ARR	VMD0041	1.0	9 March 2015	-		X
Estimation of baseline soil carbon stock changes and greenhouse gas emissions in peatland rewetting and conservation project activities	BL-PEAT	VMD0042	1.0	9 March 2015	-		X

Title	Reference		Version	Date	Requirements (*)	Applicability RIU-SM	
						A	NA
Leakage							
Estimation of emissions from activity shifting for avoided planned deforestation	LK-ASP	VMD0009	1.2	9 March 2015	-		X
Estimation of emissions from activity shifting for avoided unplanned deforestation	LK-ASU	VMD0010	1.1	9 March 2015	M	X	
Estimation of emissions from market-effects	LK-ME	VMD0011	1.1	9 March 2015	(m) ¹		X
Estimation of emissions from displacement of fuelwood extraction	LK-DFW	VMD0012	1.0	11 October 2013	-		X
Estimation of emissions from displacement of pre-project agricultural activities	LK-ARR	VMD0043	1.0	9 March 2015	-		X
Estimation of emissions from ecological leakage	LK-ECO	VMD0044	1.0	9 March 2015	-		X
Emissions							
Estimation of greenhouse gas emissions from biomass and peat burning	E-BPB	VMD0013	1.1	9 March 2015	M	X	
Estimation of emissions from fossil fuel combustion	E-FFC	VMD0014	1.0	11 October 2013	O		X
Estimation of direct N ₂ O emissions from nitrogen application	E-NA	[CDM tool]	1.0	3 October 2013	(m) ⁴		X
Monitoring							
Methods for monitoring of greenhouse gas emissions and removals	M-MON	VMD0015	2.1	20 November 2012	M	X	
Methods for monitoring greenhouse gas emissions and removals in ARR project activities on peat and mineral soil	M-ARR	VMD0045	1.0	9 March 2015	-		X
Methods for monitoring of soil carbon stock changes and greenhouse gas emissions and removals in peatland rewetting and conservation project activities	M-PEAT	VMD0046	1.0	9 March 2015	-		X
Miscellaneous							
Methods for stratification of the Project area	X-STR	VMD0016	1.1	9 March 2015	M	X	
Estimation of uncertainty for REDD Project activities	X-UNC	VMD0017	2.1	9 March 2015	M	X	
Tools							
Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities	T-ADD	[CDM Combined Tool]	3.0	1 February 2012	M	X	
Tool for testing significance of GHG emissions in A/R CDM Project activities	T-SIG	[CDM Tool]	1	04 May 2007	M	X	
VCS AFOLU Non-Permanence Risk Tool	T-BAR	[Procedural Document]	3.3	19 October 2016	M	X	

Conventions:

(*) Avoiding Unplanned Deforestation/ Degradation

M: Modules marked with an M are fully mandatory: the indicated modules and tools must be used

O: Modules marked with an O are fully optional: the indicated pools and sources can be included or excluded as decided by the Project but if included in the baseline they must also be in the Project scenario.

(m)¹ Mandatory where the process of deforestation involves timber harvesting for commercial markets

(m)³ Mandatory if this carbon pool is greater in baseline (post-deforestation/degradation) than project scenario and significant; otherwise can be conservatively omitted.

(m)⁴ Mandatory where leakage prevention activities include increases in the use of fertilizers

Source: PDD, page 123

1.9 Other Programs

1.9.1 Emission Trading Programs and Other Binding Limits

The Project REDD+ RIU-SM has not any emission reductions generated by the Project Area (PA) as a part of an Emissions Trading Program or other binding limit.

1.9.2 Other Forms of Environmental Credit

The Project REDD+ RIU-SM has not tried to issue emission reductions from any way of environmental credits.

1.9.3 Participation under Other GHG Programs

DECLARATION

The subscribed Legal Representatives of the organizations of the Strategic Alliance: *Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén* (ACATISEMA) and *MEDIAMOS F&M S.A.S.*, that constitute the "Project Proponents" of the "REDD+ Project *Resguardo Indígena Unificado - Selva de Matavén* (RIU-SM)", with Registration ID VCS PD 1566 (VCS Project Database <http://www.vcsprojectdatabase.org/#/home>) and APX -VCS Registry VCSR1235 (<https://vcsregistry2.apx.com/myModule/rpt/myrpt.asp?r=111>), are declaring that for the period of verification 2016-2017 the Project has not participated or registered under another GHG program.

For constancy, we are signing on the 24th day of the month of September, 2018:

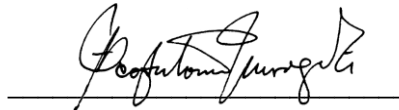


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Legal Representative

MEDIAMOS F&M S.A.S.

1.9.4 Impacts of Articles 40 and 41 of Resolution 1447/2018 on the Project

First it is necessary consider what refers to **Article 41 "Establishment of baselines for REDD+ Projects"**.

Article 41 is applicable to the REDD+ Project RIU-SM about the requirement that the holder of the same *"will must establish its baseline based on the most updated FREL that has been formally submitted by Colombia and evaluated by the UNFCCC ..."*.

However, because the REDD+ Project RIU-SM validated its baseline according to the "VCS PROJECT REVIEW REPORT" issued by VCSA on June 28, 2017, prior to the issuance of Resolution 1447 that came into force on August 02, 2018, applies *"parágrafos"* 1 and 2 of this Article 41:

- According to **"parágrafo" 1**, the REDD+ Project RIU-SM should comply with "the provisions of Article 40 regarding the Maximum GHG Mitigation Potential object to national accounting of emission reduction and GHG removal for the period between January 2016 and December 2019, for REDD+ activities and carbon deposits included in the FREL submitted by Colombia to the UNFCCC", that is, for the present verification of results of years 2016 and 2017 of the REDD+ Project RIU-SM, the **Article 40 would be applicable**, about which an expansion will be made later.
- According to **"parágrafo" 2**, the REDD+ Project RIU-SM should adjust and validate its baseline based on the most updated FREL to carry out the verification of emission reductions and GHG removals generated from January 2020 onwards.

In conclusion, for the present verification of years 2016 and 2017 of the REDD+ Project RIU-SM, Article 40 would apply, as well as for the verifications of the years 2018 and 2019; that is, the adjustment and validation of the baseline of the REDD+ Project RIU-SM based on the most updated FREL for all these years 2016, 2017, 2018 and 2019 are not required, but they will be a requirement for future verifications from January 2020.

As the application of Article 41 to the REDD+ Project RIU-SM is already clarified, now the application of **Article 40 "Maximum potential for GHG mitigation"** will be considered.

According to *"parágrafo"* 1 of Art. 41, because the REDD+ Project RIU-SM validated its baseline before the issuance of Resolution 1447/2018, the Project must comply with the provisions of Article 40 about the Maximum GHG Mitigation Potential (MMP) for the period between January 2016 and December 2019, that is, for the present verification of results of years 2016 and 2017 of the REDD+ Project RIU-SM, the maximum mitigation potential would be applied.

As previously stated, the RENARE Technological Platform and its Technical Guide to date, today January 9, 2019, is not available to users yet; consequently, when the operation of the platform begins, the *Ministerio de Ambiente y Desarrollo Sostenible* must establish the Maximum GHG Mitigation Potential applicable to the Project for the results of the present verification of years 2016 and 2017, that is, the determination of this Maximum GHG Mitigation Potential does not depend on the Project. Its future application will be done by the Project as specified by the *Ministerio de Ambiente y Desarrollo Sostenible*, in an official communication dated October 8, 2018 (Annex 14: some aspects about application of Resolution 1447, 2018, which in two of its subsections says -Numeral 6. Article 40, folio 6-):

"6. Article 40, Maximum GHG mitigation potential for REDD+ Projects, object to national accounting.

...

In case of referring to results accounted above the maximum GHG mitigation potential, based on a project baseline validated prior to the issuance of Resolution 1447/2018 in the validity periods between 2016-2019, these may be used for the purposes of mitigation different to the national goals in climate change and although they must be registered, they will not be part of the national accounting.

In addition to what is described in the previous paragraph and taking into account that Article 40 states that for purposes of accounting for GHG emissions reduction and removal, only those GHG mitigation results will be valid if, in addition to being verified and registered in RENARE, they are included in the maximum GHG mitigation potential object of said national accounting. Consequently, the interpretation according to which the mitigation results that are above the calculated maximum GHG mitigation potential can be marketed and cancelled in other mechanisms different to those established by the National Government is correct. Thus, although they must also be registered in RENARE, these surpluses do not count for national accounting nor for payments for results or similar compensations that have been established by the National Government."

In conclusion, the Maximum GHG Mitigation Potential for the present verification of results of years 2016 and 2017 of the REDD+ Project RIU-SM will be determined by the *Ministerio de Ambiente y Desarrollo Sostenible* as soon as the RENARE Technological Platform be put in operation, and its application will make by the Project according to the specifications presented in the two previous paragraphs.

1.10 Sustainable Development

In the PDD, section 1.11, the main set of laws and regulatory frameworks that specify the priorities established at the national level for the country's sustainable development were presented.

The National Government considers as a key strategy to develop REDD projects in Colombia, as defined by the *Consejo Nacional de Política Económica y Social* (National Council for Economic and Social Policy) approved as CONPES Document 3700 "*Estrategia Institucional para la articulación de políticas y acciones en materia de cambio climático en Colombia*" (Institutional Strategy for Policy Coordination and Action on Climate Change in Colombia) (CONPES, 2011), four routes for critical work or actions achieve sustainable national development by reducing the negative impacts generated by climate change.

These routes work were reflected in the *Plan Nacional de Desarrollo PND 2010-2014* (National Development Plan) (Law 1450, 2011) (Congreso de Colombia, 2011) and in the *Plan Nacional de Desarrollo PND 2014-2018* (Law 1753, 2015) (Congreso de la República, 2015):

- *Plan Nacional de Adaptación al Cambio Climático – PNACC* (National Plan for Adaptation to Climate Change, as mandated by the Law 1450, 2011 in its Article 217 - *PND 2010-2014*) (DNP, 2011).
- *Estrategia Colombiana de Desarrollo Bajo en Carbono – ECDBC* (Colombian Strategy Low Carbon Development) (MADS, 2011).
- *Estrategia Nacional de Reducción de Emisiones por Deforestación y Degradación Forestal – ENREDD+* (National Strategy for Reducing Emissions from Deforestation and Forest Degradation) (MADS, 2011).
- *Estrategia de Protección Financiera ante Desastres* (Strategy for Disaster Financial Protection).

(The last of the four routes is reflected in the National Development Plan PND 2010-2014, while in the PND 2014-2018 is considered as *Fondo de Adaptación* (Adaptation Fund) (Decree-Law 4819, 2010)

(Minhacienda, 2010) as part of *Sistema Nacional de Gestión del Riesgo de Desastres* (National System of Disaster Risk Management)").

The REDD+ Project RIU-SM, with 5 years of implementation (2013-2017) and what is going in year 2018, has contributed to the first three work routes indicated above, and especially in the third route "National Strategy for Reducing Emissions from Deforestation and Forest Degradation" (ENREDD+) (MADS, 2011). The Project contributes specifically to achieving the goals of reducing deforestation and forest degradation in the transition zone of the colombian Orinoquía-Amazonía.

Illustration 9. Children of the Matavén Forest, Sector Cumaral – RIU-SM, November, 2017



Likewise, as established in the *Plan Nacional de Desarrollo 2014-2018* (National Development Plan 2014-2018), Law 1753 (Congreso de la República, 2015), in its Article 171, Chapter VI: Green Growth:

"Article 171. Deforestation of natural forests. The Ministry of Environment, Housing and Territorial Development will develop a national policy to combat deforestation which contains an action plan aimed at ending the loss of natural forests by 2030. This policy will include provisions to substantively link to the sectors that act as drivers of deforestation, including the productive chains that use the forest and its derivatives".

As in the PDD was established, the particular Project activities (PDD, page 54) (referred to section 1.8 Matrix of Logic Structure, MLS), that have been implemented and consolidated during the five and a half year of execution, have been contributing to achieve the Development Objective and the Specific Objective (PDD, pages 45 and 46), which are fully consistent with national priorities regarding the reduction of deforestation and degradation of natural forests.

And, of course, it contributes to what is established in the *Plan Nacional de Desarrollo 2010-2014* (National Development Plan 2010-2014). Law 1450 of June 16, 2011 (Congreso de Colombia, 2011) about biodiversity:

Regarding biodiversity, the DNP in Chapter VI "Environmental sustainability and risk prevention", looked at the need to pursue actions to:

- a. *Strengthen the protection and restoration of biodiversity and eco systemic services.*
- b. *Risk management for losing biodiversity and ecosystemic services.*
- c. *Strengthen sustainable use of biodiversity for competitiveness and economic and social growth.*

And what is established in the *Plan de Acción en Biodiversidad de la Cuenca del Orinoco - Colombia* (Biodiversity Action Plan Orinoco Watershed - Colombia) (Correa, Ruiz, & Arévalo, 2005).

"Vision: In 10 years, there will be greater awareness of biodiversity in the Orinoco and increased the processes of conservation and sustainable use; human groups are more aware of the biological and cultural wealth for the improvement of their living conditions".

Finally, it contributes to the purpose of "Technical and Scientific Institutional Capacity to Support Reduce Emissions from Deforestation and Degradation Projects (REDD) in Colombia" ¹⁴.

As established by the VCS standards on monitoring and reporting, the REDD+ Project carries out the monitoring plan (PDD, section 4.3, page 265) and performs the corresponding record by monitoring the established parameters and variables (PDD, section 4.2, page 247), particularly on the reduction of GHG emissions generated by deforestation in the Project Area and the Leakage Belt in the RIU-SM. A first report on the monitoring of results for the years 2013, 2014 and 2015 was presented in 2016, and now this second monitoring report is presented according to the results for the years 2016 and 2017.

It is necessary to highlight that in the country two important decrees were issued that specify measures on priorities of sustainable development that were previously stated.

- The **Decree 870 of 2017** issued by the *Ministerio de Ambiente y Desarrollo Sostenible (MADS)* (Ministry of Environment and Sustainable Development) (MADS, 2017), *por el cual se establece el Pago por Servicios Ambientales y otros incentivos a la conservación* (by which establishes the Payment for Environmental Services and other incentives for conservation), the recognition for the provision of environmental services is ratified and consolidated in its recitals, giving a special valuation of cultural and spiritual intangibles, and protecting the social interest, systems of sustainable food production and silvopastoralism, reforestation, peasant reserve zones (ZRC), indigenous territories and in general, other forms of organization of the rural population and of the sustainable peasant economy.

Likewise, the free self-determination of indigenous peoples to the concept of indigenous territoriality contemplated in Convention 169 of International Labour Organization (ILO) is ratified, integrated into the block of constitutionality, with the purpose of safeguarding the cultural, administrative and spiritual autonomy of the peoples in relation to their territoriality. In this sense, the incentive of Payment for Environmental Services when dealing with the territories of indigenous peoples and communities, will give special consideration to the cultural and spiritual intangibles that indigenous peoples have interpreted in their own government functions, through the close relationship they have with the natural order and conditions of good living and full life of the indigenous peoples.

¹⁴ During 2002-2009 IDEAM, supported by the Gordon and Betty Moore Foundation, developed the project "Technical and Scientific Institutional Capacity to Support Reduce Emissions from Deforestation and Degradation Projects (REDD) in Colombia" with which the country is preparing to address the demands of REDD through historical knowledge of deforestation and the estimation of potential reserves of carbon stored in aboveground biomass in natural forests of Colombia.

And in its Article 3 mentions about the payment for environmental services in the indigenous territories, that the interpretation and application of this decree in indigenous territories of reservations, ancestral, possessed and / or traditionally used in relation to payment for environmental services, will be governed, in addition to what is established here, under the precepts of greater right, own right and law of origin, and of the environmental functions of the indigenous authorities; as well as the principles of self-determination, autonomy, effective participation and the fundamental right to prior, free and informed consultation; to the identity, social, economic and cultural integrity, the rights over their lands, territories and resources, which imply the recognition of their ancestral territorial practices and their integral plans of life or their equivalents and the block of constitutionality.

The REDD+ Project RIU-SM complies with all the specifications of Decree 870 of 2017 and therefore contributes to this National purpose of developing payments for environmental services and likewise to all justifications and considerations related to sustainable development.

- The **Decree 926 of 2017** issued by the *Ministerio de Hacienda y Crédito Público* (Ministry of Finance and Public Credit) and the *Ministerio de Ambiente y Desarrollo Sostenible (MADS)* (Ministry of Environment and Sustainable Development) (Minhacienda, MADS, 2017), which regulates/establishes regarding the carbon tax and its non-causation for passive subjects who certify being carbon neutral. This decree allows to do effective the non-causation of the national carbon tax through reductions of GHG emissions coming of a GHG mitigation initiative developed in the national territory, such as the REDD+ Project RIU-SM.

The REDD+ Project RIU-SM complies with all the requirements established in this Decree and, therefore, contributes to the development of these provisions that aim to achieve sustainable development priorities at the national level.

In accordance with the above, the REDD+ Project RIU-SM contributes to the goal known as "Nationally Determined Contribution" (NDC), that Colombia adopted as a part of the United Nations Framework Convention on Climate Change (UNFCCC), and which is contained in the "Paris Agreement". The country intends to achieve 20% less emissions than projected in the year 2030, according current trends. Thus, the total estimated emissions in 2030 (335 MtonCO₂-e) is expected to be reduced to 268 MtonCO₂-e (MADS).

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

2.1.1 Operation of the project activity(s) during this monitoring period 2016-2017

REDD+ Project RIU-SM implementation is based on the Matrix of Logic Structure ("MLS", PDD section 1.8, page 45), which includes the developed of activities and tasks defined in Project Design Document (PDD, page 54).

This Project logical structure links objectives, products, activities and tasks (from the general to the particular and specific), as illustrated in the objectives tree (Illustration 9 of PDD, page 44).

In this structure also indicators, means of verification and assumptions associated with each component of the project (objectives and products, PDD pages 45-51) were defined, determining the operation of the Project through activities and tasks (PDD, pages 52-58) .

Based on this logical structure, the Yearly Operating Plans (YOPs) have been defined; to date, 5 YOPs have been defined and executed (2013, 2014, 2015, 2016 and 2017) and the sixth YOP of 2018 is in execution.

Each YPO for each year is systematized and synthesized in a table titled "Annual Program by Activities" that relates products, activities, tasks, indicators, assumptions and monitoring and reporting (see the YPOs for the year 2016 -Annex 3.1 - and for 2017 -Annex 3.2 -, of this Monitoring Report, section 1.2). This table has associated the schedule and the budget of the respective year (sections 1.3 and 2 of Annex 3.1 -YPO 2016- and fo Annex 3.2 -YPO 2017-).

For each executed YPO, the corresponding reports are available. These reports contain a table titled "Progress in implementation of the Activities, Tasks and Outputs achievement" that informs and relates systematically and synthetically the Products, Activities, Tasks developed, Outputs achieved, evidences, start date, date of completion, indicators, assumptions and monitoring and reporting (see Annex 3.3 -Fourth Project Progress Report 2016- and Annex 3.4 -Fifth Project Progress Report 2017-, of this Monitoring Report, section 1.1 of YPO corresponding).

The execution of the corresponding budget is also reported (section 3 of Annex 3.3 -2016- and Annex 3.4 -2017-).

In this way there are 5 YPOs with their corresponding reports for the years 2013, 2014, 2015, 2016 and 2017.

The YPOs and their reports for the years 2013, 2014 and 2015 were presented for the validation and verification process to ICONTEC (as a validating / verifying entity), a process that began on 10/30/2015, obtaining a report from ICONTEC "VALIDATION & VERIFICATION REPORT" dated 03/06/2017 (version 1.3). The ICONTEC issues on 06/12/2016 the "VALIDATION DEED OF REPRESENTATION" y el "VERIFICATION DEED OF REPRESENTATION" (see Table 1 of this Monitoring Report).

Illustration 10. ICONTEC Auditor, Zona 3, January 2016



In the PDD, section 1.1.2 (pages 20-22) "Implementation Status of the Project" was presented on that occasion for the 2013 and 2014-2015 monitoring periods, and in the section 1.1.3 "Developed actions" (page 21) are the actions developed according to the approach and methodology explained above.

ICONTEC, in its report “VALIDATION & VERIFICATION REPORT”, section 3.1.1 “Project scope, type, technologies and measures implemented, and eligibility of the project” (page 20), expresses *“The activities and measures implemented to the date by the project proponent included the monitoring of forest and lands within the project area, the implementation of a communication system among the stakeholders and project developers, the execution of a governance plan, the establishment of family food production units and the execution of training and educational schemes. ICONTEC confirmed the execution of these activities during the site visit”*. Also in section 4.1 “Project Implementation Status” (page 53) ICONTEC expresses *“In general, the project activity has been implemented as described in the PD. ICONTEC has reviewed the monitoring report (Section 7 on PD - Achieved GHG Emission Reductions and Removal) and confirms by means of comparison with the information given in the registered PD, that the project information gathered during the site visit and the description of the implementation status of the project activity is in line with the applicable provisions of the project standard”*.

For this verification period (years 2016 and 2017) regarding the Implementation Status of Project Activities and, in particular for the operation of the project activities, the same approach and methodology explained above is followed. Then it is presented:

YPO year 2016 (Annex 3.1) and its progress report (Annex 3.3) (this Monitoring Report).

YPO year 2017 (Annex 3.2) and its progress report (Annex 3.4) (this Monitoring Report).

Next, the Table 6 is presented, which summarizes the tasks executed during the years 2016 and 2017 and, therefore, the execution of activities, which contribute to the achievement of the products and the Objectives of the Project; special comments are made in which events or situations of importance for the development of the Project and its current implementation status are highlighted. In general, the 8 specific activities of the Project are carried out every year, with the exception of activity A3.1, which refers to the validation, which was executed in 2016 and part of the year 2017; what varies is the intensity of execution of the same, according to the time and status of Project. It is, therefore, important to examine its compliance, adjustments and corrections, when appropriate, and its progress and contribution in terms of products and objectives, based on the indicators presented in the Matrix of Logic Structure (MLS).

Table 6. Products, Activities and Tasks executed during the period 2016-2017

Products	Activities	Executed tasks
Product 1: Measures to reduce the vulnerability of the RIU-SM generated by external factors, designed and implemented.	Activity A1.1: To monitor and to control the conservation and recovery of forests and lands of the RIU-SM.	T1.1.1: Review and adjustment of the design and planning of the surveillance and control of the forests and lands of the RIU-SM to avoid deforestation and degradation. <i>Task already executed in previous years.</i>
		T1.1.2: Train to indigenous leaders and socialize to communities of Indigenous Reservation about: - Threats of forest deforestation and degradation. - Legislation of forest protection. - Environmental knowledge in the surveillance, control and monitoring of the forests and lands of RIU-SM. - Interpretation of GIS. <i>Task already executed in previous years.</i>
		T1.1.3: Implement the routes of surveillance and control of RIU-SM's forests by the indigenous guard.
		T1.1.4: Systematization and divulgation of results about routes of surveillance and control of RIU-SM's forests.
		T1.1.5: Review permanently the early warnings issued by the IDEAM and Corporinoquia on areas that are susceptible to forest fires.
		T1.1.6: Check the set of sample plots.
	Activity A1.2: To develop and to implement a communication and information system at the RIU-SM.	T1.2.1: Design, review and adjustment communication and information systems in RIU-SM. <i>Task already executed in previous years.</i>
		T1.2.2: Implement communication and information systems in RIU-SM.
		T1.2.3: Identify and manage institutional plans and events led by the Government and other institutions related with initiatives of protection of environmental resources in Colombia and compensations by projects of conservation.
		T1.2.4: Support to ACATISEMA to be linked to events concerning Indigenous Associations.
		T1.2.5: Measure the impact that the development and the results of the Project are generating for national and international purpose of climate change mitigating.
	Activity A1.3: To design and to establish a system of governance for development and sustainability of ACATISEMA Association.	T1.3.1: Socialize and train to communities and leaders of RIU-SM. <i>Task already executed in previous years and actually.</i>
		T1.3.2: Management and supervision of the normative and regulatory aspects of ACATISEMA.
		T1.3.3: Strengthen the organization of ACATISEMA in the management and logistic and obtain support to develop meetings, workshops and Ordinary General Meeting of the Association.

Products	Activities	Executed tasks
		T1.3.4: Management of a second phase of Convention No. 310 of 2015 signed between the Ministry of Environment and ACATISEMA. <i>This task was not executed.</i> T1.3.5: Propose that indigenous communities continue with the project activities related with the surveillance, control and conservation of RIU-SM's forests, maintained and extended by ACATISEMA for an additional cycle of 30 years, beyond of current Project cycle. T1.3.6: Propose to improve of ACATISEMA's Statutes and to define a Good Government Code. T1.3.7: Realize a financial audit. T1.3.8: Countersign the Strategic Agreement.
Product 2: Implemented auto-sustainable production system.	Activity A2.1: To establish and to develop a Family Agri-food Production Units System - FAPUS.	T2.1.1: Design, review and adjustment a Family Agrifood Production Units System (FAPUS), whereby arable areas are identified to ensure food of indigenous communities and the quantity of food that they can produce. <i>Task already executed in previous years and actually.</i>
		T2.1.2: Socialize and train to people of communities and leaders of RIU-SM in application of techniques to manipulate GIS, data, documents and computing equipment, also new ways to improve the use of land. <i>Task already executed in previous years and actually.</i>
		T2.1.3: Implement the FAPUS and, consequently, the management plan of lands and forests in RIU-SM, like a pilot project.
		T2.1.4: Implement a survey to realize a social and economic characterization of the population of RIU-SM and to evaluate and complement the Plan of family food production to 2014 and 2015. <i>Task already executed in previous years, and currently a census is carried out.</i>
	Activity A2.2: To design and to develop a training and education program plan for the administration and management of natural resources RIU-SM.	T2.2.1: Manage the development of the programs of education and training.
		T2.2.2: Management to provide libraries and educational endowments.
		T2.2.3: Management for the construction / remodeling of schools.
		T2.2.4: Design, planning, execution, supervision, systematization and dissemination of measures for the development of training programs.
	Activity A2.3: To manage resources for project design and establishment of production chains.	T2.3.1: Identify and prioritize productive projects.
		T2.3.2: Design a plan of development of productive projects chains.

Products	Activities	Executed tasks
Product 3: A mechanism for valuation and compensation for environmental services generated in the RIU-SM, validated and verified.	Activity A3.1: To validate a REDD+ Project with international standards.	T3.1.1: Design a REDD+ Project with international standards. <i>Task already executed in previous years.</i>
		T3.1.2: Implement a field work to realize an inventory of aboveground and underground biomass and to monitor content of carbon. <i>Task already executed in previous years.</i>
		T3.1.3: Manage to obtain the resources and the support of partners to ensure participation and dedication of suitable professionals and indigenous through the provision of work capital until sales of VCUs, with the aim properly develop activities, noting cash flow and its sufficiency with respect to required funds, realizing a financial audit.
		T3.1.4: Contact DOE to realize the validation process of REDD+ Project RIU-SM. <i>Task already executed in previous years.</i>
		T3.1.5: Execute a process of pre-audit, to adjust some aspects that require strengthening and improvement. <i>Task already executed in previous years.</i>
		T3.1.6: Execute the process of validation, following the indications of DOE.
		T3.1.7: Review and adjustment to design of the REDD+ Project RIU-SM with international standards.
	Activity A3.2: To verify the project and to record the units of forest compensation for avoided deforestation.	T3.2.1: Perform the monitoring of deforestation in RIU-SM 2013 and 2014-2015.
		T3.2.2: Execute the process of verification of periods 2013 and 2014-2015.
		T3.2.3: Manage the process of pre-sale and sale of VCUs.
		T3.2.4: Manage a Fiducia to ensure the distribution of incomes contained in the Strategic Alliance Agreement signed between ACATISEMA and MEDIAMOS is fulfilled.
		T3.2.5: Achieve the approval of the Project about the Completeness check by Registry Administrator and the Accuracy review by VCSA.

To consult details of the planning, execution, compliance, expected outputs, evidences, dates, indicators, assumptions and actions for monitoring and reporting of the tasks of Activities, see section 1.2 "Annual Program by Activities" of POA 2016 (Annex 3.1 of this Monitoring Report) and POA 2017 (Annex 3.2 of this Monitoring Report) and its corresponding section 1.1 "Progress in implementation of the Activities, Tasks and Outputs achievement" of Project Progress Report 2016 (Annex 3.3 of this Monitoring Report) and Project Progress Report 2017 (Annex 3.4 of this Monitoring Report).

SPECIAL COMMENTS

Following are special comments about the activities and tasks presented in the previous Table 6, which were executed in the period 2016-2017, following events and situations of importance for the development of the Project and its current implementation status are highlighted.

✓ **PRODUCT 1:** Measures to reduce the vulnerability of the RIU-SM generated by external factors, designed and implemented.

- **Activity A1.1:** To monitor and control the conservation and recovery of forests and lands of the RIU-SM.

This activity constitutes an important axis of the Project and is an essentially activity of conservation and sustainable management of land, forests and other natural resources of the territory, avoiding deforestation and degradation in all sectors of the RIU-SM.

Illustration 11. Indigenous guards, Sector Cumaral, RIU-SM. November, 2017



- **T1.1.3:** Implement the routes of surveillance and control of RIU-SM's forests by the indigenous guard.
 - This task is permanent during all the years and is vital due to the constant threats of external factors (settlers and illegal mining).
 - Routes of surveillance and control correspond to paths over the RIU-SM's territory that the members of indigenous guard permanently go through at various places to observe if any alteration occurs in their territory or if there is any interference by strangers to the reservation (Annex 4.1 and maps of routes of surveillance and control - this Monitoring Report).
 - Surveillance and control were accomplished by indigenous guard in each zone and sector, under coordinator supervision.
 - Indigenous guard is duly organized, currently its members receive remuneration for their work, the necessary endowment is being provided for the surveillance (shirt, vest, pants, hat -Annex 4.6 of this Monitoring Report-) and they work with Zonal Coordinators materials such as formats, maps and digital information recording equipment (communication device, camera, GPS) (Annexs 4.1 and 4.2 of this Monitoring Report).

Illustration 12. Endowment to Indigenous guard



Illustration 13. Map handling by members of the indigenous guard



- Also, with the resources of the Project, transport and food costs are being financed, quotations are being made for the acquisition of boats to provide adequate transport in the task of monitoring and control of the territory (Annex 4.7 of this Monitoring Report: contract to acquire boats, some for the indigenous guard and others for transport). Control stations and information hoardings are being implemented.
- 6 control stations to support the task of monitoring and controlling the territory of the RIU-SM are being built. These control stations are in: 1) Sector *Caño Cawasi*, 2) *Dume* creek mouth to the Vichada river, 3) Vichada river mouth to the Orinoco river, 4) *Matavén* creek mouth to the Orinoco river, 5) *Uva* river mouth (*Brazo de Amanavén*) to Guaviare river and 6) Sector *Manajuare*.

Illustration 14. Projection about how the hoardings are being made



- 150 indigenous guards perform the task of monitoring and control throughout the territory of the RIU-SM. The proposal is to renew the staff of the indigenous guard every 6 months, to stabilize a group of 300 - 450 people. The selection of people for this task is carried out autonomously by indigenous communities (Annex 4.4 of this Monitoring Report: lists of indigenous guards).

Illustration 15. Indigenous guards, Camunianae community, RIU-SM. November, 2017



- Some actions were undertaken due to events that were detected, such as that alguaciles were notified and they, joint with the indigenous guards, objurgate to people that burst into the indigenous reservation. Venezuelan neighbors (some indigenous people) who were fishing and hunting without authorization (*Atana-Pirariame*, *Caño Zama* and *Matavén Fruta* sectors) and deforesting in *San Piñalito Morichal* and *Mangal (Bajo Vichada II sector)*. Colonists were cutting down trees to expand grasslands near the communities *Rio-Arbolito-Waracañe (Aiva-Cuna sector)*, *San Luis (Lagunas Negra y Cacao sector)*, *Sejalito –San Benito sector*, and *San Rafael community (Morocoto sector)*.
- Adjustment tasks have also been carried out in the boundaries of the reservation, since sometimes communities have been confused in determining with better accuracy which territory should be protected from incursion by foreigners. There were some conflicts that have been resolved with the intervention of the indigenous authorities.
- Some damages due external factors were found, such as strong winds that knocked down trees in 2016 (*Cumaral sector*) and some fires that occurred near the communities *San Piñalito Morichal*, *Tirso Atana (Bajo Vichada II sector)*, *Barranco Colorado*, *Nueva Esperanza*, *Pirarlame*, *San Antonio (Atana-Pirariame sector)*, *Berrocal*, *Guayabal Anapo*, *Sabanita Sucariepo*, *Pueblo Escondido (Matavén Fruta sector)*, *Santa Cruz - Ajota (Berrocal Ajota sector)*, *Cumaral (Cumaral sector)* and *Sabanita (Giro sector)*, which amount to around 80 ha. These fires were attended and measures were implemented to suffocate and / or prevent their expansion and damage.
- The damages to the forest by floods that were investigated by technical personnel of MEDIAMOS in the company of the Zonal Coordinators, were due to the winter wave that, according to the indigenous tradition, operates more or less every 10 years, which has been happening, precisely, in the year 2017 and the elapsed of the year 2018. This phenomenon has been decreed as an emergency, with greater impacts in the sectors *Barranquito - Laguna Colorada*, *Laguna Anguilla - La Macarena*, *Cumaral* and *Giro* on Guaviare river, *Mataven Fruta* on Orinoco river, *Caño Cawasi*, *Aiwa Kuna* and *Bajo Vichada II* on Vichada river.

Illustration 16. Guaviare river overflow that affected forests

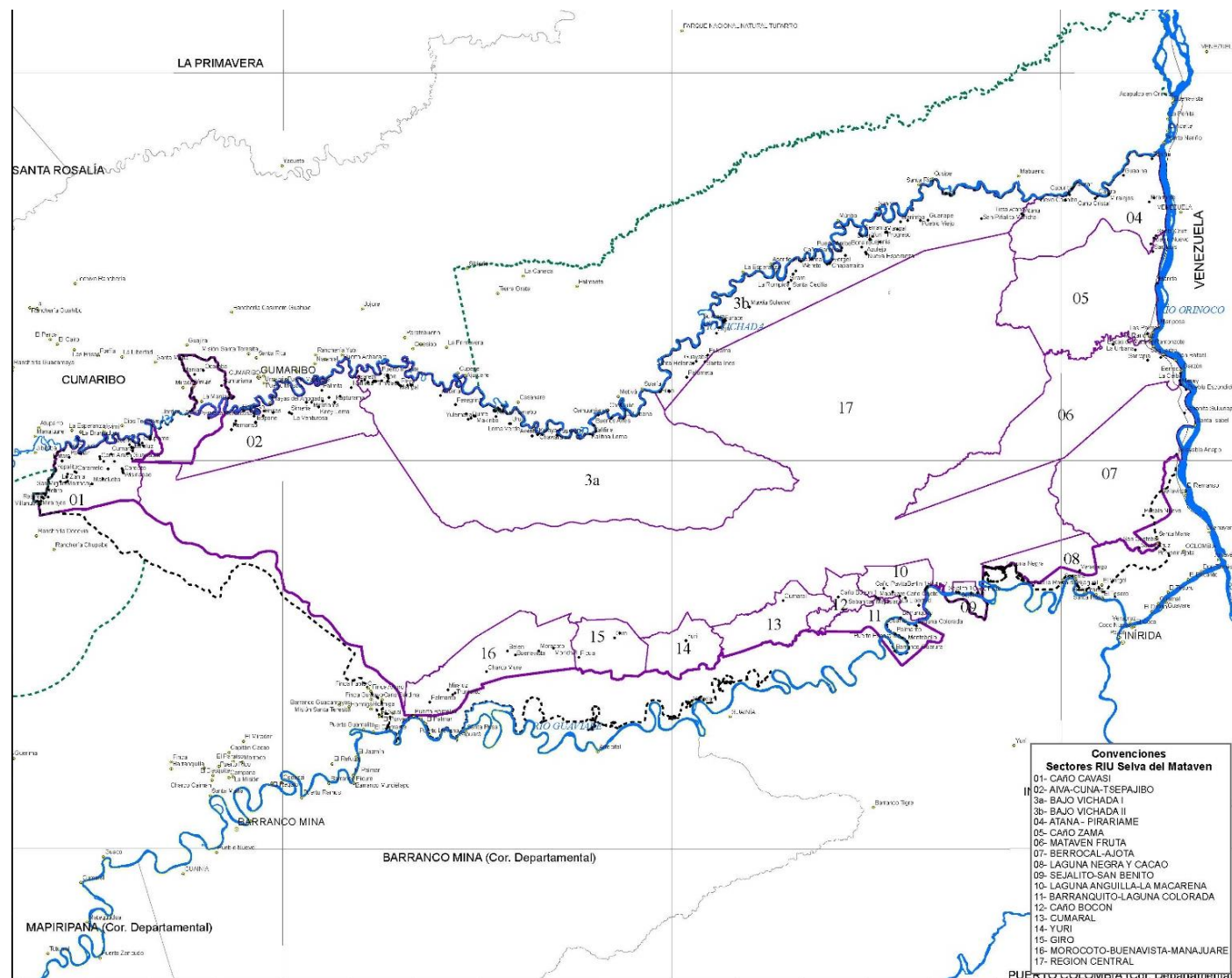


Illustration 17. Community *La Urbana* affected by flood (on Orinoco river)



- The communities are geographically distributed bordering the RIU-SM, on the banks of the main rivers (Vichada, Orinoco, Guaviare), and with presence in all zones and sectors in which the territory of the reservation is divided, which determines a strength, since that this distribution resembles a "protective community wall". In this way, the communities also play a role in the surveillance and control of the territory, since the natives transit permanently along the routes, which helps with the task of indigenous guard (see Map 4 in next page).
- **T1.1.4:** Systematization and divulgation of results about routes of surveillance and control of RIU-SM's forests.
 - In many communities, indigenous people have expressed that are implementing the land and forest management system, making good use, in a special way, of land for crops. Among others, the following communities stand out: *Barranco Colorado, Cajaro, Palmar, Cucurital, Cochibo, Toninas, San Antonio, Pirariame, Caño Zama, Pueblo Nuevo, San Luz, Matavén Fruta, San Felipe, Nueva Esperanza, Sarrapia, Piedra Pintada* in the Zone 3 stand out.
 - Members of Coordinator Committee, Captains and indigenous leaders of RIU-SM know results of implementation of surveillance and control system. Communities also collaborate with the identification of threats and communicate it to their leaders.
- **T1.1.5:** Review permanently the early warnings issued by the IDEAM and Corporinoquia on areas that are susceptible to forest fires.
 - The official information provided by *Instituto de Hidrología, Meteorología y Estudios Ambientales* (IDEAM) (Institute of Hydrology, Meteorology and Environmental Studies) is constantly being reviewed on the status of the threat of deforestation and the predictions of the occurrence of fires, applying to Vichada Department and, particularly, in the area of the indigenous reservation. Information of Corporinoquia is the same from IDEAM. (Annex 4.8 of this Monitoring Report, surveillance and control tracking results).
 - It is reported that there have been small fires that were controlled by the communities of the corresponding sectors. These fires were attended and measures were implemented to suffocate and / or prevent their expansion and damage:

Map 4. Geographic distribution of settlements in RIU-SM



Source: REDD+ Project RIU-SM – GIS (for more details, see file “map4_settlements.pdf” in folder “general_maps”)

- In Sectors *Matavén Fruta y Berrocal-Ajota* (Zone 3) it is reported that 5 fires occurred during the first quarter of 2016.
- In Sector *Atana-Pirariame* (Zone 3) the occurrence of 1 fire is reported in February 2017, 2 fires in mid-2017 and another in December of the same year.
- In Sector *Bajo Vichada II* (Zona 2) the occurrence of 3 fires is reported in June 2017.
- **T1.1.6:** Check the set of sample plots.
 - o The zonal coordinators, together with auxiliaries (properly trained), visits some of the forest inventory plots for carbon estimation, to check their status. Maintenance was made to some plots to improve their marking and the measures of trees were taken again to corroborate data and prepare a new Project verification (see Annex 5 of this Monitoring Report, templates with tree measurement information for some of these plots).

Illustration 18. Making a record in a plot. *Berlín* community, RIU-SM



- **Activity A1.2:** To develop and to implement a system of communication and information at the RIU-SM.

This activity constitutes a solution to a very felt need of all the RIU-SM's communities. There are many difficulties in communication, information and transport between the communities due to geographical characteristics (there are no internal land routes), long fluvial distances and high communication and transportation costs.

- **T1.2.2:** Implement communication and information systems in RIU-SM.
 - o Logistics are being provided to improve communication between the communities and the holding of meetings. 6 boats were financed for Zones 3, 4 and 5 with Project resources (Annex 4.7 of this Monitoring Report).
 - o About 2,000 booklets / brochures and 2,000 posters (translated in indigenous languages, Annexes 6.2 to 6.4 of this Monitoring Report) have been designed, printed and delivered with relevant information of the REDD+ Project RIU-SM and its implementation, addressed to every indigenous communities of the reservation, socialized during several meetings in 2016 and 2017, and also

within the framework of the Convention 310 signed between ACATISEMA and MADS (Annex 6.1 of this Monitoring Report). The Project website is also available in: <http://selvamatavenredd.org>.

Illustration 19. People of the indigenous communities have received the informative material



- Members of Coordinator Committee, Captains and indigenous leaders and communities have improved their communication. They participate in the socialization and training workshops that are held and provide support for the dissemination of information in their communities (see Annex 2 of this Monitoring Report: Minutes of meetings and socialization/ training workshops, with signatures).

Illustration 20. Leaders of Reservation communicate information relevant to communities



- Generated information during develop of Project is registered, saved in suitable media and available (Information System: digital information and physical documents are available in MEDIAMOS office).
- A summary of generated information during development of Project is exposed to public (web page of VCS Project Database: http://www.vcsprojectdatabase.org/#/project_details/1566).

- **T1.2.3:** Identify and manage institutional plans and events led by the Government and other institutions related with initiatives of protection of environmental resources in Colombia and compensations by projects of conservation.
 - o The activities of the Convention 310 of 2015 signed between ACATISEMA and the MADS which objective was the formulation and implementation of actions aimed at strengthening forest governance with a view to reducing deforestation and forest degradation in the area of the *Resguardo Indígena Unificado - Selva de Matavén* were executed (Annex 6.1 of this Monitoring Report: Final report of Convention 310 of 2015 dated March, 2016).
 - o In May 12-13, 2017 (in *Caño Bocón*, RIU-SM) MADS developed the workshop “*Fortalecimiento de Capacidades en Cambio Climático y REDD+ con los Pueblos Indígenas de la Selva Matavén*” (Strengthening Capacities in Climate Change and REDD+ with the Indigenous Peoples of *Selva Matavén*) (Annex 2.4 of this Monitoring Report), to which ACATISEMA attended:
 - Delegations from MADS, UN-REDD, FCPF and ONIC, among other institutions, attended this workshop.
 - The General Coordinator and the Secretary expressed that the administration of ACATISEMA supports the REDD+ Project RIU-SM.
 - The Board of Councils and the Coordinating Committee communicated to these entities that the REDD+ Project RIU-SM is maintained by them as an independent initiative of ACATISEMA and the indigenous peoples of the RIU-SM.
- **T1.2.4:** Support to ACATISEMA to be linked to events concerning Indigenous Associations.
 - o Plans and events led by the Government and other institutions related to the protection of natural resources and indigenous communities have been carried out. Some of these plans can support to development of the REDD+ Project RIU-SM. The ways and management to participate on they are being studied, seeking that entities such as the *Servicio Nacional de Aprendizaje* (SENA) (National Learning Service) in coordination with the Programs such as *Jóvenes en Acción* to training in education for work, and strategies such as *Familias en Acción* and *Red de Seguridad Alimentaria* (RESA) (Food Safety Network) of the *Departamento de Prosperidad Social* (Department for Social Prosperity), but they could not be done because it needed updated information from a census, which is already in phase of execution with Project's economic resources. This support activities can be developed with contributions from both the Government agencies, other institutions and the Project, to provide benefits to the indigenous communities.

In order to link people from the Indigenous Reservation to these institutions and programs, procedures are being taken to apply a census that provides the information updated required by the Ministry of the Interior to recognize people as potential beneficiaries. This census is very important because it depends that people of the indigenous reservation are registered in the institutional databases, exist for the national government and can access the programs. (Annex 7 of this Monitoring Report).
- **T1.2.5:** Measure the impact that the development and the results of the Project are generating for national and international purpose of climate change mitigating.

- This aspect has been explained in section 1.10 "Sustainable Development" of this Monitoring Report, highlighting the contribution of the Project to achieve the NDC of Colombia and in the commitments with the Paris Agreement.
- **Activity A1.3:** To develop and to implement a governance for development and sustainability system of ACATISEMA Association.

This activity is of permanent execution and aims to strengthen the governance and organization of the Association, seeking also generate other forms of organization compatible with ACATISEMA such as cooperatives of production and services.

Illustration 21. Board of Councils and Coordinating Committee with MEDIAMOS's representatives, Villavicencio. November, 2017



- **T1.3.1:** Socialize and train to communities and leaders of RIU-SM.
 - Improving governance at the RIU-SM by support indigenous authorities to consolidate their territory management practices, through socialization and training workshops, in which information material is disseminated (booklets, posters, the Project website). This is a permanent task that is carried out through of workshops where informative materials are provided (booklets, posters, web page) (Annexes 6.2 to 6.4 of this Monitoring Report).
 - ACATISEMA's members and Captains have improved their ability to management the Project aspects on their charge, support to development of Project activities, holding meetings / workshops, and to socialize the status of implementation in communities (Annex 2 of this Monitoring Report).
- **T1.3.2:** Management and supervision of the normative and regulatory aspects of ACATISEMA
 - The Association has drawn up its Contracting Protocol, in order to set regulations and procedures for activities that require the provision of products and services provided by third parties for the execution of the Investment Plan. It is being fully met by ACATISEMA (Annex 6.5 and Annex 2.15a of this Monitoring Report).
 - An operating regulation of the indigenous guard was designed and is being implemented (Annex 4.5 of this Monitoring Report).

Illustration 22. Indigenous guard improves its organization with support of REDD+ Project

- **T1.3.3:** Strengthen the organization of ACATISEMA in the management and logistic, and obtain support to develop meetings, workshops and Ordinary General Meeting of the Association.

- ACATISEMA develops its management to strengthen its structure, to renovate delegates and to decide about important issues. REDD+ Project supports all this type of actions, such as the development of the own meetings of the Association, among others, the Zonal meetings and the Ordinary General Assembly of ACATISEMA, where a new administration (Coordinator Committee) was elected in 2016 (Annex 6.6 of this Monitoring Report: Resolution by which the new Coordinating Committee of ACATISEMA is registered). These actions make it possible to stabilize the organization, discuss issues and resolve conflicts. It will also be done for the Zonal Meetings and the General Assembly of 2019 (every 3 years these meetings and this assembly are held), in which a new administration of ACATISEMA will be established.

In Table 2 of this Monitoring Report “Relevant implementation dates about meetings and events” were presented.

- The previous administration of the RIU-SM continues working for the Project, articulating adequately with the current administration. There have been spaces where ratification purposes were achieved and unity actions have been carried out (Annex 2.3 of this Monitoring Report: Minutes of meeting of Joint Commission, 23/01/2017).
- The Association has improved its organization, now that it has been able to count on administrative personnel to carry out institutional management financed economically by the Project, hiring, personnel management, compliance with the regulations, among others, in an autonomous manner. Documentation related to the protocol to open tenders and contract, make investments (according to the budget approved by the Coordinating Committee and the Board of Councils) and the Association's statutory process through work on life plans has been defined.
- Economic support to the Board of Councils, the Coordinating Committee and the Zonal Coordinators to guarantee the development of the Project for the 5 zones, which includes a great extension of territory.
- The formulation of the Life Plans of the indigenous communities of the 6 ethnic groups that make a presence in the resguardo is continued, and it must capture, according indigenous leaders, the essence of the REDD+ Project's objective. The Project Zonal Coordinators are accompanying these processes.
- The REDD+ Project is financing the creation of step homes in Cumaribo and in Inírida, as a support to the members of the indigenous communities that have to visit this municipality and did not have a space for an adequate stay.

- With resources from the REDD+ Project, everything related to ACATISEMA offices in Cumaribo and Inírida is being strengthened, making arrangements to acquire and improve spaces for the Association (Annexes 6.7a, 6.7b and 6.7c of this Monitoring Report). The lawyer and the ACATISEMA's staff have traveled to the offices of Cumaribo and Inírida to carry out a verification of documents, interviews and evaluation of the venues.
- Project resources have been used to finance cultural events (Annex 6.8 of this Monitoring Report: endowment for sports).
- It is important to highlight that the Investment Plan and the budgets for the years 2018 and 2019 were the result of a broad consultation process throughout the Resguardo in the 5 zonal meetings held in November 2017, in compliance with the provisions of the the ACATISEMA Statutes (see Annex 2.9 to 2.15 of this Monitoring Report).
- **T1.3.5:** Propose that indigenous communities continue with the project activities related with the surveillance, control and conservation of RIU-SM's forests, maintained and extended by ACATISEMA for an additional cycle of 30 years, beyond of current Project cycle.
 - Councils, members of the Coordinating Committee and Zonal Coordinators express their support for the REDD+ Project RIU-SM and authorize the Board of Directors of ACATISEMA to design and implement the necessary measures for the continuity and strengthening of the Project, taking into account the Strategic Alliance Agreement ACATISEMA-MEDIAMOS. Indigenous authorities of the Reservation affirm that will continue with a second cycle of the REDD+ Project RIU-SM (Annex 2.9 of this Monitoring Report).
- **T1.3.6:** Propose to improve of ACATISEMA's Statutes and to define a Good Government Code.
 - The establishment of an ACATISEMA Commission is foreseen for the revision and adjustment of Statutes, to adapt them to the current tasks.
- **T1.3.7:** Realize a financial audit.
 - The feasibility and convenience of that both ACATISEMA and MEDIAMOS carry out a financial audit is being studied, in order to provide the greater security in the management, compliance and distribution of resources, according to the Strategic Alliance Agreement ACATISEMA-MEDIAMOS, especially for the long period of the Project. ACATISEMA is carrying out its own management, in coordination with MEDIAMOS, in order to improve its administration and fulfill the tasks corresponding to the Project and the development of the Indigenous Reservation. Currently, a strict control and surveillance of the budget execution is being carried out through an internal audit. (accounting information is available at the Project offices).
- **T1.3.8:** Countersign the Strategic Agreement.
 - The commitments of the parties (ACATISEMA, MEDIAMOS) to strengthen the Strategic Alliance Agreement have been reviewed and countersigned in meeting carried out with the Joint Commission (Annex 2.5 of this Monitoring Report: Minutes of meetings in Bogotá in July 25, 2017).

Illustration 23. Meeting of the Joint Commission



Compliance of the Product 1: Through the execution of Activities A1.1, A1.2 and A1.3, and their respective tasks, according to Matrix of Logic Structure (MLS) (PDD, section 1.8, page 45), the compliance with indicators, means of verification and assumptions at the end of year 2017 is as follows:

Product 1: Measures to reduce the vulnerability of the RIU-SM generated by external factors, designed and implemented.		
Indicators	Means of Verification	Assumptions
1) 220 captains, 5 zone coordinators and 250 members of the Indigenous Reservation applied environmental knowledge in the surveillance, control and monitoring of the RIU-SM. <i>It is fulfilled, although not at the same level. The 5 zonal coordinating are at the highest level, members of Coordinator Commite and Board of Councils with a lower level (the Councils change annually); the Captains with a lower level; there are a good number of professors, students, women, young people and other members of the reservation (no less than 150) who have achieved a good level in the application of environmental knowledge. It is considered that in 2018 this indicator would approach the indicated goals.</i> 2) A system of communication and information for the 5 areas of the RIU-SM has been established and implemented.	1) Reports on results, monitoring and evaluation of the surveillance and control of the Reservation. <i>Surveillance routes designed. Mapas of these routes. Files of the forms filled out and processed. Indigenous Guard organized. (Annex 4).</i> 2) Reports on results, monitoring and evaluation of communication and information system of the RIU-SM. <i>They have been realized. Report of Convention 310, 2015 (ACATISEMA-MADS (Annex 6.1). Minutes of meetings (Board of Councils, Coordinator Committee, Zonal meetings Annex 2). Booklets, posters (Annex 6.2, 6.3, 6.4), web page (http://selvamatavenredd.org). ACATISEMA's information in its headquarters.</i> 3) Reports on results, monitoring and evaluation of the established governance system.	- External actors involved in Project participate in the implementation through an appropriate institutional coordination. <i>It is fulfilled: Fondo Acción, MADS (Annex 6.1: Report of Convention 310); Action Plan by Interinstitutional Alliance between MADS, Fondo Acción, Fundación Natura, ACATISEMA and MEDIAMOS, to support the REDD+ Project RIU-SM (Annex 1.10 and sub-annexes of PDD).</i> - External actors do not interfere with the stability of the ACATISEMA governance. <i>There was a situation in year 2016, of interference, but it was overcome. Now it is being fulfilled.</i>

Product 1: Measures to reduce the vulnerability of the RIU-SM generated by external factors, designed and implemented.

Indicators	Means of Verification	Assumptions
<i>The information system is accomplished in a 100% and the communication system in a 60%. The information system consists of the generation, collection, analysis, processing, storage and retrieval of data related to the activities of the Project and concerning the indigenous reservation. This information is in the offices of ACATISEMA and MEDIAMOS, digitally and physically. The communication system has been improved by implementing actions that increase the frequency of information exchange between communities, through the transportation of people, meetings and informative material.</i> 3) 17 members of the Coordination Committee, 17 Councils, 5 zonal coordinators and 220 captains of ACATISEMA Association apply knowledge in the statutory and organizational aspects. <i>It is 100% accomplished. Meetings of Board of Councils, Coordinator Committee, Zonal Coordinators and the 5 Zonal meetings held in November 2017 showed the competence of the members of ACATISEMA and captains of Reservation in the application of knowledge in these aspects.</i>	<i>They have been realized; minutes of meetings and workshops (Annex 2). ACATISEMA's members and Captains support the implementation of Project Activities. ACATISEMA executes budget items. ACATISEMA improves its administrative organization. Formulation of the Life Plans of the 6 ethnic groups. ACATISEMA improves its offices (Annex 6).</i> 4) List of participants in the different events. <i>It is 100% accomplished. There are lists of assistants to different events in the reservation (Annex 2).</i> 5) Records of meetings and events. <i>It is 100% accomplished. Minutes of meetings (Annex 2).</i> 6) Audiovisual records. <i>It has been achieved. The database of audiovisual records is in the Project offices, duly documented.</i>	

Conclusion about compliance of Product 1: The Activities and Tasks have been completed (the surveillance and control of the territory, the information system and governance actions). The indicators show an adequate compliance of this product. The associated assumptions are also fulfilled, as well as the strengthening of the training regarding the application of "environmental knowledge" and the control, surveillance and monitoring of the RIU-SM. Only emphasizes that the communication system must be reinforced.

✓ **PRODUCT 2:** Implemented sustainable production system.

- **Activity A2.1:** To establish and to develop a Family Agrifood Production Units System (FAPUS).

This activity aims to ensure food production for food security, implemented in plots of land already deforested.

In Annex 4.1 of PDD, "Sustainable management plan for land and forest" was explained:

"Strategic Element 4: Implement actions for food security of communities in Heterogeneous Agricultural Areas (HAA) y Grasslandes (known in the Indigenous Reserve as "conucos") in areas of Savannah and in some areas of natural regeneration. These shares can be agro-forestry and pasture systems, which provide food (plant and animal) and wood products from plantations with native species in combination with agricultural crops or livestock systems. These systems can be a source of small timber for building houses, fences, barns and other facilities that are required by the RIU-SM, so that they can replace those from secondary forests and ensure that these forests can be transformed to primary forests."

- **T2.1.1:** Design, review and adjustment a Family Agri-food Production Units System (FAPUS), whereby arable areas are identified to ensure food of indigenous communities and the quantity of food that they can produce.
 - Currently, an updated version of the Familiar Agri-food Production Units System is being worked on (Annex 8.1 of this Monitoring Report).
- **T2.1.3:** Implement the FAPUS and, consequently, the management plan of lands and forests in RIU-SM, like a pilot project.
 - Captains of the indigenous reservation (Annex 8.4) are in charge of organizing and ensuring the correct execution of the Sustainable Management Plan of Land and Forest, through implementation of the Family Agro-Food Production Units System (FAPUS). Quarterly economic support are being made for all the captains of the reservation. The FAPUS is being updated to provide more accurate information on the areas that are being used for food production for indigenous communities. For several monitoring periods information has been collected about kind and quantity of produced food by sector and zone. (Annex 8.1, 8.1a and 8.2 of this Monitoring Report: FAPUS design, formats for conducting the survey, GIS's maps and results of survey about its implementation).
 - 229 communities (that could be considered as a sample of 88% of the total of the communities of RIU-SM) were consulted about the food production (see Annex 8.3 of this Monitoring Report: implementation of FAPUS and results) The main results found for the two years of this Monitoring Report (2016-2017) are:

(in 229 communities)	Quantity ton. 2016	%	Quantity ton. 2017	%	Quantity ton. TOTAL	%
CROPS / PRODUCTS						
Cassava	3,180	64%	3,303	54%	6,483	59%
Banana	879	18%	1,226	20%	2,105	19%
Corn	569	11%	1,044	17%	1,612	15%
Cane	176	4%	246	4%	422	4%
Name	47	1%	55	1%	103	1%
Chili pepper	32	1%	65	1%	96	1%

(in 229 communities)	Quantity ton. 2016	%	Quantity ton. 2017	%	Quantity ton. TOTAL	%
Rice	32	1%	36	1%	68	1%
Sweet potato	19	0%	28	0.46%	47	0.42%
Madura verde	24	0.48%	13	0.21%	36	0.33%
Chontaduro	20	0.40%	13	0.22%	33	0.30%
Tavena	12	0.24%	15	0.25%	28	0.25%
Cocoa	0.31	0.01%	10	0.16%	10	0.09%
Potato	0.00	0.00%	10	0.16%	10	0.09%
Others	7	0.15%	6	0.10%	14	0.12%
Subtotal crops	4,997	100%	6,071	100%	11,068	100%
FRUITS						
Pineapple	122	48%	127	50%	249	49%
Lulo	37	14%	34	13%	71	14%
Copo azul	10	4%	30	12%	40	8%
Caimaron	24	9%	13	5%	37	7%
Orange	9	4%	6	2%	15	3%
Watermelon	8	3%	6	3%	15	3%
Ice-cream bean	10	4%	2	1%	13	2%
Cashew	5	2%	6	3%	12	2%
Lemon	2	1%	8	3%	10	2%
Others	29	11%	20	8%	49	10%
Subtotal fruits	256	100%	254	100%	510	100%
TOTAL	5,253		6,325		11,578	

- Informed food production in crops in 2016 was 4,997 ton. in several products, and in fruits was 256 ton. in the sample of 229 communities.
- Informed food production in crops in 2017 was 6,071 ton. in several products, and in fruits was 254 ton. in the sample of 229 communities.
- Total informed food production, in the sample of 229 communities, in crops for Monitoring period (2016-2017) was 11,068 ton. (annual average of 5,534 ton.) for 229 communities (**annual average of 24.2 ton / community**). If the value of the average per community is inferred to the 261 communities of the RIU-SM, there would be approximately a production of **6,316 tons. per year in all the indigenous reservation**.
- Total informed fruit production in Monitoring period (2016-2017) was 510 ton. (annual average of 255 ton.) for 229 communities (**annual average of 1.1 ton of fruits / community**). If the value of the average per community is extrapolated to the 261 communities of the RIU-SM, there would be approximately a production of **287 tons. per year in all the indigenous reservation**.
- o For all communities, 350 cassava graters have been delivered to indigenous communities in every sectors, to improve their production processes of derivatives of this tuber. The REDD+ Project financed the purchase of these items and ACATISEMA was in charge of advancing the contractual and logistic management to bring them to the settlements that required them. This responds mainly to the requests made in the zonal workshops held in November 2017 (Annexes 8.5a and 8.5b of this Monitoring Report).

Illustration 24. 350 cassava graters for the communities of the RIU-SM



- A meat and milk production line is being implemented to complement and improve family food production, distributed in the communities of Zones 1 and 2, also in response to the request made in the Zonal meetings of November 2017, in order to provide meat for feed of people in reservation. It is also financed by the Project (Annexes 8.6a and 8.6b of this Monitoring Report).
- It is also expected to strengthen the production of cassava (mañoco), corn, banana, chili pepper, yams, cocoa, panela cane, fruits, reforestation, forestry, silvopastoralism, fish farming, tourism, crafts, marketing, cooperative (Annex 2.15a of this Monitoring Report: budget items).
- Production tools are being provided to communities to improve crop activities.

Illustration 25. Cassava cultivation in conuco. Sarrapia community, RIU-SM



- **Activity A2.2:** To design and to develop a training programs plan to administration and management of natural resources of the RIU-SM.

This activity is being designed, programed and budgeted taking into account institutional supports (*SENA, Departamento de Prosperidad Social -DPS*) and some Universities.

It is intended that, in the same place, students acquire the skills to manage the natural resources of the RIU-SM. The design and implementation of the Project will be the practical basis for the design of university academic programs and the groups of MEDIAMOS and ACATISEMA will be the basis of future teachers and leaders of this university.

- **T2.2.1:** Manage the development of the programs of education and training.

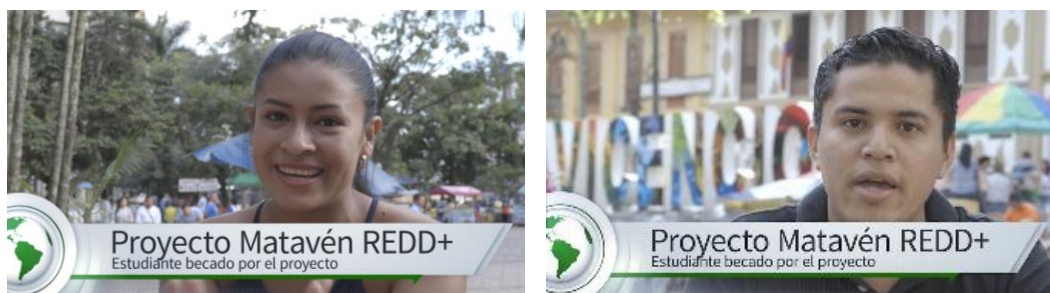
- o Currently educational aid has been given to 59 students who belong to the communities of the Indigenous Reservation and who were previously certified by the captains and Councils (as a first phase).

These students are distributed as follows: 9 university students, 8 students in technical-level institutions, 29 students in SENA, and 13 students in teaching (Annex 9.1 of this Monitoring Report).

Supporting students encourages their participation in the social processes of the Indigenous Reservation.

This task will be strengthened and increased in the next academic periods (2018 - 2019)

Illustration 26. Youth people of the reservation benefit from the financial support provided by the Project



- **T2.2.2:** Management to provide libraries and educational endowments.

- o It is planned to develop this activity from the second semester of 2018. a contract has been signed to provide endowments for libraries (Annex 9.2 of this Monitoring Report) and for sports activities (Annex 6.8 of this Monitoring Report).

- **T2.2.3:** Management for the construction / remodeling of schools

- o A contract is being negotiated, with its respective auditing, to build school classrooms in the communities of *Canapay*, *Bakatsolova*, *Sarrapia*, *Villa Luz* and *Boponé* (as a first phase), in response to an urgent request from the communities, expressed at the zonal meetings in November, 2017 (Annex 9.3 of this Monitoring Report).

- **T2.2.4:** Design, planning, execution, supervision, systematization and dissemination of measures for the development of training programs.

- o In the second semester of 2018, this task will be further developed, based on the progress of the project activities, particularly those related to A1.1, A2.1 and A2.3.

- **Activity A2.3:** To manage resources for project design and establishment of production chains.

This activity seeks to complement the FAPUS. There will be a prioritization of these initiatives in the initial phase.

- **T2.3.1:** Identify and prioritize productive projects.
 - In Zonal meetings carried out in November of 2017, the "work tables" of indigenous people of the RIU-SM were organized according to their activities within the organizational scheme of the Association, where the needs and productive projects they wish to implement were defined. The lists of these needs and projects are in Annexes 10.1 and 10.2 of this Monitoring Report, among which are highlighted: cassava (mañoco), corn, banana, chili pepper, yams, cocoa, panela cane, fruits, reforestation, forestry, silvopastoralism, fish farming, tourism, crafts, marketing, cooperative (Annex 10 of this Monitoring Report).

Illustration 27. Communities propose the productive projects that they wish to develop



- **T2.3.2:** Design a plan of development of productive projects chains.
 - Leaders of indigenous communities are preparing proposals, with the Project financial support, to develop productive projects in their communities, which let them improve the local economic environment. These projects include developing them as productive chains. Support is being provided by a MEDIAMOS professional for the definition of the technical files of these projects, who is participating in the evaluation stage of the investment in pilot projects in the Reservation (Annex 10.3 of this Monitoring Report: Report of progress in the management of productive projects).
 - Participation in artisanal fairs at the national level is sponsored by REDD+ Project RIU-SM, to offer the products elaborated by the communities of the indigenous reservation (Annex 10.4 of this Monitoring Report: Request for support for artisan project productive).

Illustration 28. Participation of artisans of RIU-SM in “Expoartesano”, Medellín



- Sport fishing has been identified as a potential activity in the RIU-SM's territory. In the routes, indigenous guard have highlighted this activity made by tourists. Then different work proposals such as fish farming, handicrafts and tourism are also being analyzed.

Compliance of the Product 2: Through the execution of Activities A2.1, A2.2 and A2.3 and their respective tasks, according to Matrix of Logic Structure (MLS) (PDD, section 1.8, page 45), the compliance with indicators, means of verification and assumptions at the end of 2017 is as follows:

Product 2: Sustainable production system implemented.		
Indicators	Means of Verification	Assumptions
1) There is an established Family Agrifood Production Units System (FAPUS) to produce at least 4,000 tons of agricultural / food per year. <i>It was achieved. It has been estimated that in the RIU-SM 6,316 tons of food per year has been produced in the 2016-2017 period.</i>	1) Progress reports on the results of the establishment of the Family Agrifood Production Units System (FAPUS) <i>Reports; processed information of 2016 and 2017 (Annex 8.3); FAPUS formats are available in MEDIAMOS office.</i>	• Community leaders, by the statutory entities of the organization, resolve internal conflicts that hinder the development of the Project and maintain work disposition integrated and concerted. <i>It was accomplished (experience is been achieved in this regard in RIU-SM).</i>
2) 800 graduated high school students have started their training and educational programs for the integral-sustainable management of forests and lands of the RIU-SM. <i>The purpose of linking, progressively, students to the Superior Education (e.g. Jóvenes en Acción Program -Youth in Action Program-) was not achieved due to the lack of registration of high school graduates in the Ministerio del Interior (MinInterior) databases. A census is been carried out as required by the Ministry. Project, meanwhile, is supporting and subsidizing to 59 students of superior education, as is explained in task T2.2.1, adjusted to current conditions, based on the programs defined in the training plan (Activity A2.2).</i>	2) List and number of producers participating in the Family Agrifood Production Units System (FAPUS) by sector and region. <i>There are lists of Captains, who who represent the communities (lists of attendance at meetings and workshops in Annex 8.4).</i> 3) List and number of plots of land and hectares established in Family Agrifood Production Units System (FAPUS) by sector and region. <i>There are maps and lists of lots and their size (Annexes 8.1 and 8.2).</i> 4) Total of agricultural products harvested by sector and region. <i>According to processed information of 2016 and 2017 (Annex 8.3).</i>	• The unit of local communities and their willingness to work together maintains integrated and concerted. <i>It was achieved. Directives of ACATISEMA, leaders and communities are integrated. (Annex 2)</i>
3) Representatives of the 250 communities of the 16 sectors and 5 zones apply environmental knowledge in the design Project for the participation of 2,500 families in the Food Security Network Program	5) List of graduated high school students enrolled in training and educational programs.	

Product 2: Sustainable production system implemented.		
Indicators	Means of Verification	Assumptions
(RESA) of the <i>Departamento para la Prosperidad Social</i> (DPS). <i>It was not achieved. Likewise a census that meet the requirements of Ministerio del Interior (MinInterior) is required to link communities and families to National Programs. The execution of the census is being managed. This indicator will also be revised and adjusted.</i> NOTE: an indicator about the establishment of productive chains will be studied and defined.	<i>It was not achieved yet due to the reasons given. Program is in development process. There are 59 students receiving financial support (Annex 9.1).</i> 6) List of the representatives of the 250 communities participating in the project design for the participation of 2,500 families in the Food Security Network Program (RESA) of the <i>Departamento para la Prosperidad Social</i> (DPS). <i>It was not achieved due to the reasons given.</i> 7) List and number of beneficiary families enrolled in the Program for Food Security Network (RESA) of the <i>Departamento para la Prosperidad Social</i> (DPS). <i>It was not achieved due to the reasons given.</i> 8) Records of meetings and events. <i>It is accomplished (Annex 2: Minutes of meetings).</i> 9) Audiovisual records. <i>It has been achieved. The database of audiovisual records is in the Project offices, duly documented.</i>	

Conclusion about compliance of Product 2:

The main indicator of this product is the implementation of a sustainable Family Agri-food Production Unit System, which has been satisfactorily achieved, particularly in the estimated production of 6,316 tons of food per year in the period 2016 - 2017, exceeding the goal quite well of the 4,000 tons per year.

About the other two indicators:

- ✓ With regard to the number of students who should have started their training and education programs, it was conceived and defined on the basis that they could participate in the government program *Jóvenes en Acción* (Youth in Action), which could not be achieved because the requirement was not met to have an updated population census of the entire reservation, in accordance with the requirements and formats

of the *Ministerio del Interior - MinInterior* (Ministry of the Interior). The census has already started and it is expected to end in September 2018, which will allow the resumption of the management to include the high school graduates who can not to enter higher education (to technical, technological and professional programs), to the *Jóvenes en Acción* Program in coordination with the *Servicio Nacional de Aprendizaje - SENA* (National Service of Learning) of governmental character and of national coverage. A budget item has been provided by the Project for this program (Annex 2.15a of this Monitoring Report: Budget 2018 2019), although the goal will be revised and adjusted according to the new conditions.

- ✓ The other indicator referring to the design of the Project for the participation of 2,500 families in the government program *Red de Seguridad Alimentaria - RESA* (Food Safety Network) was not achieved due to non-compliance, likewise, with the requirement of having an updated population census, in accordance with the requirements and formats of the MinInterior. As previously mentioned, the census has already begun and it is expected to have its results in September 2018, which will allow the corresponding management to be resumed. The goal will also be revised and adjusted according to the new conditions. Participation in this government program is to complement the FAPUS, notwithstanding the goal of food production for the shelter population has been achieved, as explained regarding the indicator 1.

It should also be in mind that the training and education program for young people and teachers has begun with the support of resources from the Project, especially for 59 students.

The two assumptions have been satisfactorily fulfilled. Therefore, it can be concluded that this product 2 is being fulfilled in its essential aspect (family agri-food production) and that the educational program is under development. We will continue with the management for participation in the government programs of Jóvenes en Acción and RESA, whose goals will be reviewed and adjusted, as complementary measures. Likewise, an indicator on the establishment of productive chains will be studied and defined.

PRODUCT 3: A mechanism for valuation and compensation for environmental services generated in the RIU-SM, validated and verified.

- **Activity A3.1:** Validate a REDD+ Project with international standards.
- **T3.1.3:** Manage to obtain the resources and the support of partners and to ensure participation and dedication of suitable professionals and indigenous through the provision of work capital until sales of VCUs, with the aim properly develop activities, noting cash flow and its sufficiency with respect to required funds, realizing a financial audit.
 - Several activities of the REDD+ Project RIU-SM were executed with work inputs-from professionals and leaders, authorities and members of indigenous communities. Due to the commercialization of VCUs, To remunerate adequately all the people has been possible, who have been linked to the Project, such as professionals from MEDIAMOS, Zonal Coordinators, indigenous guards, Captains, members of the Coordinating Committee and of the Board of Council.
 - In PDD, section 2.5.1.2 “Sub-step 2b – Option I. Apply simple cost analysis” (page 168), was established that the breakeven point would be achieved in the fifth year (2017). The registry of the Project was made in July of 2017, what let the start of marketing of VCUs and, effectively, the achievement of the breakeven point. In section “Ability to fund the cost of the activities, to ensure

that the Project will reach the breakeven point” (page 176) was mentioned that The Project Proponents have the financial capacity and strategic partners for the performance of the activities until certification and sales of VCUs (2017). To finance part of the Project Activities during the years 2016 and 2017, a private investor was brought in through a Participation Account Agreement.

- **T3.1.6:** Execute the process of validation, following the indications of DOE.
- **T3.1.7:** Review and adjustment to design of the REDD+ Project RIU-SM with international standards.
 - o MEDIAMOS F&M S.A.S. hires to ICONTEC as VVB to carry out the Validation / Verification Process of REDD+ Project RIU-SM in October, 2018.
 - o VVB ICONTEC issued the “VALIDATION DEED OF REPRESENTATION” and the “VERIFICATION DEED OF REPRESENTATION” on December 6, 2016 (Annexes 1.2 and 1.3 of this Monitoring Report).
 - o VVB ICONTEC issued the “JOINT VALIDATION & VERIFICATION REPORT: VCS”, Version 1.3, about the REDD+ Project RIU-SM and requested the registration of the project as a VCS project activity on June 3, 2017 (Annex 1.1 of this Monitoring Report).

(see Table 1 “*Relevant implementation dates about validation, verification and registry of Project*”).

- **Activity A3.2:** To verify Project and to register units of forest compensation for avoided deforestation.

- **T3.2.1:** Perform the monitoring of deforestation in RIU-SM 2013 and 2014-2015.
- **T3.2.2:** Execute the process of verification of periods 2013 and 2014-2015.
- **T3.2.5:** Achieve the approval of the Project about the Completeness check by Registry Administrator and the Accuracy review by VCSA.
 - o REDD+ Project RIU-SM was subjected to process of completeness review by APX-VCS Registry since December 1, 2016 to December 8, 2016.
 - o VVB ICONTEC issued the adjusted “JOINT VALIDATION & VERIFICATION REPORT: VCS”, Version 1.3 (according requirements of VCSA), about the REDD+ Project RIU-SM and requested the registration of the project as a VCS project activity on June 3, 2017 (Annex 1.1 of this Monitoring Report).
 - o REDD+ Project RIU-SM was subjected to process of accuracy review by VCSA since February 16, 2017 to June 28, 2017 (Annex 1.4 of this Monitoring Report).
 - o After overcoming the Completeness review by APX-VCS Registry and the Accuracy review by VCSA, REDD+ Project RIU-SM was registered in the VCS Project Database to ID VCSPD1566 and in APX -VCS Registry to code VCSR1235 on July 20, 2017. Which let to issue VCUs to trade.

In Table 1 of this Monitoring Report “*Relevant implementation dates about validation, verification and registry of Project*” was presented.

Illustration 29. Project Technical team and ICONTEC team

- **T3.2.3:** Manage the process of pre-sale and sale of VCUs.
 - o Verified VCUs of the years 2013, 2014 and 2015 are been sold according to market conditions and customer requirements, what have allowed to give financial sustainability to the REDD+ Project RIU-SM.
- **T3.2.4:** Manage a Fiducia to ensure the distribution of incomes contained in the Strategic Alliance Agreement signed between ACATISEMA and MEDIAMOS is fulfilled.
 - o Currently, mangement is being made to contract a fiducia that support the operation of the execution of economic resources of the Project. Nevertheless, a strict control and surveillance of the budget execution is being carried out through an internal audit.

Compliance of the Product 3: Through the execution of Activities A3.1 and A3.2 and their respective tasks, according to Matrix of Logic Structure (MLS) (PDD, section 1.8, page 45), the compliance with indicators, means of verification and assumptions at the end of 2017 is as follows:

Product 3: A mechanism for valuation and compensation for environmental services generated in the RIU-SM, validated and verified.		
Indicators	Means of Verification	Assumptions
1) It has been designed and validated a mechanism for valuation and compensation for environmental services according with international standards. <i>It was achieved.</i>	1) Project Design Document (PDD). <i>It was achieved</i> (http://www.vcsprojectdatabase.org/services/publicViewServices/downloadDocumentById/28154).	• It maintains and strengthens the strategic partnership between ACATISEMA and MEDIAMOS F&M S.A.S.
2) Project has been verified and forest compensation units have been registered to contribute avoiding deforestation. <i>It was achieved to 2013 and 2014-2015 periods.</i>	2) Report of established monitoring system. <i>It was achieved.</i>	<i>It was achieved (Annex 2.5: Minutes of meetings in Bogotá in July 25, 2017).</i>
3) It has managed the compensation for environmental services for avoided deforestation.	3) Reports on the results of the validation of REDD+ Project. <i>It was achieved (Annex 1).</i>	

Product 3: A mechanism for valuation and compensation for environmental services generated in the RIU-SM, validated and verified.		
Indicators	Means of Verification	Assumptions
<i>It was achieved at 100%.</i>	4) Reporting of results of monitoring, verification and registration of forest compensation units. <i>It was achieved (Verification Report 2013, 2014-2015:</i> http://www.vcsprojectdatabase.org/service/publicViewServices/downloadDocumentById/27787, APX -VCS Registry: https://vcsregistry2.apx.com/myModule/rpt/myrpt.asp?r=111 with code VCSR1235). 5) Records of meetings and events. <i>It was achieved (Annex 2).</i> 6) Audiovisual records. <i>It has been achieved. The database of audiovisual records is in the Project offices, duly documented.</i>	

Conclusion about compliance of Product 3: All Activities and Tasks have been successfully implemented. There is a compensation project for environmental services that generates resources for the RIU-SM.

The budget contains additional activities to the previous ones referring to specific aspects of special needs in the indigenous reservation, not considered in the Matrix of Logical Structure (PDD, page 45). These activities refer to aspects such as health, drinking water, basic sanitation, construction and improvement of housing, attention to the special population and issues of domestic calamity (Annex 2.15b of this Monitoring Report: Budget called "ACATISEMA Reserves" and Annex 11 with some evidences of ACATISEMA management with its reserves).

COMPLIANCE OF OBJECTIVES

Based on the level of compliance of products 1, 2 and 3, which has been examined previously, the level of compliance or achievement of the Specific Objective and the Development Objective is now examined, at the end of 2017:

Specific Objective: To develop a participative process to achieve the establishment of an integrated management system of forests and lands of the RIU-SM, to ensure its sustainability and mitigate threats to their conservation.		
Indicators	Means of Verification	Assumptions
1) Integrated sustainable system of forest and land management of RIU-SM established through the direct involvement of 250	1) Progress reports of establishment of sustainable integrated management plan of forests and lands of the RIU-SM.	• Captains, Board of Councils, Coordination Committee and Zonel Coordinators undertake

Specific Objective: To develop a participative process to achieve the establishment of an integrated management system of forests and lands of the RIU-SM, to ensure its sustainability and mitigate threats to their conservation.

Indicators	Means of Verification	Assumptions
communities of the Reservation, based on its sectorial and zonal organization (1,465,786 hectares of primary forest, 11,329 hectares of secondary forest; 30,707 hectares of heterogeneous agricultural areas and pastures, 318,314 hectares of savannah). <i>Sustainable Management Plan for Land and Forest have been designed, established and it is in development in the RIU-SM by communities.</i> 2) At least 80% of the captains, 20% of women and 25% of young of the Reservation have participated in establishing the system of integral-sustainable management of forests and lands of the RIU-SM. <i>This goal has been met very satisfactorily. In the implementation of the different activities of the Project, the communities of the RIU-SM, its leaders, women, young people, the elderly and the directors of the Association are being involved.</i> 3) The Coordination Committee, the Board of Councils and Zonal Coordinators of ACATISEMA have increased their capacity for management and organizational governance in order to conserve forests and lands in the Reservation. <i>Currently the association is improving its administrative practices, procure benefits provided by REDD + Project resources. The logistics have been reinforced so that ACATISEMA implements activities more autonomously</i> 4) It has increased by at least 1,500 tonnes, for sustainable food	<i>The Zonal Coordinators report that the communities are making good use of the land, reusing spaces to avoid deforestation. In the different zonal meetings of November, 2017 the corresponding reports were made (Annexes 2.10 to 2.14).</i> 2) List of communities and captains participants. <i>There are lists of Captains and their communities (attendance lists for zonal meetings in Annexes 2.10 to 2.14).</i> 3) Reports on the results of surveillance, control and monitoring. <i>Files of the forms filled out and processed (Annex 4.3). The forms completed in physical are available in the MEDIAMOS office.</i> 4) Management Reports of Coordinator Committee, Board of Councils and Zonal Coordinators. <i>Members of ACATISEMA present their reports in the meetings that are held (Annex 2)</i> 5) Reports on food production by sector and area. <i>See results of task T2.1.3 and Annex 8.3.</i> 6) Reports on the results and evaluation of the communication system. <i>They have been realized: reports, brochures, minutes of meetings. See results of Activity A1.2 and Annex 2 of this Monitoring Report;</i>	and participate in the development of the Project. <i>It was achieved.</i> • National institutional support for the development of the project is maintained. <i>It was achieved. Annex 6.1: Report of of Convention 310 signed between MADS and ACATISEMA and Action Plan by Interinstitutional Alliance between MADS, Fondo Acción, Fundación Natura, ACATISEMA and MEDIAMOS, to support the REDD+ Project RIU-SM (Annex 1.10 and sub-annexes of PDD).</i> • The autonomy of indigenous peoples are respected in accordance with the legal framework. <i>It has been fulfilled so far.</i>

Specific Objective: To develop a participative process to achieve the establishment of an integrated management system of forests and lands of the RIU-SM, to ensure its sustainability and mitigate threats to their conservation.		
Indicators	Means of Verification	Assumptions
production and food security of the inhabitants of the RIU-SM. <i>The proposed goal of producing 4,000 tons of food has been achieved. In this period (2016-2017) 6,316 tons, estimated per year, have been achieved.</i> 5) The 250 communities of the 17 sectors and 5 zones have improved their communication. <i>The information system is accomplished in a 100% and the communication system in a 60%. The information system consists of the generation, collection, analysis, processing, storage and retrieval of data related to the activities of the Project and concerning the indigenous reservation. This information is in the offices of ACATISEMA and MEDIAMOS, digitally and physically. The communication system has been improved by implementing actions that increase the frequency of information exchange between communities, through the transportation of people, meetings and informative material.</i> 6) There shall be no intimidating events for the people of the Reservation. <i>It was achieved.</i> 7) At least 80% of users express satisfaction about participating in the project. <i>In the last 5 zonal meetings, held in November of 2017, this goal is evident. There was unanimity in the conclusions on approving the Project (Annexes 2.10 to 2.14).</i>	<i>report of Convention C310 (ACATISEMA-MADS), Annex 6.1.</i> 7) Reports on the management of REDD+ Project. <i>Minutes of meetings of Joint Commission, Coordinator Committee, Board of Councils and Zonal Coordinators (Annex 2).</i> 8) Records of meetings and events. <i>It is 100% accomplished. Minutes of meetings (Annex 2).</i> 9) Audiovisual records. <i>It has been achieved. The database of audiovisual records is in the Project offices, duly documented.</i>	

Conclusion about compliance of Specific Objective: As can be seen, the indicators and the corresponding assumptions have been satisfactorily fulfilled. Therefore, during the course of the Project (up to this period), this Specific Objective has been satisfactorily achieved.

Development Objective: To contribute to sustainable environmental development of the Colombian Orinoco region through conservation and restoration of forest habitats and their eco-systemic services as a factor for the sustainability of the territory, local communities, climate and biodiversity.		
Indicators	Means of Verification	Assumptions
1) By 2018 RIU-SM forests and lands are managed sustainably with a plan that meets national and international standards ensuring the conservation of forest biomass and soil carbon, at least 1.1 million hectares. <i>It is accomplishing.</i> 2) By 2018 deforestation and degradation at the RIU-SM has been stopped, at least 90% compared to the deforestation of the period from 2001 to 2011. <i>According to deforested areas projected for the years 2016 to 2017 for PA and LB, and the real deforestation, this was stopped in 88.3%. In 2013 and 2014-2015 periods deforestation was stopped in 95%. The increase in deforestation with respect to the previous verified periods is mainly due to the immigration of indigenous people and Venezuelan settlers during 2016-2017. It is expected to meet the goal for the year 2018.</i> 3) By 2018 the 250 communities of the RIU-SM produce 7,000 tons of agricultural food needed for food security. <i>For the 2016-2017 period, production of 6,316 tons of food per year has been achieved; the goal of 7,000 tons is expected to be achieved by 2018.</i> 4) By 2018 at least 1,200 RIU-SM young people (between 15 to 26	1) Annual reports of progress and partial results of the comprehensive sustainable management of forests and Lands Plan of the RIU-SM. <i>POAs and Project Progress Reports of 2016 and 2017 (Annex 3).</i> 2) Annual monitoring reports of deforestation and degradation. <i>There is an analysis of deforestation by monitoring periods, 2013, 2014-2015 (already verified) and 2016-2017 (current) (PDD, section 7.1.1 Monitoring results of deforested areas -page 367- and Section 4 "Quantification of GHG emission reductions and removals" of this Monitoring Report).</i> 3) Reports on annual amounts of agricultural food produced in the sector and area. <i>Annex 8.</i> 4) List and number of participants trained in the development of the Project by sector and area. <i>Lists of attendance at meetings and workshops in Annex 2.</i> 5) List and number of students enrolled and certified in technical and technological programs related to the sustainable management plan and reports of academic results. <i>It has started (Annex 9.1).</i> 6) Records of meetings, seminars and events in the development of the Project.	• Governmental changes do not affect the development of the Project. <i>It has been fulfilled so far.</i> • The key development strategy of environmental sustainability projects in Colombia continues, as defined by the National Council for Economic and Social Policy through the document CONPES 3700 (2011). <i>It has been fulfilled so far.</i> • The institutional and legal framework on indigenous communities is respected. <i>It has been fulfilled so far.</i>

Development Objective: To contribute to sustainable environmental development of the Colombian Orinoco region through conservation and restoration of forest habitats and their eco-systemic services as a factor for the sustainability of the territory, local communities, climate and biodiversity.		
Indicators	Means of Verification	Assumptions
years old) have attended and have been certified in technical and technological programs related to the sustainable management plan. <i>According to the results discussed for Product 2 (indicator 2), this goal should be revised and adjusted according to the current conditions.</i> 5) By 2020 the sustainable management of land and forests in the Colombian Orinoco has spread to at least 2 million hectares. <i>It is expected that this goal will be achieved based on the different programs that are being promoted for the Colombian Orinoco region (CONPES 3797 of 2014) (CNP, 2014).</i>	<i>It is accomplished. Minutes of meetings (Annex 2).</i> 7) Audiovisual recording media. <i>It has been achieved. The database of audiovisual records is in the Project offices, duly documented.</i>	

Conclusion about compliance of Development Objective: As can be seen, based on the compliance of the indicators to date (2017), for year 2018 compliance with the indicators presented is expected. It can be concluded that the Development Objective is satisfactorily fulfilling to the year 2017. Indicator 4 will be revised and adjusted according to the current conditions.

Based on these analysis of compliance of products and objectives, supported on the execution of activities and tasks, it can be concluded that the implementation status of the REDD+ Project RIU-SM is highly satisfactory after 5 years of execution (year 2013 to year 2017).

2.1.2 Monitoring of leakage and non-permanence risk factors

LEAKAGE CONTROL AND MONITORING

The Project design defines an area of forest contiguous to the Project Area (PA) with a series of characteristics similar to the PA (among them) that is intended to surround the PA, called the Leak Belt (LB), and on which it is assumed that there will be displacements of deforestation activities that threaten the PA.

Leakage Belt (LB): It borders the Project Area (PA) and it is located in the most accessible and likely to be deforested areas. It is a forest area (in 2011) that surrounds or is in the immediate vicinity of the Project Area (PA) to face "the leakage" related to the displacement caused by the activities of the REDD+ Project. It meets the requirements of similarity (Annex 10 of PDD, VMD0007). (see Map 2 Project boundaries PA and LB).

In the REDD+ Project RIU-SM the Leak Belt (LB) surrounds the Project Area (PA) (which is the innermost area of the RIU-SM) and which, is also contained in the RIU-SM. The vast majority of the communities are located within the LB; in this sense the set of communities of the RIU-SM forms a kind of "protective wall" of the PA, surrounding it (see Map 2 of PA and LB boundaries, map of communities -see PDD, Map 9 in page 137 or file "map_of_settlements.pdf"- and Map 3 of RIU-SM). This arrangement, location and relationship between these spatial elements (forest areas within the RIU-SM: PA, LB, communities and territory) is a strategic element conceived and carried out in the design of the Project to reduce the risks of deforestation generated by external agents; the indigenous guard are indigenous of the reservation located in each of the 5 zones of the RIU-SM that do the control and surveillance, as specific activity of the Project (A.1.1, see Matrix of Logical Structure -MLS-) financed by the proceeds from the sale of the VCU generated by the Project.

But since the LB is also within the reservation, this area is also controlled and monitored by the indigenous guard and the RIU-SM's communities (located in areas of the perimeter of the RIU-SM), protected from interventions by external agents.

This set of aspects: strategic geographical location of PA, LB, communities and the RIU-SM's territory, combined with the operation of activity A1.1 of the Project, financed by it, constitutes a significant measure of control and monitoring of possible displacements. interventions of external deforestation agents towards the indigenous reservation (LB, PA).

The REDD+ Project RIU-SM also has arranged for all its 8 activities resources (which together seek to avoid internal and external deforestation), now coming from VCUs sales, that also precisely seek to avoid the deforestation caused by the indigenous people in their territory (A2.1, A2.3) and prevent that they migrating to other neighboring territories to perform deforestation practices. These Activities A2.1 and A2.3 seek to promote food production projects and production chains that allow changing the practice of deforestation and burning by other productive activities. This seeks to reduce risks of deforestation by internal agents and the displacement of deforestation activities, both inside the reservation (in LB) and outside the RIU-SM.

Leakage by local agents of deforestation is quantified in the leakage belt. The area deforested in the leakage belt ($A_{DefLB,i,t}$) is estimated in the same manner as the area deforested in the with-project case ($A_{DefPA,i,t}$) using the procedures presented in section 4 of this Monitoring Report. Activity shifting leakage within the leakage belt ($\Delta C_{LK-ASU-LB}$) is then calculated as the with-project emissions in the leakage belt ($\Delta C_{P,LB}$) minus the baseline emissions in the leakage belt ($\Delta C_{BSL,LK,unplanned}$) (section 4.3.7 of this Monitoring Report).

Immigrant leakage is calculated using a series of equations found in the LK-ASU module. Most of the data for calculating immigrant leakage has been derived for the ex-ante estimates (including $\Delta C_{BSL,LK,unplanned}$; $AVFOR$; $TOTFOR$; $PROTFOR$; $MANFOR$; $PROP_{LB}$; $LBFOR$; $COLB$; C_{LB} ; $PROP_{CS}$; and $A_{BSL,PA,unplanned,t}$) or gathered in the course of monitoring activity shifting leakage within the Leakage Belt (LB) and deforestation in the Project Area (PA) (including A_{DefPA} ; $A_{DefLB,i,t}$; and $\Delta C_{P,LB}$).

The monitoring parameters $MANFOR$, $PROTFOR$, $TOTFOR$ will be sourced from official data, peer reviewed publications or other verifiable sources, such as the *Registro Único Nacional de Áreas Protegidas* – RUNAP (National Unique Registry of Protected Areas) of *Parques Nacionales Naturales de Colombia* - (Natural National Parks of Colombia) and IDEAM. These monitoring parameters will be updated on review of current literature at least every 2 years according to monitoring periods and available information.

The leakage monitoring is done according to the monitoring plan in the whole area of the RIU-SM; deforestation is monitored in PA and in LB as an activity planned and defined in the PDD, see:

- ✓ Section 2.2 Applicability of methodology / 3. LK-ASU, Estimation of emissions from activity shifting for avoided unplanned deforestation - VMD0010 (PDD, page 129).
- ✓ Sub-step 2.3 Monitoring of emissions in the project scenario / **iv** Estimation of project emissions (Project Area - PA and Leakage Belt - LB) (PDD, page 278).
- ✓ Section 4 Achieved GHG Emission Reductions and Removals (PDD, page 356).
- ✓ Section 4.2 Data and Parameters Monitored (PDD, page 257) and Section 7.1 Data and Parameters Monitored (PDD, page 356). Methods and assumptions of Data and Parameters Monitoring have been developed in section 4 of this document.
- ✓ Section 4.3.1.1 Data and parameters (PDD, page 265).
- ✓ Section 4.3.1.2 Stages or processes of the information management / Sub-step 2.1 Monitoring of deforestation (PDD, page 267).
- ✓ Section 7.4 Leakage Emissions (PDD, page 381).
- ✓ Section 7.1.1 Monitoring Plan (PDD, page 364).

Data and Parameters Monitoring

$A_{DefLB,i,t}$	Area of recorded deforestation in the leakage belt in the project case in stratum i in year t
$A_{DefPA,i,t}$	Area of recorded deforestation in the project area in the project case in stratum i in year t
$\Delta C_{LK-AS, unplanned}$	Net greenhouse gas emissions due to activity shifting for projects preventing unplanned deforestation
$\Delta C_{LK-ASU-LB}$	Net CO ₂ emissions due to unplanned deforestation displaced from the project area to the Leakage Belt.
$\Delta C_{LK-ASU-OLB}$	Net CO ₂ emissions due to unplanned deforestation displaced outside the Leakage Belt.
C_{OLB}	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the Leakage Belt
C_{LB}	Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation inside the Leakage Belt
$\Delta C_{BSL,LK,unplanned}$	Net CO ₂ emissions in the baseline from unplanned deforestation in the leakage belt
ΔCP_{LB}	Net greenhouse gas emissions within the leakage belt in the project case
LB	Leakage belt area. Map showing the location and stratification of forests within the leakage belt. (100% forest at the beginning of the project).
P_{LK}	Ratio of the area of the leakage belt to the total area of RRD
RRL	Geographical boundaries of the reference region to locate deforestation
MANFOR	Total area of forests under active management nationally
PROTFOR	Official data, peer reviewed publications and other verifiable sources
TOTFOR	Total available national forest area
PROP_{IMM}	Estimated proportion of baseline deforestation caused by immigrating population
PROP_{LB}	Area of forest available in the Leakage Belt for unplanned deforestation as a proportion of the total national forest area available for unplanned deforestation
PROP_{CS}	The proportional difference in carbon stocks between areas of forest available for unplanned deforestation both inside and outside the Leakage Belt

PROP_{RES}	Estimated proportion of baseline deforestation caused by population that has been resident for ≥5 years
Leakage Belt Forest Cover Monitoring Map	Map evidencing the stratification and location of the forest in the Leakage Belt at the beginning of each verification period. It has to be evidenced if there are deforested areas.
Leakage Belt Forest Cover Benchmark Map	Map showing the location of forest land within the leakage belt area at the beginning of each monitoring period. Only applicable where leakage is to be monitored in a leakage belt.

CONTROL AND MONITORING OF NON-PERMANENCE RISK FACTORS

The REDD+ Project RIU-SM has completely applied the VCS Tool T-BAR (version 3.3, dated October 19, 2016) and updated the Non-Permanent Risk Report (Annex 12 of this Monitoring Report).

Based on that VCS Tool and on current Non-Permanent Risk Report, 3 types of risks (internal, external and natural) and 11 classes of risk factors (4 classes of internal risks; 3 classes of external risks; 4 classes of natural risks) were identified, including its scores:

Type of risk	Class	Risk factors related to	Risk Rating
Internal Risk Factors	1	Project Management	-2
	2	Financial Viability	2
	3	Opportunity Cost	-2
	4	Project Longevity	15
	Total Internal risk (not less than zero)		13
External Risk Factors	5	Land Tenure and Resource Access/Impacts	0
	6	Community Engagement	-5
	7	Political Risk	0
	Total External risk factors (not less than zero)		0
Natural Risk Factors	8	Fire	1
	9	Pest and Disease outbreaks	0
	10	Extreme Weather	0
	11	Geological Risk	0
	Total Natural risk factors		1
	Overall Risk Rating		14

The risk rating calculated for Monitoring Period 2016-2017 is:

Total Risk Assessment	14%
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For Monitoring Period 2016-2017:

Total Risk Assessment	14%
Net change in the project's carbon stocks: $\Delta C_{BSL,unplanned} - \Delta C_P$ (or ΔC_{WPS} , table 29 of this document)	8,426,320
TOTAL NUMBER OF CREDITS TO BE DEPOSITED IN THE AFOLU POOLED BUFFER ACCOUNT	1,179,685

ADAPTIVE MANAGEMENT PLAN

This valuation of Non-permanence Risk is subject to periodic considerations, the review of verification reports and the evaluation of the behavior of the project following the VCS guide, likewise, mitigation measures are identified:

For risk class 1 (internal risk factors related to project management) in its category *h*), the requirement to prepare and execute an Adaptive Management Plan is specified. In section 4.3.3 of the PDD "Mitigation Measures and Monitoring actions". In PDD, page 280, how that plan was developed is explained:

Based on the assumptions presented in the Matrix of Logic Structure (MLS, presented above) which is at the level of objectives and products, it proceeds to the assessment of risk associated with each respective assumption and the submission of appropriate mitigation measures. The methodology published by the International Tropical Timber Organization in its "Manual for Project Formulation" applies (OIMT, 2009), Part 3: Description of project interventions, Assumptions, Risks and Sustainability, pages 58-59.

According to this methodology, an assumption is a condition that must exist for the project can be successfully developed and it must be formulated with a positive statement of what is expected to happen. Risk is the probability that an assumption is not met.

Based on the project design for some risks identified, mitigation measures through project management were arranged; risk factors of Non-permanence and mitigation measures are presented in Annex 12 of this Monitoring Report).

In this way the Adaptive Management Plan is then systematized in the PDD's table (from page 281 to page 308), which specifies the level of risk associated with an assumption, the corresponding mitigation measures (evidence) and the respective monitoring actions, also indicating to which specific Project Activity is related. In section 4.3.3 of the PDD "Monitoring and documentation of mitigation measures. Adaptive Management Plan" (page 309) this plan is more specified.

Therefore, the different risk factors of Non-Permanence considered in the VCS Tool T-BAR, with their respective mitigation measures and monitoring actions, are contained in this Adaptive Management Plan; however, the plan also contains other mitigation measures and monitoring actions related to other types of risks associated with the assumptions of the Matrix of Logical Structure, as can be seen in the table that was indicated in the PDD.

The following Table 7 presents the monitoring actions corresponding to the mitigation measures that were applied and the tasks of the Project Activities that contain those monitoring actions.

All the tasks indicated in this Table 7 were executed and, therefore, the respective monitoring actions and corresponding mitigation measures were carried out, as indicated in the table, including the risk factors of non-permanence.

Table 7. Monitoring actions for Mitigation Measures according to identified Risks from Adaptive Management Plan

In the monitoring actions for mitigation measures, the Non-Permanence Risk factors / Mitigation measures, indicated in the "NPRT / M" column, have been included (see Annex 12 of this Monitoring Report: Non-Permanence Risk Report).

MA: Monitoring action; **Act:** Activities

NPRT: Non-permanence Risk type; **IR:** Internal Risk; **ER:** External Risk; **NR:** Natural Risk; **Cl:** Risk Class; **RF:** Risk Factor; **M:** Mitigation

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
MA1	A1.1 T1.1.3 T1.1.6	✓ Monitoring the routes of surveillance and control that the indigenous guard makes, noting they have the required logistics and resources, that documents prepared for this purpose are filled, that they communicate novelties and that corrective actions are taken.	✓ Maintain surveillance and control of the territory against any threat of intrusion and violation of rights, particularly through of monthly patrols in each zone of the Indigenous Reservation.	IR Cl:1 RF:b	Annex 4: ✓ Surveillance Routes ✓ Maps ✓ Formats ✓ Results
			✓ Control and surveillance permanently through the indigenous reservation, according with the relevant plan in each sector and zone.	IR Cl:1 RF:b	
			✓ Have in account within the control system planned for the REDD+ Project RIU-SM, the monitoring of fires and burns.	NR Cl:8	
			✓ Maintain forest patrols by the REDD+ project RIU-SM to prevent intrusions by outside actors into the project area. This activity is an ongoing enforcement and tends the protection of 100% of the carbon stock of the project area.	IR Cl:1 RF:b	
MA2	A1.1 T1.1.4	✓ Monitoring the actions of training and socialization carried out in the Indigenous Reservation, noting how often they are made and dissemination, by different means, of agreements, managements, activities and Project results (benefits), and the degree of assimilation, by participants to events, of issues of governance, rights and duties as indigenous communities, organizational structure and application of the ACATISEMA Statutes.	✓ Strengthen the community capacities in management of controlled burnings in the framework of the REDD+ project RIU-SM activities, as well as the implementation of awareness and environmental education programs in schools within the scope of the project. The organization at community level will be also essential to prevent the impacts of these burnings.	NR Cl:8	Annex 2: ✓ Minutes of meetings and training / socialization workshops
	A1.2 T1.2.2		✓ Train and inform all members of ACATISEMA on the rights and duties of indigenous peoples established in the legal norms, through semiannual workshops in each area Indigenous Reservation.	ER Cl:5 RF:b M:f	
	A1.3 T1.3.1		✓ Maintain ongoing communication and information with communities about the development of the negotiations and implementation of project activities through newsletters, workshops and meetings of socialization. ✓ Strengthen education in ethical values and their application in project management, through zonal workshops.		

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
			✓ Maintain continuous and permanent manner, the training of indigenous zonal coordinators and Co-director, considering that this group of Indigenous people will taking increasing responsibility in management of project. Workshops and internships will be conducted in 2016 and 2017.		
			✓ Widely spread among communities about the benefits of the project, publishing a booklet and posters in which these benefits are illustrated	ER Cl:6 M:c	
			✓ Intensify the dissemination of the Agreement, so that all communities clearly aware of the points agreed between ACATISEMA and MEDIAMOS. New edition and publication of the Agreement and Articles of ACATISEMA be made.	ER Cl:6 RF:a	
			✓ Train and educate communities about their rights and duties on Indigenous Reservation in the constitutional, legal framework of the country, developing two workshops in each area during 2016 and 2017 and against land ownership and use of their resources through a primer and two newsletters in 2016 and 2017.	ER Cl:5 RF:b	
			✓ Consolidate these rights and duties by applying ACATISEMA Statutes in the constitutional and legal framework.	ER Cl:5 RF:b	
			✓ Strengthen ACATISEMA governance through unity and compliance with its Statutes.		
			✓ Train captains, Board of Councils, Board of ACATISEMA, Coordinating Committee and Zonal Coordinators on good governance practices and relationships, through regional workshops in 2016.		
			✓ Expand and intensify the dissemination and socialization among communities on efforts made and progress through quarterly newsletters.	ER Cl:6 RF:a	

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
MA3	A1.1 <i>T1.1.4</i> A1.2 <i>T1.2.2</i>	✓ Monitoring the work done by the Zonal Coordinators related to inform constantly in its area of influence on the degree of development of the Project.	✓ Permanently maintain communication and consultation with indigenous communities through the Zonal Coordinators, at least two workshops per year (one by semester) also be made, that allows interaction between the various indigenous communities.	<i>ER</i> <i>Cl:6</i> <i>RF:a, b</i>	Annex 2: ✓ Minutes of socialization workshops. ✓ Reports of Zonal Coordinators in meetings
MA4	A1.1 <i>T1.1.5</i>	✓ Monitoring the consultations that are made about the information that is available from the institutions, saving it in a database.	✓ Keeping track of early warnings issued by the IDEAM and Corporinoquia on areas that are susceptible to forest fires and act accordingly.	<i>NR</i> <i>Cl:8</i>	Annex 4.8: ✓ Information collected on fire warnings and deforestation risks
MA5	A1.1 <i>T1.1.5</i> A1.2 <i>T1.2.2</i>	✓ Monitor the ongoing operation of headquarters provided for the development of the Project, with the presence of members of the management team, especially those offices of ACATISEMA in the cities of Cumaribo and Inírida, noting that they have the physical and technical resources and that preserve the conditions that facilitate travel to those places.	✓ Maintain the administrative and technical offices of the REDD+ project RIU-SM, which are located less than 3 hours traveling from the project area.	<i>IR</i> <i>Cl:1</i> <i>RF:d</i>	Annex 6.7: ✓ Headquarters of ACATISEMA
MA6	A1.1 <i>T1.1.5</i> A1.2 <i>T1.2.2</i> A1.3 <i>T1.3.3</i>	✓ Monitoring the spaces where different government bodies of ACATISEMA actively involved, noting determinations about actions carried out by the Association in an attempt to fulfill its objective.	✓ Keep ACATISEMA unit to preserve their rights, through consultations and dialogues in 2016 zonal workshops.	<i>ER</i> <i>Cl:5</i> <i>RF:b</i>	Annex 2.2: ✓ Minutes of Ordinary General Assembly of ACATISEMA 2016
MA7	A1.2 <i>T1.2.3</i> <i>T1.2.4</i>	✓ Monitoring the management made by the administrative team of REDD+ Project RIU-SM	✓ Management the inclusion of Project in plans that are developed at the national, departmental and municipal levels, related to the protection of natural resources and indigenous communities.	<i>ER</i> <i>Cl:7</i> <i>M:f</i>	Annex 2

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
		relating to the identification of institutional plans led by the Government, its characteristics, its influence on the Project, its preparation and presentation of proposals for inclusion.	✓ Participate in the National Strategy EN-REDD and Development Plan of the country, as it is for the low-carbon development, promoting the REDD+ Project RIU-SM will constitute a pilot plan to region and country in control and reducing deforestation and forest degradation.		✓ Meeting with MADS (13/05/2017)
MA8	A1.2 T1.2.3 T1.2.4	✓ Monitoring the actions made to participate in events of interest to the Project, showing the progress and observing, collecting and putting into practice the lessons learned that can potentiate the development of Project."	✓ Present in national, departmental and municipal events the project results, showing compliance with the goals of controlling deforestation and benefits to communities and biodiversity in the area where is located the Indigenous Reservation, achieved through the implementation of Project activities.		
MA9	A1.3 T1.3.3 T1.3.8	✓ Monitoring the actions and decisions that address in the Zonal meetings and the General Assembly of the Association, noting that the leaders of the Indigenous Reserve continue to support the continuity of REDD+ Project RIU-SM, and that ACATISEMA is reaffirmed as the only association that has the property and rights to use the land and resources of the RIU-SM. <i>See especially regarding zonal meetings (Nov., 2017).</i>	✓ Ratify in the Zonal Assemblies and each Ordinary General Assembly of ACATISEMA the Agreement between the Association and MEDIAMOS to develop the REDD+ Project RIU-SM. ✓ Promoting the project is maintained and extended by ACATISEMA for at least another cycle of 30 years. An "Other If" will be established in the Agreement between ACATISEMA and MEDIAMOS formulating this point.	IR Cl:3 M:f IR Cl4 RF:a, b	Annex 2: ✓ Minutes of Ordinary General Assembly of ACATISEMA 2016 ✓ Minutes of meeting in Villavicencio (8-9/11/2017)
MA10	A1.3 T1.3.6	✓ Monitoring the actions of support and proposals which seek to improve ACATISEMA Statutes, noting the interest that	✓ Manage level ACATISEMA reform statutes for better compliance with the legal and institutional framework on indigenous and to better fulfill the goals and objectives of the project framework issues.		✓ Commission in ACATISEMA is foreseen

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
		they can producing and the agreement that can be achieved between indigenous leaders.	✓ Advice and support reform Statutes ACATISEMA to remedy failures or gaps in their participation and coordination mechanisms. A commission that will report to the General Assembly in 2016 was appointed.		for the revision and adjustment of Statutes
MA11	A1.3 T1.3.7	✓ Making a financial audit, disposing of reports on the dynamics of resource flow, noting that the distribution of incomes contained in the Strategic Alliance Agreement signed between ACATISEMA and MEDIAMOS is fulfilled.	✓ Manage project resources, mainly financial, maintaining and respecting all mechanisms and measures necessary internal and external control		✓ Accounting report are available in Project offices
			✓ Ensure compliance with the distribution according to the Strategic Alliance Agreement		
			✓ Monitor improving social and economic conditions of indigenous peoples of the Indigenous Reservation.	IR Cl:3 RF:d	
MA12	A2.1 T2.1.3	✓ Monitoring the impact that the activities of the Project are generating, evaluating whether defined and agreed benefits are reaching communities in the manner prescribed in the Project design and schedule established.	✓ Maintain the benefits of the project, which prevents corruption and violence, and contributes to law enforcement and political and social stability of the region and the country.	IR Cl:3 RF:d	✓ Reports of results in the different areas of work
MA13	A2.1 T2.1.3	✓ Monitoring the amount of food produced by indigenous people for self-consumption, noting how enough is and whether it meets the established plans.	✓ Keep food production activities through FAPUS.		Annex 8: ✓ Information collected on the execution of FAPUS
MA14	A2.1 T2.1.3 A3.1 T3.1.3	✓ Monitoring the management that the administrative and marketing staff of the Project makes to obtain the resources, both investment returns by selling VCUS, and support of partner institutions to properly develop activities."	✓ Maintain and strengthen the efforts that allow arriving in a timely manner, indigenous peoples, benefits in education, food, communication, production, health and housing generated by the project.	IR Cl:3 RF:d	Financial information is in Project offices, available for the audit.
			✓ Secure at least 40%-80% of needed funding to cover the total of required flow of expenses before the project reaches breakeven. Details are provided in a cash flow analysis which can be found in the PD of Project (section 2.5.1.2).	IR Cl:2 RF:g	
			✓ Streamline management of resources for the establishment of sub-projects of productive chains already selected.		

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
			✓ Ensure the funds to support the development of the Project activities during the year when it plans to reach breakeven (2016) and even the resources to keep the project the following year (2017).	IR Cl:2 RF:c	
MA15	A2.3 T2.3.1 T2.3.2 A1.2 T1.2.1 T1.2.2	✓ Monitoring the management made to organize some media in the Indigenous Reservation, consulting about the identified needs, approaches to entities that support these initiatives, agreements have been signed, logistics and resources. <i>This is still in management.</i>	✓ Strengthen communication mechanisms by managing a radio-station and six digital kiosks, putting into operation agreement with the Ministry of TICs.		Annex 10: Productive project proposals according minutes and results of Zonal meetings (nov 2017)
MA16	A3.1 T3.1.3	✓ Monitoring the development of the Project activities, the participation and the degree of dedication of suitable professionals and indigenous people (according to their profile and resume) that participate in Project, reviewing periodic reports and products they generate, noting its willingness to continue until the balance point is achieved.	✓ Ensure the continued participation, in the team, of professionals with at least 5 years of experience in their field, in each subject area of the Project. ✓ Ensure the continued participation of indigenous in the Co-director team and the six zonal coordinators with at least 5 years of experience in knowledge and management of Indigenous Reservation. ✓ Maintain the strategy of the REDD+ project RIU-SM under which it is developed by an interdisciplinary team of professionals in MEDIAMOS with relevant experience in the development and implementation of forestry projects and with indigenous personal of ACATISEMA with great knowledge of the forest and their communities. The alliance between ACATISEMA and MEDIAMOS is the main element in managing the project because they are groups that complement the technical and scientific part and knowledge of the territory.	IR Cl:1 RF:c IR Cl:1 RF:c IR Cl:1 RF:e	✓ Reports of results in the different areas of work
			✓ Extend the commitment to 5th year of the Project, both ACATISEMA as MEDIAMOS, so that the work of indigenous peoples in the project activities and their participation in the workshops are made without charges until revenues are taken for VCU's sale; the same with all the technical and administrative body of MEDIAMOS (PDD, section 2.5.1.2).	IR Cl:2 RF:g	

MA	Act / Tasks	Monitoring action for Mitigation Measures	Mitigation Measures for Risk	NPRT / M	Evidence
MA17	A3.1 T3.1.6 T3.1.7 A3.2 T3.2.1 T3.2.2	✓ Monitoring the management to develop the processes with the DOE (Designated Operational Entity), so as to quantify the VCUs that can be marketed.	✓ Expedite the process and procedures of the validation, verification, registration and marketing of VCUs.		Annex 1: ✓ Documents about validation, verification and registry
MA18	A3.2 T3.2.3	✓ Monitoring the actions taken with already contacted institutions and others that can be made new alliances, to achieve marketing of VCUs, by reviewing agreements and contracts signed.	✓ Intensifying business strategy presales and sales of VCUs from 2016 through agreements with specialized agents, before the year Project breakeven point, taking into account that the Government has publicly announced that it has international resources for REDD+ Projects offsets.	<i>IR</i> <i>Cl:2</i> <i>RF:g</i>	Report about marketing of VCUs are in the Project offices, available for the audit.
MA19	A3.2 T3.2.4	✓ Monitoring the Fiducia with the Fondo Acción, noting that the distribution of incomes contained in the Strategic Alliance Agreement signed between ACATISEMA and MEDIAMOS is fulfilled.	✓ Establish a Fiducia for project cycle that ensures proper routing and allocation of resources to the different communities of the Indigenous Reservation. With Fondo Acción respective management has been processed.		The information on this is in the Project offices, available for the audit.
MA20	A3.2 T3.2.5	✓ Monitoring the procedures to obtain the validation, verification and registry of the REDD+ Project RIU-SM. <i>It has been done properly for 2013 and 2014-2015 periods. See execution of Activities and Tasks (section 2.1.1) and evidences presented.</i>	✓ Achieve the approval of the Project about the Completeness check by Registry Administrator and, possibly, the Accuracy review by VCSA		Annex 1: ✓ Documents about validation, verification and registry

Monitoring actions for Mitigation Measures have been executed properly. See execution of Activities and Tasks (section 2.1.1) and evidences presented.

2.1.3 Other changes

There was a change in the direction of the ACATISEMA Association. A new Coordinating Committee was elected in the Ordinary General Assembly, held on September 27, 2016. (Annexes 2.2 and 6.6 of this Monitoring Report).

2.2 Deviations

2.2.1 Methodology Deviations

There are no methodology deviations in the application of the approved VCS REDD Methodology Modules.

2.2.2 Project Description Deviations

There are no Project Description Deviations.

2.3 Grouped Project

Project REDD+ *Resguardo Indígena Unificado – Selva de Matavén* is not a grouped project.

2.4 Safeguards

2.4.1 No Net Harm

Safeguards "are policies and procedures to avoid social or environmental damages in the preparation and implementation of REDD+". The final report of Convention 310 of 2015, section 7, presents aspects about the safeguards and their planning, which states that the REDD+ Project RIU-SM does not affect the rights of the RIU-SM peoples or the integrity of the Territory. On the contrary, it brings benefits.

That final report of the Interadministrative Convention MADS-ACATISEMA No. 310, 2015, dated March, 2016 (Annex 6.1 of this Monitoring Report), in its page 67 says:

"Regarding the Safeguard Plans, ACATISEMA has defined the following ethnic and environmental safeguards, within the constitutional and legal framework of Colombia:

1. Territory: as a reason for being of the physical and cultural existence of the Indigenous Reservation, since it is the fundamental guarantee to continue living as an indigenous people. In particular, the Integral Management Plan for the Reservation's Lands and Forests guarantees compliance with this aspect. In this sense, no entity that could intervene in the territory, acquires rights over the territory of the Unified Indigenous Reservation, making absolutely clear that the Plan does not imply commitments of sale or rent of any part of the territory of the Reservation, guaranteeing its integrity.

2. Autonomy: understood as the ability to make decisions about the territory, self-government and culture, in accordance with the ancestral practices of internal organization. The right to autonomy and self-determination of peoples is recognized by international law and in the Colombian National Constitution. It is made explicit that the Plan does not restrict the absolute freedom of the communities to access, transit and obtain the benefits of food, recreation, research and any other benefit that may derive from the protection, conservation and recovery of forests and other natural resources of its territory.

3. *Culture: culture and identity as social, productive and spiritual practices that have been inherited from the elderly and nurtured in the relationship with other peoples, allows indigenous peoples to maintain and transmit their knowledge from generation to generation, and in this meaning, it allows them to continue being what they are: Indigenous Reservation.*

4. *Unity and "Minga": Unity is the set of territory, culture and autonomy. The "minga" is an expression of the strength and unity of the Indigenous Reservation.*

5. *Gender Equity: it is necessary that each and every one of the activities and actions to be developed in the Plan are based on gender equity, that is, on the possibility of applying measures that are not necessarily equal, but conducive to equality in terms of rights, benefits, obligations and opportunities between men and women.*

6. *Participation: a fundamental relationship to achieve the integration of all needs, with assertive responses adjusted to the reality that will consolidate the permanence of the Indigenous Reservation in the future, is the participation of each of its ethnic groups, its authorities and organizations: elderly, men, women, youth and children.*

7. *Environment and Biodiversity: it must be considered and act in favor of the protection of the environment, natural resources and all forms of life, as the existence of the Indigenous Reservation depends on the existence of the Selva Matavén."*

Additionally, Annex 6.9 of this Monitoring Report is presented with the Planning of the "Safeguards for REDD+ in the *Resguardo Indígena Unificado – Selva de Matavén*".

In Annex 21 of PDD, the impacts to biodiversity are presented in two scenarios:

- A. One that describes the problems that were estimated could continue to happen if the activities of the REDD + RIU-SM Project are not carried out (negative impacts).
- B. The other scenario describes the benefits (positive impacts) associated with the implementation of the REDD + RIU-SM Project activities in the areas of flora, fauna, climate, air, landscape, soil and water.

Regarding native flora and fauna, it was estimated that the impact would be moderately to highly positive.

Regarding air, landscape, soil and water, it was estimated that the impact would be moderately positive.

In the same sense, measures to mitigate the nature of biodiversity in the Project scenario are described.

The conclusion obtained is that the net benefit of the Project on biodiversity is always positive, contrasting with the negative impact that would continue to occur in a scenario without Project, which are being minimized or avoided with the implementation of the Project activities.

With respect to socio-economic impacts, in Annex 22 of PDD, the vital importance of participation in the Project RIU-SM of the members of the indigenous communities that inhabit the Selva de Matavén is highlighted. During the years 2016 and 2017, Project activities have been continued that encourage the active participation of different actors of the indigenous communities, as described in section 4 of that Annex. In this aspect, it have's strive to continue integrating women, youth and the elderly in the development of the REDD+ Project.

In the Zonal Assemblies (Nov., 2017) and meetings of the Board of Councils, Coordinator Committee and Zonal Coordinators (see Annexes 2.10 to 2.14 of this Monitoring Report), in which the future developments and plans of ACATISEMA were evaluated (for example, the investment plan 2018-2019), no negative impact was reported on the socio-economic aspect that could be related to the execution of the Project.

2.4.2 Local Stakeholder Consultation

The key local actors are the communities of the 6 indigenous ethnicities of the RIU-SM (see Table 4 of this Monitoring Report). The REDD+ Project RIU-SM is located within the territory of the RIU-SM. These 6 indigenous ethnicities are organized and associated in the "Asociación de Cabildos y Autoridades Tradicionales Indígenas de la Selva de Matavén – ACATISEMA", which has the organizational structure presented through the illustration 4 of this report. This structure is formally and legally recognized by the Colombian state (see Annex 2.1.1 of PDD: Resolution 0177 of December, 2002 of *Ministerio del Interior*) and has its own Statute (see Annex 2.1.2 of PDD) that defines its procedures to involve all indigenous peoples and their communities, their ways and regulations for consultation through their established organizational and management bodies (General Assembly, 5 Zonal Meetings, Board of Councils and the Coordinator Committee with its Board of Directors) and the new bodies created for the design and execution of the REDD+ Project RIU-SM (Joint Commission, Zonal Coordinators and Project Co-director). This structure and its statutory regulations for its operation have been respected and applied by all local communities of the RIU-SM; since the constitution of the Association (2002) until now, 16 years of operation and compliance.

Precisely, Project Activity A1.3 *"Design and to establish a system of governance for development and sustainability of ACATISEMA Association"* seeks to strengthen the governance of ACATISEMA. Prior to the validation and first verification (years 2013, 2014 and 2015) through the structure of ACATISEMA, the consultation process with the local communities about the REDD+ Project RIU-SM was carried out, taking into account that ACATISEMA participated directly in the design of it, as well as, in its divulgation and socialization. The convocations to meetings have a regulation in terms of times and formats, previously informing the objective, themes, sites and dates, taking into account the great extent of the territory and the complexity. The procedures for documenting the results of this consultation process are those established in the statutes, that is, the preparation of minutes (subject to collective reading and approval and duly signed by the participants), photographic records; in addition, in these minutes the interventions, comments, proposals, discussions and decisions of the participants are left in writing. The Zonal Meetings, the General Assembly, the Board of Councils and the Coordinator Committee, have their established procedures for the formation of directive boards and functioning. In the case of the REDD+ Project RIU-SM, this process and its results were made explicit in the PDD (see PDD, Annex 1).

It should be mentioned that the Superior Court of the Judicial District of Villavicencio - Labor Chamber and the Supreme Court of Justice - Labor Chamber of Cassation, ruled about the legal validity of the consultation process that was carried out with the communities, as well as about the benefits obtained the communities with the execution of the Project (see PDD, section 6.4 "Legal Rulings" - page 345 - and Annexes 1.11.5, 1.11.7, 1.11.8 and 1.11.10 of the PDD).

Throughout this process of design and implementation of the Project, since June 2012 to date, July 2018, direct communication has been maintained with local communities about the progress, difficulties, solutions, reports, decisions regarding the Project (see Annex 1 of PDD). In particular, for the current verification of the 2016 - 2017 period, the minutes of consultation and decisions of the communities through ACATISEMA are available (see Annex 2 of this Monitoring Report),

As an aspect of special relevance of the current period subject to verification (2016-2017), are the meetings of the 5 zones of the RIU-SM (covering the entire Unified Reservation), carried out in 2017, in which the results that have been obtained by the Project were analyzed, and in which the endorsements were ratified in all 5 zones, the most urgent needs were defined, that would be subject to immediate solution through the definition and approval of the investment plan, which is executed with the income from sales of VCUs, issued from the verification period 2013 and 2014-2015, applying Decree 926 of 2017, commented in section 1.10 of this report, and that is specified in the budgets approved for the years 2018 and 2019. The continuity of the Project was also decided for 30 more years, according to clause 12, paragraph 2, of Strategic Alliance Agreement ACATISEMA-MEDIAMOS (see Annex 2.9 of this Monitoring Report).

Everything was consulted and defined based on the organizational structure of ACATISEMA (see Annex 2 of this Monitoring Report: Minutes of meetings, Annex 2.15a of this Monitoring Report: approved budget 2018 - 2019 for REDD+ Project RIU-SM's activities).

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

VM0007: METHODOLOGY FRAMEWORK (REDD-MF)

Data / Parameter	$\Delta C_{BSL,unplanned}$
Data unit	t CO ₂ e
Description	Net greenhouse gas emissions in the baseline from unplanned deforestation
Equations	3
Source of data	Module BL-UP
Value applied	Values applied: See Annex 9 of PDD – VM0007 Table 10. Net GHG emissions under the REDD baseline scenario up to year t*
Justification of choice of data or description of measurement methods and procedures applied	See module BL-UP
Purpose of Data	Calculation of baseline emissions
Comments	Without comment

VMD0001: Estimation of carbon stocks in the above- and below ground biomass in live tree and non-tree pools (CP-AB)

Data / Parameter	<i>CF</i>
Data unit	t C t d.m. ⁻¹
Description	Carbon fraction of dry matter
Equations	1, 3, 10, 11
Source of data	Values from the literature: <i>IPCC 2006, Volume 4 - AFOLU, Chapter 4 – Forest Land, Table 4.3 Carbon Fraction of aboveground forest biomass (p. 4.48)</i>
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	The default value is 0.47 tonne of C per tonne of biomass (dry weight). This default value is more realistic for herbaceous biomass (<i>IPCC 2006, Volume 4 - AFOLU, page 6.9</i>).
Purpose of Data	Transform biomass to carbon

Comments	Without comment
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Data / Parameter	R
Data unit	t root d.m. t ⁻¹ shoot d.m.
Description	Root to shoot ratio appropriate to species or forest type / biome; note that as defined here, root to shoot ratio is applied as belowground biomass per unit area:aboveground biomass per unit area (not on a per stem basis)
Equations	5, Equation to calculate
Source of data	• Yepes A.P., Navarrete D.A., Duque A.J., Phillips J.F., Cabrera K.R., Álvarez, E., García, M.C., Ordoñez, M.F. 2011. Protocolo para la estimación nacional y subnacional de biomasa - carbono en Colombia. Instituto de Hidrología, Meteorología, y Estudios Ambientales-IDEAM-. Bogotá D.C., Colombia. 162 p. tabla 14, p. 86 • IPCC 2006, Chapter 4, page 4.49, Table 4.4 "Tropical moist deciduous forest / above-ground biomass >125 tonnes ha⁻¹"
Value applied	$R = 0,24$
Justification of choice of data or description of measurement methods and procedures applied	This is a recommended indirect method for estimating carbon in roots biomass, it is the result of review of more than 160 researchs in bosques nativos tropicales, templados y boreales (Cairns <i>et al</i> , 1997) in Yepes <i>et al</i> , 2011.
Purpose of Data	Estimating carbon in roots biomass according to aboveground biomass
Comments	Guidelines for Conservative Choice of Default Values: 2. Global value is selected from Table 4.4 of the AFOLU Guidelines (IPCC 2006), by choosing a climatic zone and forest type that most closely matches the project circumstances.

VMD0004: Estimation of stocks in the soil organic carbon pool (CP-S)

Data / Parameter	Dep_{sample}
Data unit	cm
Used in equations	1
Description	Depth in cm to which soil sample is collected
Source of data	(Yepes, <i>et al.</i> , 2011. Protocol for national and sub-carbon biomass estimate in Colombia), page 93.
Measurement procedures (if any)	(Yepes, <i>et al.</i> , 2011. Protocol for national and sub-carbon biomass estimate in Colombia), section "1.1.1 Muestreo en campo", page 92.
Any comment	Without comment

Data / Parameter	F_{LU}
Data unit	Dimensionless
Used in equations	3
Description	Land use factor before or after conversion
Source of data	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Measurement procedures (if any)	It was used according to source of data.

Any comment	Stock Change Factors as defined in IPCC 2006GL are equal to the carbon stock in the altered condition as a proportion of the reference carbon stock. Stock Change Factors must be selected to reflect the circumstances most closely matching those of the project area and baseline scenario, especially regarding climate and post-conversion land-use, taking into account management practices and carbon inputs.
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Data / Parameter	F_{MG}
Data unit	Dimensionless
Used in equations	3
Description	Management factor before or after conversion
Source of data	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Measurement procedures (if any)	I was used according to source of data.
Any comment	Stock Change Factors as defined in IPCC 2006GL are equal to the carbon stock in the altered condition as a proportion of the reference carbon stock. Stock Change Factors must be selected to reflect the circumstances most closely matching those of the project area and baseline scenario, especially regarding climate and post-conversion land-use, taking into account management practices and carbon inputs.

Data / Parameter	F_I
Data unit	Dimensionless
Used in equations	3
Description	Input factor before or after conversion
Source of data	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Measurement procedures (if any)	I was used according to source of data.
Any comment	Stock Change Factors as defined in IPCC 2006GL are equal to the carbon stock in the altered condition as a proportion of the reference carbon stock. Stock Change Factors must be selected to reflect the circumstances most closely matching those of the project area and baseline scenario, especially regarding climate and post-conversion land-use, taking into account management practices and carbon inputs.

VMD0007: Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP)

Data / Parameter	$A_{RRD, unplanned, hrp}$
Data unit	ha
Used in equations	3
Description	Total deforested area during the historical reference period (2001 a 2011) in the RRD
Module parameter originales in	Value taken from the satellite images
Any comments	The Landsat images have the adequate resolution and they are a free and available tool to all public.

Data / Parameter	$C_{AB_tree,i}$
Data unit	t CO ₂ -e ha ⁻¹
Used in equations	12, 13
Description	Carbon stock in aboveground biomass in trees in stratum i
Module parameter originales in	CP-AB
Any comments	Whitout comment

Data / Parameter	$C_{BB_tree,i}$
Data unit	t CO ₂ -e ha ⁻¹
Used in equations	12, 13
Description	Carbon stock in belowground biomass in trees in stratum i
Module parameter originales in	CP-AB
Any comments	Whitout comment

Data / Parameter	$C_{SOC,i}$
Data unit	t CO ₂ -e ha ⁻¹
Used in equations	12
Description	Carbon stock in soil organic carbon in the baseline in stratum i
Module parameter originales in	CP-S
Any comments	Whitout comment

Data / Parameter	$C_{SOC,PD-BSL,i}$
Data unit	t CO ₂ -e ha ⁻¹
Used in equations	13
Description	Mean post-deforestation stock in soil organic carbon in the post deforestation stratum i
Module parameter originales in	CP-S
Any comments	Whitout comment

VMD0010: Estimation of emissions from activity shifting for avoided unplanned deforestation (LK-ASU)

Data / Parameter	$\Delta C_{BSL,LK,unplanned}$
Data unit	t CO ₂ e
Description	Net CO ₂ emissions in the baseline from unplanned deforestation in the leakage belt
Equations	1, 6
Source of data	Module <i>BL-UP</i>
Value applied	Module <i>BL-UP</i> "Annex 10 of PDD – VMD0007 Table 47"

Justification of choice of data or description of measurement methods and procedures applied	See module BL-UP
Purpose of Data	Calculation of leakage emissions
Comments	Without Comment

Data / Parameter	<i>C_{LB}</i>
Data unit	t CO ₂ -e ha ⁻¹
Description	Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation inside the Leakage Belt
Equations	4
Source of data	field calculated: file: plot study fustales.xlsm, sheet "calculo Yst var Lk
Value applied	443.8 t CO ₂ -e/ha
Justification of choice of data or description of measurement methods and procedures applied	Calculate from field measurements using Module CP-AB. As forests in the leakage belt are deforested, the area weighted average will be recalculated at each monitoring period.
Purpose of Data	Calculation of leakage emissions
Comments	Without Comment

Data / Parameter	<i>C_{OLB}</i>
Data unit	t CO ₂ -e ha ⁻¹
Description	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the Leakage Belt
Equations	4
Source of data	Literature: Average carbon dioxide –e- (tco ₂ -e/ha) Philips J.F (2011) IDEAM estimaciones de carbon en Colombia Tabla 3.1 C B-ht:132.1 tC/ha
Value applied	484.37
Justification of choice of data or description of measurement methods and procedures applied	2. Use numbers derived from peer-reviewed literature that are nationally or at least regionally appropriate The available national forest area and <i>MANFOR</i> and <i>PROTFOR</i> will change over time. The area-weighted average will be recalculated at least every 5 years.
Purpose of Data	Calculation of leakage emissions
Comments	Without Comment

Data / Parameter	<i>A_{BSL,PA-unplanned,t}</i>
Data unit	ha
Description	Projected area of unplanned baseline deforestation in the project area at time t
Equations	7
Source of data	Module BL-UP
Value applied	Calculated value. Annex 10 of PDD – VCS Module VMD0007, Table 25

Justification of choice of data or description of measurement methods and procedures applied	See Module BL-UP
Purpose of Data	Calculation of leakage emissions
Comments	Without Comment

VMD0015: Methods for monitoring of GHG emissions and removals (M-MON)

Data / Parameter	<i>Regional Forest / Non-forest Cover Benchmark Map</i>
Data unit	ha
Description	Map showing the stratification and location of forest and non-forest areas in the Reference Region RRD at the beginning of the accreditation (<i>Map of spatial limits RRD 2011 – REDD+ project RIU-SM</i>)
Source of data	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied	"Landsat" images have adequate spatial resolution corresponding to 30 meters and an approximate scale of 1:70000, is a tool available to the public.
Any comments	Without Comment
Used in equations	3

Data / Parameter	<i>Project Forest Cover Benchmark Map</i>
Data unit	ha
Description	Map showing the stratification and location of forest areas in the Project area at the beginning of the accreditation (100% forested). (<i>Map of spatial limit PA 2011 – REDD+ project RIU-SM</i>)
Source of data	Landsat satellite images
Justification of choice of data or description of measurement methods and procedures applied	"Landsat" images have adequate spatial resolution corresponding to 30 meters and an approximate scale of 1:70000, is a tool available to the public.
Any comments	Without Comment
Used in equations	3, 8

Data / Parameter	<i>Leakage Belt Forest Cover Benchmark Map</i>
Data unit	ha
Description	Map that shows the stratification and location of forest in the Leakage belt at the beginning of the accreditation (100% forested). (<i>Map of spatial limit CF 2011 – REDD+ project RIU-SM</i>)
Source of data	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied	"Landsat" images have adequate spatial resolution corresponding to 30 meters and an approximate scale of 1:70000, is a tool available to the public.
Any comments	Without Comment

Used in equations	3
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Data / Parameter	A_i
Data unit	ha
Description	Total area of each stratum i . (<i>Table spatial boundaries, similarity VMD0016.xlsx</i>)
Source of data	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied	Every time prior to baseline renewal (at a minimum every ten years)
Any comments	Ex-ante because it is assumed that strata area will remain constant.
Used in equations	19

Data / Parameter	$A_{RRD, unplanned, hrp}$
Data unit	ha
Description	Total deforested area during the term of reference (until 2011) in the RRD. (<i>deforestation for hrp -2001 to 2011- in RRD</i>)
Source of data	Value taken from the Landsat satellite images, used by the Deforestation Model
Justification of choice of data or description of measurement methods and procedures applied	"Landsat" images have adequate spatial resolution corresponding to 30 meters and an approximate scale of 1:70000, is a tool available to the public.
Any comments	Monitored for purpose of baseline revisions.
Used in equations	This parameter is not associated with any VCS equation; see Annex 10 of PDD – VCS Module VMD0007 section 2.1.3

Data / Parameter	CF
Data unit	t C t d.m. ⁻¹
Description	Carbon fraction of dry matter
Source of data	Values from the literature: <i>IPCC 2006, Volume 4 - AFOLU, Chapter 4 – Forest Land, Table 4.3 Carbon Fraction fo aboveground forest biomass (p. 4.48)</i>
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	The default value is 0.47 tonne of C per tonne of biomass (dry weight). This default value is more realistic for herbaceous biomass (<i>IPCC 2006, Volume 4 - AFOLU, page 6.9</i>).
Purpose of Data	Transform biomass to carbon
Comments	Without comment
Equations	19

Data / Parameter	$f_j(X,Y)$
Data unit	t d.m. tree ⁻¹
Description	Allometric equation for species j linking measured tree variable(s) to aboveground biomass of living trees, expressed as t d.m. tree ⁻¹

Source of data	Protocol for the national and subnational estimates of biomass - carbon Colombia - IDEAM, 2011 (Yepes, et al., 2011), Equation 12.
Justification of choice of data or description of measurement methods and procedures applied	Equation with sufficient validation, $R^2 = 0.932$, with national coverage data for the type of tropical rainforest.
Any Comments	It will be valued by the method "Limited Measurements". Are selected trees at least 30 species of flora composition in the Project Area, with a minimum of 20 cm in diameter and a maximum diameter that represents the greatest present or potentially present trees in the future in the Project Area in the Leakage belt. • Measure DBH, and height to a 10 cm diameter top or to the first branch. • Calculate stem volume from measurements and multiplying by species-specific density to gain biomass of bole. • Apply a biomass expansion factor to estimate total aboveground biomass from stem biomass. For broadleaf tropical trees this factor shall be: – 1.38 for trees 20-40cm – 1.33 for trees 40-80cm – 1.25 for trees ≥ 80cm • Plot all the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation. If the estimated biomass of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If plotting the biomass of the measured trees indicates a systematic bias to overestimation of biomass (>75% of the trees above the predicted curve) then destructive sampling must be undertaken, or another equation selected.
Used in equations	This parameter is associated with equation 35, but that equation does not apply.

Data / Parameter	<i>Change in the land use</i>
Data unit	%
Description	Percentages of the project area that will change the land use after deforestation.
Source of data	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied	To calculate the rate of deforestation
Comments	Without Comment
Used in equations	This does not apply

VMD0016: Module: Methods for stratification of the project area (X-STR)

Data / Parameter	$A_{BSL,i}$ or A_i
Data unit	ha
Description	Area of baseline stratum i
Equations	1, 6, 8, 12 or 7
Source of data	Own assessment
Value applied	Annex 15 and Annex 10 of PDD, Table 2

Justification of choice of data or description of measurement methods and procedures applied	GIS coverages, ground survey data and/or remote imagery (satellite photographs) as outlined in Chapter 5.
Purpose of Data	Calculation of baseline emissions
Comments	Without Comment

VMD0017: Estimation of uncertainty for REDD+ project activities (X-UNC)

Data / Parameter	$A_{BSL,RRD,unplanned,t}$
Data unit	ha
Description	Projected area of unplanned baseline deforestation in the RRD in year t
Equations	1
Source of data	Module BL-UP
Value applied	13,857 ha/year
Justification of choice of data or description of measurement methods and procedures applied procedures (if any)	See module BL-UP
Purpose of Data	Calculation of uncertainty
Comments	Without Comment

Data / Parameter	$E_{REDD_BSL\ SS,i, pool\#}$
Data unit	t CO ₂ e
Description	Carbon stock or GHG sources (eg, trees, dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in the REDD baseline case
Equations	4
Source of data	The terms denoting significant carbon stocks, GHG sources or leakage emissions from baseline modules (<i>BL-DFW</i> , <i>BL-PL</i> , <i>BLUP</i>) used to calculate net emission reductions.
Value applied	Annex 10 of PDD – VCS Module VMD0007, part 4 step 4.2.1
Justification of choice of data or description of measurement methods and procedures applied procedures (if any)	See relevant modules
Purpose of Data	Calculation of uncertainty
Comments	Baseline stocks and sources are estimated <i>ex ante</i> for each baseline period

Data / Parameter	$U_{REDD_BSL,SS,i,pool\#}$
Data unit	%
Description	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the REDD baseline case (1, 2, <i>n</i> represent different carbon pools and/or GHG sources)

Equations	4
Source of data	Calculations arising from field measurement data
Value applied	Annex 16 of PDD – VCS Module VMD0017 Table 7
Justification of choice of data or description of measurement methods and procedures applied (if any)	Uncertainty in pools derived from field measurement with 95% confidence interval calculated as the standard error of the averaged plot measurements in each stratum multiplied by the <i>t</i> value for the 95% confidence level For emission sources conservative parameters should be used sufficient to allow the uncertainty to be set as zero.
Purpose of Data	Calculation of uncertainty
Comments	Baseline stocks and sources are estimated <i>ex ante</i> for each baseline period

Data / Parameter	<i>E_{REDD,WPS,SS,i, Pool#}</i>
Data unit	t CO ₂ e
Description	Carbon stock or GHG sources (eg, trees, soil organic carbon) in the project case
Equations	10
Source of data	The terms denoting significant carbon stocks, GHG sources or leakage emissions used in calculating net emission reductions, are from the following relevant modules: CP-AB, CP-S, BL-UP, LK-ASU.
Value applied	See Annex 13 of PDD – VCS Module VMD0001 Carbon Stock in each stratum; file "VMD0017.xlsx" sheet "RIU-SM soils"
Justification of choice of data or description of measurement methods and procedures applied (if any)	See relevant modules
Purpose of Data	Calculation of uncertainty
Comments	The <i>ex ante</i> estimation were derived directly from the estimations originating in the relevant modules: CP-AB, CP-S.

Data / Parameter	<i>U_{REDD,WPS,SS,i,pool#}</i>
Data unit	%
Description	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the project case (1, 2, <i>n</i> represent different carbon pools and/or GHG sources)
Equations	10
Source of data	Calculations arising from field measurement data
Value applied	file "VMD0017.xlsx" sheet "RIU-SM soils"
Justification of choice of data or description of measurement methods and procedures applied (if any)	Uncertainty in pools derived from field measurement with 95% confidence interval calculated as the standard error of the averaged plot measurements in each stratum multiplied by the <i>t</i> value for the 95% confidence level. For emission sources conservative parameters should be used sufficient to allow the uncertainty to be set as zero.
Purpose of Data	Calculation of uncertainty
Comments	<i>Ex ante</i> the uncertainty in the project carbon stocks and sources shall be equal to the calculated baseline uncertainty

3.2 Data and Parameters Monitored

3.2.1 Data and Parameters Monitored every ten years for baseline renewal

VMD0001: Estimation of carbon stocks in the above- and below ground biomass in live tree and non-tree pools (CP-AB)

Data / Parameter	A_{sp}
Data unit	ha
Used in equations	2, 6, 14
Description	Area of sample plots in ha
Source of data	(Yepes, et al., 2011)
Measurement procedures (if any)	50 x 50 meters (0.25 ha) (Yepes et al. IDEAM, 2011. Protocol for national and sub-carbon biomass estimate in Colombia, Table 9 page 52)
Monitoring frequency	Monitoring must occur at least every ten years for baseline renewal
QA/QC procedures	Permanent consultation and supervision
Purpose of data	Determination of size of plots to realize field work and then calculate aboveground and below biomass
Calculation method	Literature (Yepes et al. IDEAM, 2011)
Any comment	This parameter was known ex-ante.

Data / Parameter	N
Data unit	Dimensionless
Used in equations	4, 8
Description	Number of sample points
Source of data	(Yepes, et al., 2011)
Measurement procedures (if any)	According to Yepes, 2011. (Protocol for national and sub-estimation of biomass carbon in Colombia, page 24)
Monitoring frequency	Monitoring must occur at least every ten years for baseline renewal.
QA/QC procedures	Permanent consultation and supervision
Purpose of data	Determination of number of plots to realize field work and then calculate aboveground and below biomass
Any comment	This parameter was known ex-ante

Data / Parameter	DBH
Data unit	cm
Used in equations	1, 3
Description	Diameter at breast height of a tree in cm
Source of data	Field measurements in sample plots
Measurement procedures (if any)	Typically measured 1.3 m aboveground. Measure all trees above some minimum DBH in the sample plots. The minimum DBH is 10 cm (for humid tropical forests 10 cm is commonly used). Minimum DBH employed in inventories is held constant for the duration of the project
Monitoring frequency	Monitoring will occur every ten years for baseline renewal
QA/QC procedures	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management will be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003
Purpose of data	To calculate the biomass of the tree

Calculation method	The circumference of the tree at the height of 1.30 cm is measured and then becomes the DBH. Minimum circumference is approx. 31 cm
Any comment	This parameter was known ex-ante.

Data / Parameter	<i>H</i>
Data unit	m
Used in equations	1, 3
Description	Total height of tree
Source of data	Field measurements in sample plots
Measurement procedures (if any)	The heights of the trees were taken, <i>but this variable was not taken into account in the allometric equation</i>
Monitoring frequency	Monitoring may occur at least every ten years for baseline renewal
QA/QC procedures	This does not apply
Purpose of data	This does not apply
Calculation method	This does not apply
Any comment	This parameter was known ex-ante.

VMD0004: Estimation of stocks in the soil organic carbon pool (CP-S)

Data / Parameter	<i>C_{SOCsample}</i>
Data unit	g C/100 g soil (fine fraction <2 mm)
Used in equations	1
Description	Soil organic carbon of the sample in g C/100 g soil
Source of data	Field sampling and laboratory determination
Measurement procedures (if any)	For soil carbon determination, an aggregate sample is collected from within a sample plot in the field, thoroughly mixed and sieved through a 2 mm sieve. The prepared sample is analyzed for percent organic carbon using Walkley-Black method. (Annex 14-2 of PDD)
Monitoring frequency	Soil organic carbon is an included pool, monitoring will occur every ten years for baseline renewal
QA/QC procedures	Standard quality control / quality assurance (QA/QC) is determined by following procedures: field data collection is realized according Protocol of IDEAM (Yepes, et al., 2011) and the analysis is made according Walkley-Black method
Any comments	This parameter was known ex-ante.

Data / Parameter	<i>BD_{sample}</i>
Data unit	g cm ⁻³
Used in equations	1
Description	Bulk density of fine (< 2 mm) fraction of mineral soil per unit volume of sample in g cm ⁻³ ; bulk density equals the oven dry weight of the fine fraction (< 2 mm) of the soil core divided by the core volume
Source of data	Field sampling and laboratory determination
Measurement procedures (if any)	Procedure applied VMD0004
Monitoring frequency	Soil organic carbon is an included pool, monitoring will occur every ten years for baseline renewal

QA/QC procedures:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management will be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the IPCC GPG LULUCF 2003
Any comments	This parameter was known ex-ante.

VMD0007: Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP)

Data / Parameter	<i>Any spatial feature included in the spatial model that is subject to changes over time (Factor Maps)</i>
Data unit	Depending on the spatial features selected
Used in equations	This does not apply
Description	Factor Maps
Source of data	According to field verification and geographic information systems (SIG)
Measurement procedures (if any)	Update of digital maps
Monitoring frequency	It will be updated each time the baseline renewal (every 10 years)
QA/QC procedures	If secondary information, revision of reliable sources will be made; if primary information will be obtained according to IDEAM protocols.
Any comment	Without comment

Data / Parameter	<i>Risk Maps</i>
Data unit	ha
Used in equations	This does not apply
Description	This map shows, for each pixel, the risk for deforestation as a numerical scale (eg: 0 = 1 = minimal risk and the maximum risk)
Source of data	Maps derived factors.
Measurement procedures (if any)	By FOM confirmation process, testing various options (as specified in Section 3.2 of Annex 10 of PDD VCS-Module BL-UP VMD0007) to reach the best FOM.
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
QA/QC procedures:	By FOM model validation.
Any Comments	Without comment

Data / Parameter	<i>Baseline Deforestation Maps</i>
Data unit	Depending on the spatial features selected
Used in equations	This does not apply
Description	Maps showing the location of deforested hectares in each year of the baseline period
Source of data	Landsat satellite image.
Measurement procedures (if any)	Update of digital maps
Monitoring frequency	It will be updated each time the baseline renewal (at least every 10 years)
QA/QC procedures	Quality assessment using field GPS points taken in and confronted by the confusion matrix described in the PDD.
Any comment	Without comment

Data / Parameter	<i>AA_U</i>
-------------------------	------------------------------

Data unit	%
Used in equations	Part 2, Section 2.1.4
Description	Evaluation of the accuracy of unplanned deforestation rate (greater than or equal to 90%)
Source of data	Protocol digital image processing for quantitation of reforestation in Colombia, fine and gross national scale, IDEAM, chapter "Quality assessment Theme, p. 29 ". (Cabrera, Galindo, & Vargas, Protocolo de Procesamiento Digital de Imágenes para la Cuantificación de la Deforestación en Colombia, Nivel Nacional Escala Gruesa y Fina, 2011)
Measurement procedures (if any)	Meidinger model (2003) for the sampling design and model Bernal (2004) for assigning weights per stratum is used.
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
QA/QC procedures	The deforestation rate is calculated by the geographic information system therefore quality control is defined by the image processing control, following the rules of protocol (Cabrera et al. 2011) and field verification.
Any Comment	Without comment

Data / Parameter	<i>Correct</i>
Data unit	ha
Used in equations	15
Description	Area correct due to observed change predicted as change
Source of data	Spatial model of deforestation location
Measurement procedures (if any)	Area estimation through spatial intersection of the observed area and projected to start HRP area.
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
QA/QC procedures	By FOM model validation.
Any Comments	This is generated from the intersection of two facts: The first is the deforestation observed through the satellite in the 2005-2011 period. The second is the projected deforestation (modeled) from 2005 to 2011 in the IDRISI software.

Data / Parameter:	<i>E_{rrA}</i>
Data unit:	ha
Used in equations:	15
Description:	Area of error due to observed change predicted as persistence.
Source of data:	Spatial model of deforestation location
Measurement procedures (If any):	Estimating spatial intersection area by area as observed with the predicted change as persistent area.
Monitoring frequency:	It will be adjusted every 10 years at baseline renewal
QA/QC procedures:	By FOM model validation.
Any comment:	Without comment

Data / Parameter	<i>E_{rrB}</i>
Data unit	ha
Used in equations	15
Description	Area of error due to observed persistence predicted as change.
Source of data	Spatial model of deforestation location

Measurement procedures (If any)	Area estimation through spatial intersection observed as persistent as the predicted change area.
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
QA/QC procedures	By FOM model validation.
Any comment	Without comment

Data / Parameter	FOM
Data unit	Ha
Used in equations	10
Description	Figure of Merit
Source of data	Remote sensing
Measurement procedures (If any)	Testing various options (as specified in Section 3.2 of Annex 10 of PDD VCS-Module BL-UP VMD0007) to reach the best FOM.
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
QA/QC procedures	By FOM model validation.
Any comment	Without comment

Data / Parameter	LB
Data unit	ha
Used in equations	6, to calculate P_{LK}
Description	Leakage belt área. Map showing the location and stratification of forests within the leakage belt. (100% forest at the beginning of the project).
Source of data	Landsat satellite images.
Measurement procedures (If any)	Methodology described in the PD. Following the instructions in the "Protocol of digital image processing to quantify deforestation in Colombia" IDEAM and supported by (GOFC-GOLD, 2013).
Quality Assurance / Quality Control	Where leakage belt boundaries have not been derived using GPS on-the-ground measurements quality control shall be carried out. A minimum of 30 locations on the leakage belt boundary, each separated by at least 1 km, shall be visited. If a systematic bias is detected in the original boundaries and/or if >10% of locations differ by >50 m then the entire boundary shall be re-surveyed. According to quality control employed by the "Protocol of digital image processing to quantify deforestation in Colombia" IDEAM.
Monitoring frequency	It will be updated each time the baseline renewal (at least every 10 years).
QA/QC procedures	Quality assessment using field points GPS taken in and confronted by the confusion matrix described in the PDD.
Any comment	The stratification is based on the official map of Biomes IGAC (2008), available at the national SIGOT.

Data / Parameter	PA
Data unit	Ha
Used in equations	1, 2
Description	Unplanned deforestation project area. Map showing the location and stratification of forests within the project area (100% forest at the beginning of the project).
Source of data	Landsat satellite images
Measurement procedures (If any)	Methodology described in the PD. Follow the guidelines of the "Protocol of digital image processing to quantify deforestation in Colombia" IDEAM and supported by GOFC-GOLD (2011).
Monitoring frequency	It will be updated each time the baseline renewal (at least every 10 years)

Quality Assurance / Quality Control	Quality assessment using GPS field points taken in and confronted by the confusion matrix described in the PDD.
Any comment	The stratification is based on the official map of Biomes IGAC (2008), available at the national SDI SIG-OT.

Data / Parameter	P_{LK}
Data unit	Dimensionless
Used in equations	6
Description	Ratio of the area of the leakage belt to the total area of RRD
Source of data	Landsat Satellite images.
Measurement procedures (if any)	Calculated from the result of remotely sensed data analysis
Monitoring frequency	It will be updated each time the baseline renewal (at least every 10 years)
Quality Assurance / Quality Control	Through the accuracy assessment.
Any Comments	Monitored at least once every 10 years (when the baseline renewal). It was estimated at time zero, this estimate was used for ex-ante purposes

Data / Parameter	P_{PA}
Data unit	Dimensionless
Used in equations	5
Description	Ratio of the Project Area to the total area of RRD
Source of data	Landsat Satellite images.
Measurement procedures (if any)	Calculated from the result of remotely sensed data analysis
Monitoring frequency	It will be updated each time the baseline renewal (at least every 10 years)
Quality Assurance / Quality Control	Through the accuracy assessment.
Any Comments	Monitored at least once every 10 years (when the baseline renewal). It was estimated at time zero, this estimate was used for ex-ante purposes

Data / Parameter	RRD
Data unit	ha
Used in equations	4 (to calculate P_{RRL}), 5 (to calculate P_{PA}), 6 (to calculate P_{LK})
Description	Geographical limit of the reference region to project the rate of deforestation.
Source of data	Landsat satellite images.
Measurement procedures (if any)	Methodology described in the PC. Follow the guidelines of the "Protocol of digital image processing to quantify deforestation in Colombia" IDEAM and supported by GOFC-GOLD (2011).
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
Quality Assurance / Quality Control	Quality assessment using field GPS points taken in and confronted by the confusion matrix described in the PDD.
Any Comments	100% forest at the beginning of the historical reference period.

Data / Parameter	RRL
Data unit	ha
Used in equations	This does not apply

Description	Geographical boundaries of the reference region to locate deforestation.
Source of data	Landsat satellite Images and existing digital maps
Measurement procedures (if any)	Limits generated from geoprocessing methods.
Monitoring frequency	It will be updated each time the baseline renewal (at least every 10 years)
Quality Assurance / Quality Control	Quality assessment using field GPS points taken in and confronted by the confusion matrix described in the PDD.
Any Comments	Without comment

Data / Parameter	<i>Factor Maps</i>
Data unit	ha
Used in equations	This does not apply
Description	13 maps used to calibrate the risk model
Source of data	Landsat satellite images, SIGOT and mapping updates during the project
Measurement procedures (If any)	Limits generated from geoprocessing methods
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
QA/QC procedures	IDEAM standards are used for primary information and data from reliable sources such as government and research institutes are used for secondary information
Any comment	Procedure described in section 3

VMD0015: Methods for monitoring of GHG emissions and removals (M-MON)

Data / Parameter	<i>F_{LU}</i>
Data unit	Dimensionless
Description	Land use factor before or after conversion
Source of data	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Justification of choice of data or description of measurement methods and procedures applied	<i>F_{LU}</i> values for Tropical temperature and Moist/wet regime: A. For different activities to cropland Long term cultivated - 0.48 Paddy rice - 1.10 Perennial/ Tree crop - 1.00 Set aside (<20 yrs.) - 0.82 B. For Land-use conversions to cropland Native forest (non-degraded) - 1 Shifting cultivation (Shortened fallow) - 0.64 Shifting cultivation (Mature fallow) - 0.8 C. For grassland management Default value - 1
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
Any comments	Without comment
Used in equations	16

Data / Parameter	<i>F_{MG}</i>
Data unit	Dimensionless
Description	Management factor before or after conversion.
Source of data	Stock Change Factors are provided in Table 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.

Justification of choice of data or description of measurement methods and procedures applied	F_{MG} values for Tropical temperature and Moist/wet regime: A. For different activities to cropland Full tillage - 1.00 Reduced - 1.15 No-till - 1.22 B. For Land-use conversions to cropland Managed forest - 1.00 C. For grassland management Nominally manage (non-degraded) - 1 Moderately degraded grassland - 0.97 Severely degraded - 0.7 Improved grassland - 1.17
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
Any comments	Without comment
Used in equations	16

Data / Parameter	F_i
Data unit	Dimensionless
Description	Input factor before or after conversion
Source of data	Stock Change Factors are provided in Table 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Justification of choice of data or description of measurement methods and procedures applied	F_i values for Tropical temperature and Moist/wet regime: A. For different activities to cropland Low - 0.92 Medium - 1.00 High without manure - 1.11 High with manure - 1.44 B. For Land-use conversions to cropland Managed forest - 1.00 C. For grassland management Medium (only to improved grassland) - 1 High (only to improved grassland) - 1.11
Monitoring frequency	It will be adjusted every 10 years at baseline renewal
Any comments	Without comment
Used in equations	16

3.2.2 Data and Parameters Monitored annual or biennial when verification occurs

VM0007: METHODOLOGY FRAMEWORK (REDD-MF)

Data / Parameter	$\Delta C_{WPS-REDD}$
Data unit	t CO ₂ e
Description	Net GHG emissions in the REDD project scenario up to year t*
Equations	2
Source of data	See Module M-REDD
Description of measurement methods and procedures to be applied	See Module M-REDD

Frequency of monitoring/recording	See Module M-REDD / It will be monitored when verification occurs (annual or biennial)
QA/QC procedures to be applied	See Module M-REDD
Purpose of data	Calculation of project emissions
Calculation method	See Module M-REDD
Comments	Without comment

Data / Parameter	<i>1 CLK-AS, unplanned</i>
Data unit	t CO ₂ e
Description	Net greenhouse gas emissions due to activity shifting for projects preventing unplanned deforestation
Equations	4
Source of data	See Module LK-ASU
Frequency of monitoring	It will be monitored when verification occurs (annual or biennial)
Value applied	Folder " <i>calculation_tables</i> ", file " <i>VMD0010.xlsx</i> ", Sheet " <i>S7 Eq16 CLK-AS,unp Exante</i> "
Justification of choice of data or description of measurement methods and procedures applied	See Module LK-ASU
Purpose of Data	Calculation of leakage
Comments	Without comment

VMD0007: Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP)

Data / Parameter	<i>Project Forest Cover Monitoring Map</i>
Data unit	ha
Used in equations	3
Description	Map evidence stratification and location of the forest in the Project Area at the beginning of each verification period. It shows if there deforested areas within the project area
Source of data:	Obtained from satellite images and field verification of deforested areas if any (GPS)
Measurement procedures (If any):	By using satellite images covering the Project Area it would be determined if there are any variations in the forest stratum identified in the Project Area. In case there are deforested areas it would be verified in field and confirmed by using GPS
Monitoring frequency:	It will be monitored when verification occurs (annual or biennial)
Quality Assurance / Quality Control	Biennial verification of the project surfaces. Also, through the accuracy assessment with field work.
Any comments	Stratification is the same as the one used at the beginning of the term.

Data / Parameter	<i>Leakage Belt Forest Cover Monitoring Map</i>
Data unit	ha
Used in equations	3, 8

Description	Map evidencing the stratification and location of the forest in the Leakage Belt at the beginning of each verification period. It has to be evidenced if there are deforested areas.
Source of data	Satellite images and field verification of deforested areas if any (GPS).
Measurement procedures (If any):	By using satellite images covering the Leakage Belt it would be determined if there are any variations in the forest stratum identified in the Leakage Belt. In case there are deforested areas it would be verified in field and confirmed by using GPS.
Monitoring frequency:	It will be monitored when verification occurs (annual or biennial)
Quality Assurance / Quality Control	Biennial verification of the project surfaces. Also, through the accuracy assessment with field work.
Any comments	Stratification is the same as the one used at the beginning of the term.

VMD0010: Estimation of emissions from activity shifting for avoided unplanned deforestation (LK-ASU)

Data / Parameter	MANFOR
Data unit	ha
Description	Total area of forests under active management nationally
Equations	2
Source of data	Official data, peer reviewed publications and other verifiable sources
Description of measurement methods and procedures to be applied	According to procedures applied by "Registro Único de Áreas Protegidas – RUNAP (http://runap.parquesnacionales.gov.co/reportes) - Parques Nacionales Naturales de Colombia - Ministerio de Ambiente y Desarrollo Sostenible"
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
QA/QC procedures to be applied	See Section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	It does not apply
Comments	Without comment

Data / Parameter	PROTFOR
Data unit	ha
Description	Total area of fully protected forests nationally
Equations	2
Source of data	Official data, peer reviewed publications and other verifiable sources
Description of measurement methods and procedures to be applied	A demonstration is required that areas will be protected against deforestation. Such a demonstration shall include either: 3. Evidence that the government has immediately acted to evict any and all illegal squatters Colombian laws to establish protected forest areas and surveillance Ex-ante, because it can be assumed that PROTFOR shall remain constant.
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
QA/QC procedures to be applied	See Section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	According to national data, consulted in the corresponding period of monitoring
Comments	Without comment

Data / Parameter	TOTFOR
Data unit	ha
Description	Total available national forest area
	2
Source of data	Official data, peer reviewed publications and other verifiable sources
Description of measurement methods and procedures to be applied	Limited to forest areas within 5km of roads and rivers suitable for conversion to agriculture / livestock According to procedures applied by <i>IDEAM - Ministerio de Ambiente y Desarrollo Sostenible</i> to define total forests in Colombia.
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
QA/QC procedures to be applied	See Section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	According to national data, consulted in the corresponding period of monitoring
Comments	Without comment

Data / Parameter	$\Delta C_{P, LB}$
Data unit	t CO ₂ -e
Description	Net greenhouse gas emissions within the leakage belt in the project case
Equations	1,6
Source of data	Module M-REDD *(Folder "calculation_tables" file " VMD0015.xlsx", Sheet "Eq2 Cp LK Expost")
Description of measurement methods and procedures to be applied	It was calculated according to the method of the equation 2, Module M-MON (Ex-post)
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial)
QA/QC procedures to be applied	See chapter 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	VCS Module VMD0015, equation 2
Comments	Without comment

Data / Parameter	PROP_{IMM}
Data unit	Proportion
Description	Estimated proportion of baseline deforestation caused by immigrating population
Equations	5, 7, 8
Source of data	The source of data was chosen with priority from higher to lower preference as follows: 1. Official data (government) (DANE 2005) 2. Peer-reviewed published sources 3. Other verifiable sources 4. PRA

Description of measurement methods and procedures to be applied	Estimated as proportion of the area deforested according to the past census (2005) by population that migrated into the Leakage Belt and Project Area according to the past census (2005) (all areas within 2km of the boundaries of the project area and the leakage belt shall be considered here).
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
QA/QC procedures to be applied	See Section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	According to national data (DANE), consulted in the corresponding period of monitoring
Any comments	Without comment

Data / Parameter	$PROP_{RES}$
Data unit	Proportion
Description	Estimated proportion of baseline deforestation caused by population that has been resident for ≥ 5 years
Equations	It does not apply
Source of data	The source of data was chosen with priority from higher to lower preference as follows: 1. Official data (government) (DANE 2005) 2. Peer-reviewed published sources 3. Other verifiable sources 4. PRA
Description of measurement methods and procedures to be applied	Estimated as proportion of the area deforested in the past census (2005) by population resident in the Leakage Belt and Project Area for ≥ 5 years (all areas within 2km of the boundaries of the project area and the leakage belt shall be considered here).
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
QA/QC procedures to be applied	See Section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions.
Calculation method	According to national data (DANE), consulted in the corresponding period of monitoring
Any comments	Without comment

Data / Parameter	$A_{DefLB,i,t}$
Data unit	ha
Description	Area of recorded deforestation in the leakage belt in the project case in stratum i in year t
Equations	8
Source of data	Module M-REDD *(Folder "calculation_tables" file " VMD0015.xlsx", Sheet "Eq4 CPDefLB,i,t Expost")
Description of measurement methods and procedures to be applied	See Module M-REDD (VCS M-MON – VMD0015)

Frequency of Monitoring/ recording	See Module M-REDD (VCS M-MON – VMD0015) / Each monitoring executed (annual or biennial)
QA/QC procedures to be applied	See section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	This data is given by GIS analysis.
Comments	Without comment

Data / Parameter	$A_{DefPA,i,t}$
Data unit	ha
Description	Area of recorded deforestation in the project area in the project case in stratum i in year t
Equations	8
Source of data	Module M-REDD *(Folder "calculation_tables" file " VMD0015.xlsx", Sheet "Eq3 CPDefPA,i,t Expost")
Description of measurement methods and procedures to be applied	See Module M-REDD (VCS M-MON – VMD0015)
Frequency of Monitoring/ recording	See Module M-REDD (VCS M-MON –VMD0015) / Each monitoring executed (annual or biennial)
QA/QC procedures to be applied	See section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	This data is given by GIS analysis.
Comments	Without comment

Data / Parameter	<i>Leakage Belt Forest Cover Benchmark Map</i>
Data unit	This does not apply
Description	Map showing the location of forest land within the leakage belt area at the beginning of each monitoring period. Only applicable where leakage is to be monitored in a leakage belt.
Equations	3
Source of data	Module M-REDD (M-MON –VMD0015)
Description of measurement methods and procedures to be applied	See Module M-REDD (M-MON –VMD0015)
Frequency of Monitoring/ recording	See Module M-REDD (M-MON –VMD0015) / Each monitoring executed (annual or biennial)
QA/QC procedures to be applied	See section 9.3 of REDD-MF (VM0007)
Purpose of data	Calculation of leakage emissions
Calculation method	This does not apply
Comments	Without comment

VMD0015: Methods for monitoring of GHG emissions and removals (M-MON)

Data / Parameter	<i>Project Forest Cover Monitoring Map</i>
Data unit	ha
Description	Map evidencing the stratification and location of the forest in the Project area at the beginning of each verification period. It has to be evidenced if within the Project area there are deforested areas.
Source of data	Satellite images and field verification of deforested areas if any (GPS).
Justification of choice of data or description of measurement methods and procedures applied	By using satellite images covering the Project Area it would be determined if there are any variations in the forest stratum identified in the Project Area. In case there are deforested areas it would be verified in field and confirmed by using GPS
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
Any comments	Without comment
Used in equations	3

Data / Parameter	<i>Leakage Belt Forest Cover Monitoring Map</i>
Data unit	ha
Description	Map evidencing the stratification and location of the forest in the Leakage Belt at the beginning of each verification period. It has to be evidenced if there are deforested areas.
Source of data	Satellite images and field verification of deforested areas if any (GPS).
Justification of choice of data or description of measurement methods and procedures applied	By using satellite images covering the Leakage Belt it would be determined if there are any variations in the forest stratum identified in the Leakage Belt. In case there are deforested areas it would be verified in field and confirmed by using GPS
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
Any comments	Without comment
Used in equations	3, 8

Data / Parameter	$A_{DefPA, i, u, t}$
Data unit	ha
Description	Area of recorded deforestation in the project area in stratum i converted to land use u at time t
Source of data	Remote sensing imagery
Justification of choice of data or description of measurement methods and procedures applied	Preprocessing of satellite images, satellite processing image digital and segmentation to determine the coverage change. According to the standards set by the IDEAM
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
Any comments	Ex-ante, estimation was made of deforestation in the with-project case.
Used in equations	3

Data / Parameter	$A_{DefLB, i, u, t}$
Data unit	ha
Description	Area of recorded deforestation in the leakage belt in stratum i converted to land use u at time t
Source of data	Remote sensing imagery
Justification of choice of data or description of measurement methods and procedures applied	Preprocessing of satellite images, satellite processing image digital and segmentation to determine the coverage change. According to the standards set by the IDEAM
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
Comments	Ex-ante, estimation shall be made of deforestation in the leakage belt in the with-project case. The area of deforestation shall be made conservatively equal to: $\left(\sum_{t=1}^t (1 - PROP_{IMM}) * A_{BSL, LK, unplanned, t} \right) * (1 - PROP_{LPA})$ Where: $PROP_{IMM}$ Estimated proportion of baseline deforestation caused by immigrating population; proportion (Calculated in LK-ASU) $A_{BSL, LK, unplanned, t}$ Project rate of unplanned baseline deforestation in the Leakage Belt Area at year t; ha. yr⁻¹ (Output parameter from BL-UP) $PROP_{LPA}$ Estimated proportion of baseline deforestation agents given the opportunity to participate in leakage prevention activities; proportion (proportion shall be conservatively estimated and justifiable. Leakage prevention activities must be planned to fully replace income, product generation and livelihood. Projects have the option ex-ante to conservatively set PROPLPA as equal to 1). t 1, 2, 3 ... t years elapsed since the start of the project activity
Used in equations:	4

Data / Parameter	$A_{RRL, forest, t}$
Data unit	ha
Description	Remaining area of forest in RRL at time t
Source of data	Satellite images.
Justification of choice of data or description of measurement methods and procedures applied	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared
Frequency of Monitoring/ recording	It will be monitored when verification occurs (annual or biennial); examination must occur prior to any verification event
Any comments	There is no evidence of degraded areas or plots ex-ante within the project area.
Used in equations	This does not apply

VMD0016: Module: Methods for stratification of the project area (X-STR)

Data / Parameter	$A_{WPS, i}$ or A_i
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Data unit	ha
Description	Area of project stratum <i>i</i>
Equations	1, 6, 8, 12 or 7
Source of data	Own assessment
Description of measurement methods and procedures to be applied	GIS coverages and/or remote imagery (satellite photographs) as outlined in Chapter 5.
Frequency of monitoring/recording	At each monitoring event (annual or biennial)
QA/QC procedures to be applied	See Section 9.3 of <i>REDD-MF</i> (–VM0007)
Purpose of data	Calculation of project emissions
Calculation method	This data is given by GIS analysis.
Comments	Without comment

3.3 Monitoring Plan

The primary purpose of the Monitoring Plan is the collection of data to verify the level of deforestation within the Project Area and Leakage Belt over time, constantly updating estimates of emissions and the generation of sufficient and timely information to make adjustments to the strategies included in the project information (PDD). The Monitoring Plan, in general, focuses on two main components:

1. Monitoring of the objectives, products and activities of the Project (Matrix of Logical Structure, PDD, page 45) that is carried out through the evaluation and compliance of the same. (see section 2 of this report).

This monitoring involves monitoring actions for mitigation measures, monitoring actions and control of leakage factors and monitoring actions and control of Non-Permanence risk factors (section 2.1.2 of this report).

2. Monitoring of the Data and Parameters described in section 3.2 of this report.

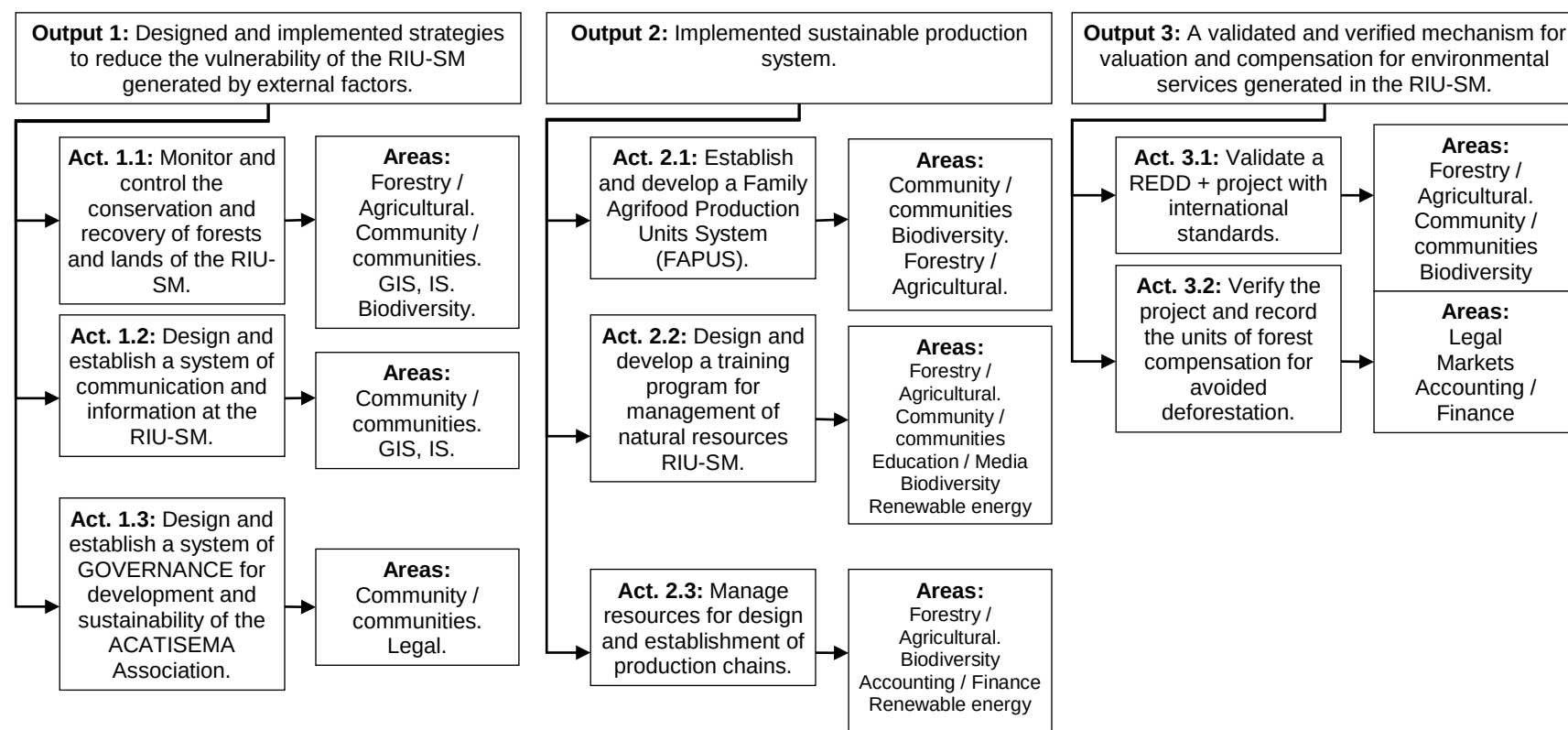
3.3.1 Organizational structure

Therefore, the actions related to the Monitoring Plan in its two components is developed by the interdisciplinary group of experts of the Project, in the following disciplinary areas of MEDIAMOS: forestry / agricultural; community / communities; geographic information system (GIS); information system (IS); education / media; renewable energy; legal; biodiversity; markets; accounting / finance.

This group maintains its coordination and integration with those responsible by ACATISEMA (Project Co-director, Zonal Coordinators) for the planning and execution of actions in the 5 zones of the territory, as explained above (see Annex 1.2.2.2 of PDD: Strategic Alliance ACATISEMA-MEDIAMOS, Ninth Clause. - Direction and Administration); the directorate and the general coordination is made by Project Director, Project Co-director and by General Coordinator of ACATISEMA.

The following illustration 30 shows the organizational structure for the implementation and monitoring of Project activities by MEDIAMOS.

Illustration 30. Organizational structure for the implementation and monitoring of Project activities



Área	Responsable
Forestry / Agricultural	Francisco Quiroga, Freddy Martínez
Community / communities	Mónica Barragán, Juan Pablo Muriel
Geographic Information System (GIS)	Miguel Idrobo, Daniel Osorio
Information system (IS)	Eider Pérez, Paulo Barragán
Education / Media	Gaby Boshell, Claudia Muriel, Sandra Bravo, Gustavo Muriel
Renewable energy	Henry Soto – Emanuel Barriga

Área	Responsable
Legal	Luis Felipe Barragán
Biodiversity	Juan Carlos Silva
Markets	Mónica Barragán, Daniela Quiroga
Accounting / Finance	Sandra Valdivia, accounting assistant

3.3.2 Monitoring and documentation of mitigation measures. Adaptive Management Plan

Mitigation measures presented in the section 2.1.2, Table 7 of this report are specifically monitored, documenting learned lessons or corrections necessary and incorporating them in Project decisions on progressive monitoring periods. Notice how each Project activity has tasks involving the monitoring, evaluation of results, systematization of these results and, finally, its divulgation and socialization. Systematization and evaluation of results imply identify corrective measures gaps and obstacles that may be appearing in the execution of each activity and mitigation measures. In the monitoring tasks of Project activities related to each mitigation measure, formats, records, minutes and reports of monitoring actions for respective mitigation measure are managed. The set of mitigation measures and monitoring processes and documentation are the Adaptive Management Plan of Project.

Annually the POA (Annual Operational Plans) are developed, which collected progressively, year after year, the experiences and lessons in the implementation and operation of the Project activities and mitigations measures.

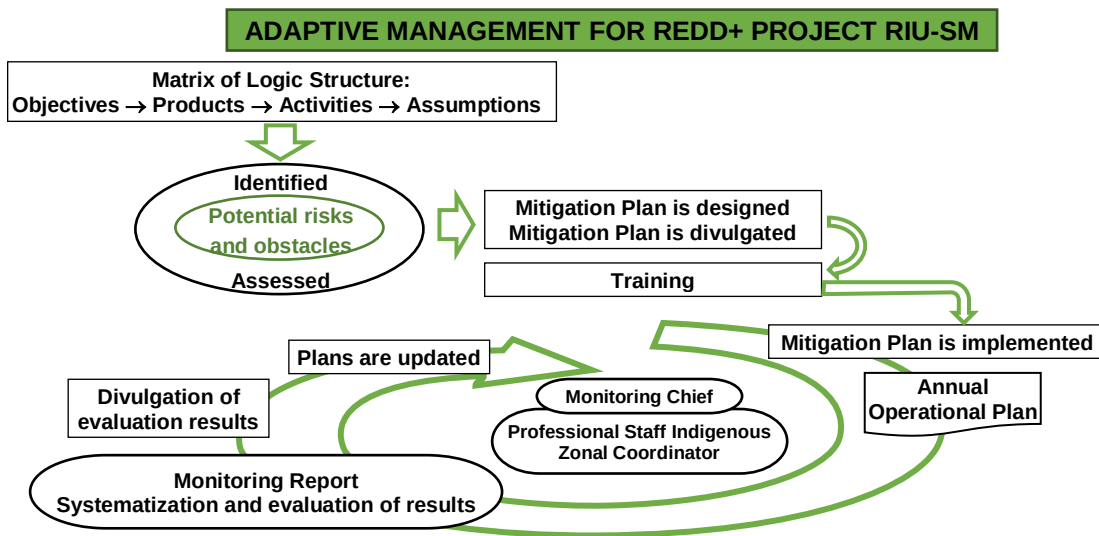
As explained above, it can be stated that Project is based in the premise of the “Adaptive Management”, in this sense every intervention on the territory is sustained in previous information collected in field as a knowledge basis. Based on this knowledge is that Operative Plans and the rest of the necessary instructions for the implementation of the project, the interventions on the territory and the treatment of the social component are defined.

This monitoring process of Project activities and mitigations measures leads to the identification of trends in the different variables and parameters, including those that are necessary and useful to assess compliance with the objectives of the Project and the Adaptive Management Plan; this knowledge, which is generated, leading to the adaptation of the system (plans and instructions).

The information collected in field by the technical staff and Indigenous Zonal Coordinator is systematized at the end of the year, with which the Monitoring Report is presented for the period, for the interdisciplinary group to analyze it and elaborate the Operative Plan of the following period, identifying additionally which manuals of instructions or protocols should be updated or adapted to the occurring changes.

Following, the information flow in the framework of the adaptive management of the project is presented:

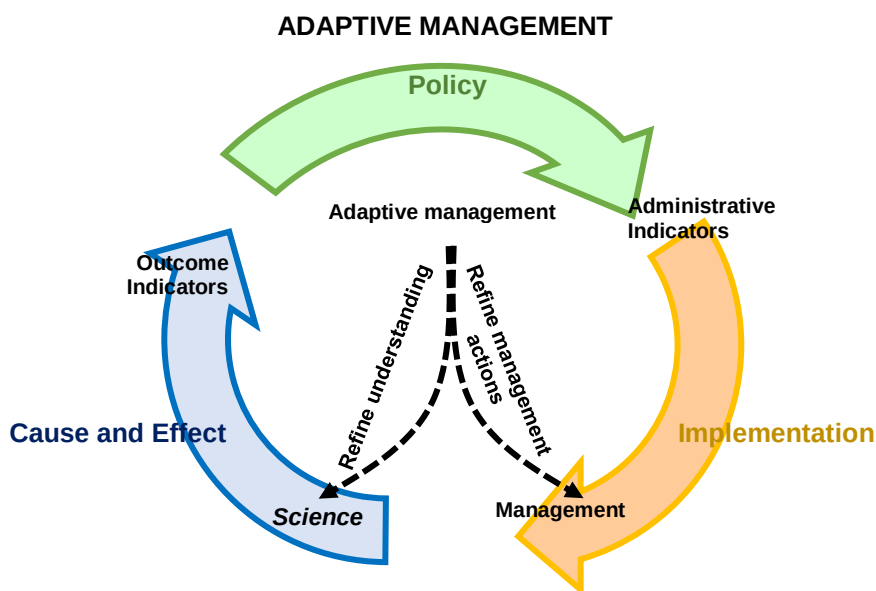
Illustration 31. Flow of Adaptive Management Plan



Source: REDD+ project RIU-SM

Adaptive management explicitly raised is experimental, ie, the integration of design with management and monitoring is sought in order to build knowledge through the development and testing of working hypotheses in order to adapt and learn. The following diagram illustrates this process.

Illustration 32. Integration of policy, implementation and cause-effect in AMP



Source: Adaptive Management: A Tool for Conservation Practitioners by Nick Salafsky, Richard Margoluis, and Kent H. Redford.
http://www.fosonline.org/Adaptive_Management1.cfm

3.3.3 Technical description of the tasks of monitoring of Data and Parameters

3.3.3.1 Data and parameters

The list of data and parameters that will be collected for the monitoring are the same data of the section 4.1 of PDD and, in same way, the procedures to make estimates of carbon stocks, which were presented in Section 3 of PDD. It should be noted that the plots installed are permanent and that the whole selected methodology is consistent with this feature.

Data Collection, Processing and Report

Data and parameters are defined in the Matrix of Logic Structure (MLS). The set of data collected, processed, reported and disseminated is the knowledge base and the Information System (IS) of REDD+ project RIU-SM (IS); this "IS" allows to identify trends in different variables and parameters that are useful to evaluate compliance with the objectives, results and indicators MLS.

Information System of REDD+ Project RIU-SM follows the recognized stages of planning and monitoring, as indicated in section 4.2 of PDD and whose collection, processing, analysis and interpretation of variables relation and parameters are presented in the chapters 2, 3, 4 and 5 of PDD.

The information collected in field, as presented in section 3.3.2 of this report, is systematized by professionals in charge of monitoring and evaluation, according to disciplinary areas of project (section 3.3.1 of this Monitoring Report), who will present the monitoring report for the stage at the end of the period and will elaborate the Operative Plan of the following period, identifying additionally which manuals of instructions or protocols should be updated or adapted to the changes that occur.

Formats have been defined for the collection of the field data and for variables that are to be monitored. The collected data is systematically digitalized in spreadsheets designed according to the information requirements. The calculations are made in spreadsheets using the correspondent formulas and thereafter the required reports are delivered as a basis for the development of Monitoring Report.

All the field monitoring processes are documented. All the plots are georeferenced and systematized within the GIS.

The physical and digital files which store the data generated during the monitoring process will be accessible in the two modalities (physical files and digital files), being kept in the offices of REDD+ project RIU-SM.

3.3.3.2 Stages or processes of the information management

The information management comprises the following steps or processes:

STEP 1: SELECTION AND ANALYSIS OF THE SOURCE OF LAND USE CHANGE

a. For the monitoring period, the following actions will be carried out:

- The collected and analyzed data should cover the entire Project Area and Leakage Belt. These data must be available for the year when verification occurs.

- To calculate each category of change of land use:
 - The area of each category within the project area and within the leakage belt will be calculated.
 - The forest cover maps of reference for the Project Area and Leakage Belt will be updated.
 - The remaining forest area within the project zone will be updated.
- b. For the monitoring period of 10 years. Baseline review:**
 - Use of high resolution images (30 m x 30 m or less, if available) at the end of the period when the baseline will be renewed.
 - The collected and analyzed data should:
 - To cover the entire reference region: data must be available for the year of baseline renewal or not more than a year earlier.
 - To be georeferenced for the processing of the land use change and geometrical corrections should be made as well as the detection of clouds and shadows.
 - The area of each category within the reference region, Project Area and the Leakage Belt will be calculated.
 - The forest cover maps for the reference area, Project Area and Leakage Belt will be updated.
 - Deforested areas during the first 10 years are estimated in order to adjust the baseline and the deforestation rate, if necessary.

STEP 2: INTERPRETATION AND ANALYSIS

This step comprises six sub-steps:

Sub-step 2.1 Monitoring of deforestation

- ✓ Deforested area within the Project Area (PA) per stratum.
- ✓ Deforested area within the Leakage Belt (LB) per stratum.

In both cases it must be specified the type of land use (LU) that have been changed to deforested areas. For the re-calculation of the baseline must be established or indicated if the percentage change of land use remains the same as in the initial baseline.

- ✓ Carbon stock in carbon pools:
 - Carbon stock in each stratum defined in the baseline is maintained. It will be reassessed for the baseline review (in 10 years).
 - Carbon stock of each land use is maintained. It will be reassessed for the baseline review (in 10 years).
- ✓ Deforested area within the Reference Region (for the baseline review).

Indications corresponding to the REDD Methodology Module be taken into account regarding the clouds for determining maps. A precise rate of 90% or more is wanted.

Sub-step 2.2 Monitoring of degradation

In this sense, it is expected that no degradation occurs by wood extraction due to illegal logging, firewood or coal production. If this happens, this degradation will be deducted.

A Participatory Rural Appraisal (PRA) will be conducted in order to determine whether degradation occurs. In this sense, these steps will be followed:

- ✓ Evaluate if degradation due to illegal logging occurs:
 - The PRA will be conducted every 2 years. If the results indicate that the Project Area has no pressure from this type of degradation, then it will be assumed that: $\Delta C_{p,Deg,i,t} = 0$.
- ✓ If the results of the PRA indicate that there is potential for degradation, then it must:
 - Obtain a “penetration distance” in the PRA (distance that the degradation agents can enter from the nearest access points).
 - Identify the most important access points to the vulnerable area.
 - From these points, draw distances and create a buffer zone with a width equal to the length of the penetration distance.
 - Transects will be established to evaluate the buffer zone. The assessed area should not be lesser than 1% of the buffer area.
 - If stumps are not found (harvested trees), then it is assumed that $\Delta C_{p,Deg,i,t} = 0$ and the assessment is repeated every 2 years.
 - If stumps are found, then a systematic assessment is carried out. For this, plots are distributed systematically, being the area to assess $\geq 3\%$ of the buffer area.
 - Take into account the diameter of the stumps, which will be assumed as their DBH. If they are very large (e.g. due to buttresses), then the specie of stump is identified and standing trees of the same species are located. Afterwards, their DBH and stump diameter are measured and a ratio between DBH/stump diameters is calculated. With this ratio, the DBH from the stump diameter of the cleared individuals that were found is estimated.
 - With the DBH data, the carbon stock of the harvested trees is calculated, using the allometric equation that was used for the estimation of the tree carbon stocks in the baseline.
 - It will be assumed that all carbon stock of harvested trees will be emitted to the atmosphere.
 - This assessment must be repeated every 2 years.

Sub-step 2.3 Monitoring of emissions in the project scenario

For this monitoring, estimation of carbon stocks before and after deforestation are used and, consequently, the estimation of changes of these stocks.

i Estimation of carbon stocks before deforestation

➤ Carbon stock inventory

The procedure for the implementation of the carbon stock inventory is indicated in section 3.1.2 of the PDD in accordance with the protocol settled down by IDEAM.

Estimations of carbon stocks are based on field observations obtained from plots of stratified random sampling, then allometric equations properly validated are used. The calculations of estimations are made using appropriate statistical developments in this type of sampling, as it was done in the initial carbon inventory.

➤ Size of field plots

The protocol established by the IDEAM was applied to determine the size and type of the plots (Protocol for the national and subnational estimates of biomass carbon in Colombia, 2011) (Yepes, et al., 2011), Chapter 1, pages 17 - 24. The size and type is determined by the table 4 (page 35), Step 1-3: selected plot size is 50 x 50 m (0.25 hectares) with a sampling error of 10%.

The plot size 50 x 50 m was considered the most suitable for this type of forest, taking into account the recommendation of studies “Keller et al. 2001”, “Chave et al. 2003”) (Yepes, et al., 2011), page 34:

“For the projects at sub-national scales (e.g. regional / subregional), it is recommended to use plots of 0.25 ha (50 mx 50 m) because it is the most appropriate size to achieve the required error in estimations of carbon (±10% with confidence of 95%) in forestry projects (Emmer 2007, Biocarbon Fund 2008, Rüginitz et al. 2009). This size allows to make estimations of average aboveground biomass and, therefore, of carbon, with very narrow confidence intervals, and very similar behaviors to those obtained when plots of 1.0 ha are used (...). Similar results were obtained in the Brazilian Amazon and Panama (Keller et al. 2001, Chave et al. 2003), where they concluded that plots of 0.25 ha were the ideal size to estimate the existing aboveground biomass in this forests type.”

➤ Amount of field plots

To calculate the number of plots (n) is necessary to specify the level of accuracy given by the maximum allowable sampling error ($E\%$) and the level of probability. The VCS VMD0017 standard - Module X-UNC states:

*“Guidance on uncertainty – a precision target of a **95% confidence interval half-width** equal to or less **than 15%** of the recorded value must be targeted. This is especially important in terms of project planning for measurement of carbon stocks; sufficient measurement plots should be included to achieve this precision level across the measured stocks.” (VCS Module VMD0017 Estimation of uncertainty for REDD+ project activities (X-UNC), page 5)*

To calculate the sample size (n) for stratified random sampling (H strata) Equation 4 of Protocol for national and sub-carbon biomass estimate in Colombia has been used (Yepes, et al., 2011), page 26:

$$n = \frac{t^2 \sum_{i=1}^H P_j S_j^2}{E^2 + \frac{t^2 \sum_{i=1}^H P_j S_j^2}{N}} \quad (\text{Equation 4})$$

Where:

n : number of sample plots

t : student t value for given probability

P_j : relative importance or proportion occupied by each stratum

S_j^2 : variance associated with the variable of interest in each stratum (biomass or carbon stored in vegetation)

E : sampling error

N : total number of plots that could be established in the area of interest.

The average of inventory ($\bar{X}$) is obtained using Equation 5 of the Protocol, page 26:

$$\bar{X} = \sum_{j=1}^H P_j * \bar{X}_j \quad (\text{Equation 5})$$

Where:

$\bar{X}$: average of inventory

P_j : relative importance or proportion occupied by each stratum

$\bar{X}_j$: average of inventory in each stratum

For the distribution of the number of samples in strata (n_j) Equation 6 of the Protocol is used, page 26:

$$n_j = n * P_j \quad (\text{Equation 6})$$

The confidence interval (CI) was calculated with Equation 8 of the Protocol, page 26:

$$IC = \bar{X} \pm S_{ye} * Z^{(\alpha)} \quad (\text{Equation 8})$$

Where:

CI : average of confidence interval

$\bar{X}$: average of inventory

S_{ye} : standard error of the stratified average of inventory

$Z^{(\alpha)}$: 1,96 (for the 95% probability level)

$$E = S_{ye} * Z^{(\alpha)}$$

With Equation 9 the sampling error percentage is calculated

$$E\% = \frac{S_{ye} * Z^{(\alpha)}}{\bar{X}} * 100 \text{ (Equation 9)}$$

$$E\% = \frac{E}{\bar{X}} * 100$$

Where:

$E\%$: sampling error (in percentage)

As shown, the value of n depends on the variance of the strata (S_j^2), which are unknown, and $E\%$ depends on the average $\bar{X}$ that is also unknown. Then the method to be used is an heuristic type, i.e. successive approximations previously using some existing related or approximate information and apply sampling pilots or pre-sampling to have some information about the variances and average, and based on them, to make a calculation of n and n_j of each stratum.

In our case to make pre-sampling and sampling pilots is very expensive, the high cost of travel to the selected parcels to go back, calculate and return back to the jungle. Therefore, as an initial guide information published by the IDEAM [Figure 6 of the Protocol for national and sub-carbon biomass estimate in Colombia, on page 36 it is used; or table 3 on page 123, Annex 2 (Yepes, et al., 2011)], which indicates that for plot size of 50m x 50m, an $E\%$ of 15% and a probability of 95%, in simple random sampling (in each stratum a simple random sample is selected independently) 11 plots would be required in each stratum, that is, with about 44 plots are conservatively approximate the size of stratified random sample.

Acting more conservatively and to ensure the accuracy levels required by the standard, if only 10%, there was a stratified random sample of 131 permanent plots, distributed proportionally in each stratum, as follows:

	Strata i			
	Helobiome	Peinobiome	Litobiome	Zonobiome
	n_1	n_2	n_3	n_4
n_j	16	29	24	62

Source: file "plot_study_fustales.xls", sheet "calculo Yst var PA (BA)" in folder "calculation_tables" of PDD

With independent simple random sampling in each stratum.

Application of equations

With the data of proportionality in each stratum with respect to the entire area of the Project Area, the P_j is obtained. With the data collected in each simple random sample from each stratum, estimate of S_j^2 in each stratum and the average of inventory were made:

	Strata <i>i</i>			
	Helobiome	Peinobiome	Litobiome	Zonobiome
P_j	0.1517	0.2835	0.1009	0.4639
S_j^2	10784.04	3448.60	4411.57	35100.57

Source: file "plot_study_fustales.xls", sheet "calculo Yst var PA (BA)" in folder "calculation_tables"

With these data Equation 4 was applied; for stratified random sampling with an $E\%$ of 15% and 95% probability:

$P_1 * S_1^2$	1,636.21
$P_2 * S_2^2$	977.60
$P_3 * S_3^2$	445.29
$P_4 * S_4^2$	16,281.77
$\sum_{i=1}^H P_j S_j^2$	19,340.87

$$t = 1.96$$

$$t^2 \sum_{i=1}^H P_j S_j^2 = 74,299.898$$

$N = 4,600,850$ (Source: file "plot_study_fustales.xls", sheet "calculo Yst var PA (BA)" in folder "calculation_tables" of PDD)

Sampling error (according to Equation 9)

$$E\% = 15\%$$

$$E = E\% * \bar{X}$$

$$E = 38.55$$

Finally, the number of plots in the 4 strata is calculated (Equation 4):

$$n = \frac{t^2 \sum_{i=1}^H P_j S_j^2}{E^2 + \frac{t^2 \sum_{i=1}^H P_j S_j^2}{N}} = 50$$

Equation 6 is applied to calculate the number of samples within each stratum (n_j), with $n = 50$:

$$n_j = n * P_j$$

	Strata <i>i</i>			
	Helobioma	Peinobioma	Litobioma	Zonobioma
P_j	0.1517	0.2835	0.1009	0.4639
n_j	8	14	5	23

Therefore, with sample sizes (# of plots) randomly selected independently in each stratum, compliance accuracy is guaranteed (all sample sizes in each stratum are higher than those required) to $E\%$ of 15% and probability level selected.

Applying Equation 4 to calculate $E\%$:

$$E^2 = t^2 \sum P_j S_j^2 \left(\frac{1}{n} - \frac{1}{N} \right)$$

$$E = 23.8$$

$E\% = \frac{E}{\bar{X}} * 100 = 9.3\%$, with a probability level of 95%, which meets conservatively with the level of accuracy established in the standard.

This sampling error value is equal to applying the equation presented in "*Sampling Techniques, Chapter 5 Stratified Random Sampling, page 92 (Cochran, 1997)*" to estimate the error of the mean of stratified inventory:

For stratified random sampling, the variance of the estimate $\bar{y}_{st}$ is:

$$V(\bar{y}_{st}) = \sum_{h=1}^L W_h^2 \frac{S_h^2}{n_h} (1 - f_h) \quad (5.6)$$

Where:

$V(\bar{y}_{st})$: variable of weighted sample mean

$\bar{y}_{st}$: weighted sample mean ($\bar{X}$) (estimator of the mean in stratified sampling)

W_h : stratum weight

S_h : true variable by stratum

n_h : numbers of plots by stratum

f_h : sampling fraction in the stratum (n_h/N_h)

h : stratum

The Standard Error of Mean is $\sqrt{V(\bar{y}_{st})} = (S_{ye})$.

Average of inventory $\bar{X}$ (Equation 5):

	Strata i			
	Helobiome	Peinobiome	Litobiome	Zonobiome
P_j	0.1517	0.2835	0.1009	0.4639
$\bar{X}_j$	10784.04	3448.60	4411.57	35100.57
$P_j * \bar{X}_j$	42.25	62.04	22.41	130.29
$\sum_{j=1}^H P_j * \bar{X}_j$	256.99			

$\bar{X} = 256.99$ (Source: file "plot_study_fustales.xls" sheet "calculo Yst var PA (BA)" in folder "calculation_tables" of PDD)

Stratified inventory standard error S_{ye} :

	Strata i			
	Helobiome	Peinobiome	Litobiome	Zonobiome
W_h^2	0.0230	0.0804	0.0102	0.2152
S_h^2	10784.04	3448.60	4411.57	35100.57
n_h	16	29	24	62
f_h	0.00002	0.00002	0.00005	0.00003

$$V(\bar{y}_{st}) = 148.75$$

$$S_{ye} = 12.20$$

(Source: file "plot_study_fustales.xls" sheet "calculo Yst var PA (BA)" in folder "calculation_tables" of PDD)

$$E\% = \frac{S_{ye} * Z^{(\alpha)}}{\bar{X}} * 100 = 9.3\%$$

(Source: file "plot_study_fustales.xls" sheet "calculo Yst var PA (BA)" in folder "calculation_tables" of PDD)

The observations of field work are presented in formats that also takes into Annex 13 of PDD – VCS Module VMD0001.

An instructive was elaborated to be applied in field work (Annex 13 of PDD: CP-AB – VCS Module VMD0001) indicating procedures for plots locating and trees measuring. This instructive was updated for this monitoring period 2016-2017 (Annex 5.7 of this Monitoring Report).

Following are the results of the analysis of the sample (Annex 19 of PDD "Estimation of carbon in the above and belowground biomass in live trees").

➤ Data processing

Following the corresponding steps for processing field data are presented

1. Selection of the allometric equation:

The following is the equation that is applied for trees (in spanish "fustales"). There is other equation for palms.

$$\ln(BA) = a + B1 \ln(D)$$

Where:

BA is the biomass of trees in kg

D is the average diameter measured at 1.3 m height from the ground for trees with DBH≥10cm

A and **B1** are model constants.

R² is the model adjustment.

Independent variable: diameter (D). The values of the estimated parameters are:

Forest type	a	B1	R ²
bh-T	-1.544	2.37	0.932

This allometric equation was selected by comparison with other equations. This equation offers the advantages of requiring only the diameter at breast height (DBH), reducing risks of uncertainty and measurement errors because other variables such as height and density are not required.

Allometric equation to estimate the biomass of palms

$$BA = 6.666 + 12.826 * H^{0,5} * \ln(H)$$

Where:

Acronym	Description
BA	Aboveground biomass, kg/tree
H	Height of the trunk, in meters. For palms this is the main stem, excluding the fronds

Source: (IPCC, 2003) Annex 4.A.2 (4.A.2 table, page 4.114 [513])

2. Estimation of aboveground biomass of each tree

The estimation of **biomass** of each tree is obtained applying the allometric equation. See file "plot_study_fustales.xls" in folder "calculation_tables".

3. Calculation of the average carbon in aboveground biomass per plot in each stratum

0.47 is the value of the factor that was used to transform biomass in carbon.¹⁵

Results of **biomass** and **carbon** in aboveground pool are presented in PDD, Table 48 “*Statistics of simple random sampling in each stratum. Aboveground biomass*”.

4. Calculation of the belowground biomass per plot in each stratum

0.24 is the value of the “R factor” that was used to calculate the belowground biomass according to aboveground biomass¹⁶.

Results of **biomass** and **carbon** in belowground pool are presented in PDD, section 3.1.2.2 “*Belowground tree biomass ($C_{BB_tree,i}$)*”, and in Table 51 of PDD are the “*Belowground tree biomass in each stratum*”.

5. Estimation of soil organic carbon

See Annex 14 of PDD.

Also, results of **soil organic carbon pool** study are presented in PDD, section 3.1.2.3 “*Estimation of soil organic carbon pool*”, and in Table 52 of PDD are the “*Statistics of simple random sampling in each stratum CO₂ in soil by soil depths*”.

6. Estimation of carbon stocks before deforestation

Results of **carbon stocks before deforestation** are presented in PDD, section 3.1.2.4 “*Forest carbon stock pre-deforestation*”, and in Table 53 of PDD are the “*Estimation of carbon stocks (t CO₂/ha) before deforestation for stratum*”.

In that section, following was presented:

- Equipment used for measuring and monitoring the aboveground carbon stock and
- Equipment used for measuring and monitoring the carbon stock in the soil organic

ii *Estimation of carbon stocks after deforestation*

Results of **carbon stocks after deforestation** are presented in PDD, section 3.1.2.7 “*Forest carbon stock post-deforestation*”, and in Table 68 are the “*Estimation of carbon stocks after deforestation for stratum*”.

¹⁵ CF = carbon fraction of dry matter (default = 0.47), (ton C/tonne d.m.) (IPCC, 2006) INV GLs AFOLU Chapter 4 Table 4.3)

¹⁶ AFOLU Guidelines (IPCC 2006, Chapter 4, page 4.49)

iii *Estimation of carbon stocks changes*

Results of **carbon stocks changes** are presented in PDD, section 3.1.2.8 “*Forest carbon stock changes*”, and in Table 69 are the “*Estimation of changes of carbon stocks for stratum*”.

iv *Estimation of Project emissions (Project Area - PA and Leakage Belt - LB)*

Project emissions are presented in section 4.2 “*Project Emissions*” of this report, and in Table 20 are the “*Net greenhouse gas emissions under the project scenario (PA) (ΔC_p), 2016-2017 period*”.

Leakage Belt emissions are presented in section 4.3 “*Leakage*” of this report, and in Table 28 are the “*Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation net CO₂ emissions, 2016-2017 period*”.

Sub-step 2.4 *Estimation ex-post of net reductions in emissions of greenhouse gases*

Based on real deforestation detected for 2016-2017 period in Project Area (PA), Leakage Belt (LB), and according to Annex 10 of PDD – VCS Module VMD0007, sub-step 2.1, the **current ex-post net reductions in emissions of GHG** are presented in this Monitoring Report, section 4.4 “*Net GHG Emission Reductions and Removals*”, and in Table 29 are the “*Total net GHG emission reductions of the REDD project activity, 2016-2017 period*”.

Sub-step 2.5 *Calculation of VCS buffer*

According to risk indicator, as result of application of VCS Module T-BAR (Annex 12 of this Monitoring Report), **buffer** for 2016-2017 period was calculated in section 4.4.2 “*Buffer, 2016-2017 period*” of this Monitoring Report.

Sub-step 2.6 *Calculation of VCU*s

According to VCS Methodology VM0007 - REDD-MF, section 8.4.7, VCU for 2016-2017 period was calculated in section 4.4.4 “*VCUs, 2016-2017 period*” of this Monitoring Report, and in Table 30 are the “*Number of Verified Carbon Units, 2016-2017 period*”.

3.3.3.3 *Quality control*

Quality control is established according to the stage of information processing and as it sets out in section 4.1 for each data or parameter:

- ✓ In the collection of field data: It has applied statistical methods of quality control based on Gauss or normal curve models. It can be applied to all parameters and variables established in the monitoring plan. The diameter of the trees is the variable that defines the biomass and the other parameters are derived from it.
- ✓ In the process of these data for storage and statistical analysis: It is applied the techniques of the computer processing, giving timely maintenance to the equipment and applications.

- ✓ In the analysis and interpretation of results that allow the comparison between periods in time to estimate ex post net changes in carbon stocks: also apply statistical methods of interpretation of results and inference.

All these quality controls have specialized and auxiliary personnel which allows lowering the level of risk of uncertainty and imprecision.

The process of data collection to statistics production is designing and it will be implemented in real time, saving time and manual processing steps to reduce error risks in the process.

In summary, the quality and control measures (QA/AC), standard operating procedures and methods of control and management of information collected are described as shown below:

CONTROL MEASURES	The following factors are considered: teams of collection and processing of information; trained staff; type of parameters and variables; statistical methods (samples, accuracy and level of reliability). The control elements are set for these factors according to established standards.
STANDARD OPERATING PROCEDURES	These procedures are defined and controlled according to the following phases: data collection, systematization, analysis, interpretation, inference and reporting of results. In Annex 5.9 the QA/QC procedures that are applied by MEDIAMOS to the field monitoring forms filled out by indigenous people groups of ACATISEMA in collection and systematization phases are presented.
METHODS OF CONTROL AND INFORMATION MANAGEMENT	The core of these methods focuses on security and storage thereof. In addition, control measures and standard operating procedures are taken into account.

3.3.4 Duration of monitoring period and date of monitoring start

In section 1.6 of this report was presented this information:

“1.6 Project crediting period

REDD project crediting period

Start: January 1st, 2013

End: December 31st, 2042

Total number of years: 30 years

Date at which the Project baseline will be revised

Each 10 years

Duration of Monitoring Period

The first period will be annual, and the following periods will be biennials

The first period annual was: 2013

The second period biennial was: 2014-2015

The third period biennial (this Monitoring Report): 2016-2017

And so successively.

Monitoring start date: 1st January 2013"

3.3.5 Internal Audit

The purpose of the internal audit is to minimize the risk of error, in such a way that it achieves the appropriate reliability of monitoring results. Its main stages are as follows:

1. Staff training

It includes the training of the interdisciplinary group and the new participants in the different roles to comply with the activities and tasks established for the REDD+ Project RIU-SM, however, aiming at always having quality information, the training on those critical points of the information management will be prioritized, which are field collection and its processing (specific evaluation and monitoring staff, field staff and GIS specialist). All staff must go through an induction process before executing any activity related to the monitoring.

2. In-field verification

It basically consists of monitoring in the field, and that the field staff is following the procedures set out in the methodological guidelines given in the previous process of induction. This work is in charge of the Project's Director and Co-director, Zonal Coordinators, Geographic Information System – GIS leader and Information System – IS leader.

An error in following the procedures should be corrected in the field during the execution of samplings or assessments.

3. Quality control when collecting and processing data

The collected data should be reviewed before (field forms) and after (electronic spreadsheet) in its digitalization, so that a second review can detect inconsistent information. This work is in charge of the Geographic Information System – GIS leader and Information System – IS leader.

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

4. Preparation of the Monitoring Report

With the information collected, processed and with results, having made the evaluation of the implementation status of Project activities and tasks, and the monitoring of Data and Parameters, the Monitoring Report was elaborated.

5. Review of the monitoring reports prior to publication

The monitoring reports must be reviewed prior to publication, in order to confirm the calculations, analysis and the conclusions are accurate and measured. This work is in charge of the Project's Director and Co-director, Geographic Information System – GIS leader and Information System – IS leader.

If non-conformities exist during the internal or external auditing processes, the data should be reviewed and the non-conformities addressed.

6. Publication of reports.

As part of one of the same tasks of the Project, the information generated in the execution of the activities is disseminating, socialized it to the indigenous communities in meetings in the Reservatoin, and exhibiting it to the public through communication mechanisms (web page of the Project, social networks, VCS Project Database)

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

Monitoring results of deforested areas

The procedure description for the implementation of monitoring in the Project Area and in Leakage Belt Area according to digital image processing and monitored points on the ground with their respective results by period 2016-2017, are presented below.

Maps of deforestation and updating of land coverage were processed according to IDEAM approaches in its so-called guidelines "Protocol of digital image processing for the quantification of deforestation in Colombia national level - gross and fine scale" developed by the IDEAM (*Protocolo de Procesamiento Digital de Imágenes para la Cuantificación de la Deforestación en Colombia, Nivel Nacional Escala Gruesa y Fina*, (Cabrera, Galindo, & Vargas, 2011)), and their procedures are considered official for regional planning to scale 1:100000. This procedure consists of:

Selecting and downloading images to RRL Area (Region Reference to Locate Deforestation) in Glovis web sit (USGS).

Step 1: Radiometric calibration and atmospheric correction: It was used the conversion radiance and reflectance procedure by applying the COST model (Chavez, 1996), which incorporates all the elements of the model of subtraction by dark object (for the elimination of fog), the rigorous models of atmospheric correction are not applicable as there is with information from input to feed these models.

Step 2: Geometric correction: It wasn't applied the geometric correction, since the land sat images are already Ortho-corrected. On the other hand, also it will correct topographically, since the entire area is a subject of a flat studio with slope below 15% by 99%.

Initial classification forest coverage / No forest (automated tool application)

At this stage the source document: "book on REDD GOFC-GOLD" (GOFC-GOLD, 2013) and "Protocol of digital image processing for the quantification of deforestation in Colombia national level - coarse and fine scale" developed by the IDEAM (Cabrera, Galindo, & Vargas, 2011) should be taken as a reference.

Step 3: Change detection: the method of detecting changes between the pair of images from the latest update of the RRL Area and the new image will be applied. So, both images will be in reflectance, in addition to add layers as NDVI and the first 3 main components of the bands (red, green, blue, near infrared, far infrared).

The change detection process generates three types of situations:

- Real changes
- Areas of change that were not detected
- Transform a polynomial vector.

Parameters for polygon generation rate:

- Polygons with areas greater than 1 ha.
- Polygons that are within the area of RRL

Step 4: Inspection: It will be an inspection and interpretation of each of the polygons of change detection:

Inspection 1: To detect changes that were not discovered by the algorithm of detecting changes and draw them according to the parameters.

Inspection 2: To delete exchange polygons that were detected by the algorithm as change due to fluctuations of phenology, floods or other phenomenon that alters the spectral values.

Step 5: Calculation of deforestation on the RRL forest

- Polygons that intersect with forest are cataloged as deforestation.

Step 6: Allocation of coverage: According to the interpretation of satellite images a category is assigned to define the uses of land cover giving for national land cover legend "Methodology Corine Land Cover adapted to Colombia scale 1:100 000" developed by the IDEAM (2010).

Selection of satellite images:

The images were acquired from the USGS Geological Service portal, "Earth Explorer" (<https://earthexplorer.usgs.gov/>) server, which were visited by sensor type, date and percentage of cloud cover.

To estimate the coverage and land use (forest and non-forest), Landsat 8 satellite images of the path and row (4-57 and 5-57) of December 2017 and January 2018.

LC08_L1TP_004057_20161228_20170314_01_T1

LC08_L1TP_004057_20170809_20170824_01_T1
LC08_L1TP_004057_20171231_20180103_01_T1
LC08_L1TP_004057_20180201_20180201_01_RT
LC08_L1TP_005057_20170205_20170216_01_T1
LC08_L1TP_005057_20180208_20180208_01_RT

Note that these images may only be acquired over a period between December and January of each year, since the remaining rainy season months do not allow to observe the earth's surface, given the percentage of cloud cover.

Processing of satellite images

For the processing of the selected satellite images IDRISI SELVA 17®, GDAL-Python and ArcGis 10.2.0® type will be used.

The processing of satellite images should include the following steps:

✓ Geometric correction

This process is applied only if the land sat image does not come with this band composition process.

It is applied to obtain a better quality in the classification of images by obtaining a single file per image.

✓ Visual classification

IDEAM methodology was used to classify the satellite images and working scale was 1:60000 and 1:70000. The identified types were:

- Forest
- Non-forest land.

The last one was divided into sub categories:

- Pastures.
- Heterogeneous Agricultural Areas
- Secondary forest
- Grasslands – sheets
- Regenerating vegetation

An accuracy assessment was developed to analyze the precision of the final maps.

More details of the whole procedure can be seen in the final technical report made (Annex 13 of this Monitoring Report). In that report the details of the work related to the GIS component of the REDD+ Project RIU-SM are presented, explaining the procedures, methods and techniques applied, and the adequate tools used to perform the tasks of obtaining, processing, analyzing and verifying the maps of land uses and coverage.

This process was carried out from April to June, 2018, during which activities of digital processing of satellite images, geoprocessing, verification of changes in the territory, training of the communities' people and validation of the final result were carried out. The product of this procedure is the updated map of the land uses and coverage in RRL (Reference Region for the location of deforestation) and, of course, the areas of change from forest to non-forest. It also includes the transition tables (file "monitoring.xlsx", sheet "Defor2016-2017", in folder "calculation_tables") generated from the geographic data, evaluated and consolidated.

In that report, a detailed description is made of each of the land uses and coverages, characterized in the Selva de Mataven, as well as the technical procedures of the remote sensors, the detail of the satellite images used, the detection of the changes, the allocation and coherence of the changes in coverage and the methodology used for the quantitative validation of the map.

It is finalized by presenting the results of the coverage map, the verification process carried out with the support of aerial images with Drone, in areas where it was important to verify some changes that were observed during the processing of the satellite images, in addition to the process of validation of the map using the samples taken in the field.

The results of the monitoring of deforestation in the period 2016-2017 are presented as following.

Table 8. Change from forest to other land use in the Project Area (PA) and Leakage Belt (LB) (2016-2017)

	Change LU/LC 2016-2017		Has/year
	Has	%	
Project Area (PA)	2,049.4	44.8%	1,024.7
Leakage Belt (LB)	2,522.1	55.2%	1,261.1
Total	4,571.6	100%	2,285.8
Change/year	2,285.8		

Source: File "monitoring.xlsx", Sheet "Defor2016-2017" in Folder "calculation_tables".

Table 9. Anthropic Deforestation (without considering change from forest to wetlands) in the Project Area (PA) and Leakage Belt (LB) (2016-2017)

	Change LU/LC 2016-2017		Has/year
	Has	%	
Project Area (PA)	1,501.8	41.3%	750.9
Leakage Belt (LB)	2,137.9	58.7%	1,068.9
Total	3,639.6	100%	1,819.8
Deforested/year	1,819.8		

Source: File "monitoring.xlsx", Sheet "Defor2016-2017" in Folder "calculation_tables".

Deforested areas projected for the years 2016 to 2017 for PA and LB were 31,137.2 hectares. Anthropic deforestation (without considering change from forest to wetlands) found for these two years is 3,639.6 hectares, which gives a percentage ratio of 11.7 i.e., that are reached to stop deforestation in 88.3% in the PA and LB.

The increase in deforestation with respect to the previous verified periods (2013 and 2014-2015) is mainly due to the immigration of indigenous people and Venezuelan settlers during these two years (2016-2017),

especially in Zone 3 (Orinoco river) that borders with Venezuela. This was analyzed in the meeting of Zonal Coordinators, Co-director of the Project, assistant of Co-director, zone leaders and technical assistants of ACATISEMA, together with the Project Director and technical staff of MEDIAMOS, held in Inírida in June 01-03, 2018. (Annex 2.16 of this Monitoring Report). Based on this, measures have been defined to resolve this impact in the reservation, incorporating some indigenous families into the RIU-SM communities and hiring the settlers.

Table 10. Change from forest to other land use in the Project Area (PA) by strata (biomes)

Biome	Change LU/LC 2016-2017		
	Has	%	Has/year
Helobiome	1,244.0	60.7%	622.0
Peinobiome	114.8	5.6%	57.4
Litobiome	105.4	5.1%	52.7
Zonobiome	585.3	28.6%	292.6
Total	2,049.4	100%	
Deforested/year	1,024.7		

Source: File "monitoring.xlsx", Sheet "Defor2016-2017" in Folder "calculation_tables".

Table 11. Change from forest to other land use in the Leakage Belt (LB) by strata (biomes)

Biome	Change LU/LC 2016-2017		
	Has	%	Has/year
Helobiome	792.2	31.4%	396.1
Peinobiome	491.3	19.5%	245.7
Litobiome	393.3	15.6%	196.7
Zonobiome	845.3	33.5%	422.6
Total	2,522.1	100%	
Deforested/year	1,261.1		

Source: File "monitoring.xlsx", Sheet "Defor2016-2017" in Folder "calculation_tables".

Table 12. Change from forest to other land use in PA and LB, by land use

		Categories of land cover (ha)										Total	%	Has/year
		HAA	%	GL	%	BS	%	VR	%	WL	%			
Project Area (PA)	(2016-2017)	1,405.8	68.6%	54.9	2.7%	36.4	1.8%	4.8	0.2%	547.7	26.7%	2,049.4	44.8%	1,024.7
	Change/year	702.9		27.4		18.2		2.4		273.8		1,024.7		
Leakage Belt (LB)	(2016-2017)	1,791.4	87.4%	117.0	5.7%	60.3	2.9%	169.2	8.3%	384.3	18.8%	2,522.1	55.2%	1,261.1
	Change/year	895.7		58.5		30.1		84.6		192.1		1,261.1		
TOTAL		3,197.1	156.0%	171.8	8.4%	96.7	4.7%	174.0	8.5%	931.9	45.5%	4,571.6	100.0%	2,285.8
Defor/year		1,598.6		85.9		48.3		87.0		466.0		2,285.8		
%		69.9%		3.8%		2.1%		3.8%		20.4%				

Source: File "monitoring.xlsx", Sheet "Defor2016-2017" in Folder "calculation_tables".

In both, Project Area and Leakage Belt, the change of land cover / land use, from forest, has been dedicated to Heterogeneous Agricultural Areas (HAA) (69.9%), Wetland (20.4%), Vegetation in Regeneration (VR) (3.8%), Grassland (GL) (3.8%) and Bare Soil (2.1%).

4.1 Baseline Emissions

To calculate the baseline emissions the following three stages were fulfilled:

1. *Calculation of Carbon stocks and CO₂-e in biomass in following pools: Aboveground Tree Biomass ($C_{AB_tree,i}$), Belowground Tree Biomass ($C_{BB_tree,i}$) and Soil Organic ($C_{SOC,i}$), by stratum i , by hectare.*
2. *Determination of the unplanned deforestation within the Region Reference to project Deforestation rate (RRD) during historical reference period (HRP), to estimate the threat of deforestation within Project Area (PA)*
3. *Calculation of baseline Carbon stock changes and GHG emissions*

The following is a summary of each stage:

4.1.1 Calculation of carbon stocks in Aboveground tree biomass, Belowground tree biomass and Soil Organic

4.1.1.1 Estimation of carbon stocks in aboveground tree biomass ($C_{AB_tree,i}$)

To calculate Aboveground Tree Biomass CO₂-e ($C_{AB_tree,i}$) (Annex 13 of PDD – VCS Module VMD0001, part 1) following steps were fulfilled:

1: Determine the tree dimensions and size and amount of field plots

Procedures to determinate size and number of plots and parameters to be measured in each tree and results are presented in Annex 13 of PDD – VCS Module VMD0001, page 7 – 15 and section 3.1.2.1, step 1 of PDD.

2: Selection of an appropriate and validated allometric equation

The equation used for estimation of biomass in trees was Equation 12 of “*Protocol for the national and subnational estimates of biomass - carbon Colombia - IDEAM, 2011*” (Yepes, et al., 2011) (Annex 13 of PDD – VCS Module VMD0001, page 15), and Equation 5 for palms applied according to the “*Good practice guidance for land use, changing land use and forestry. 2003, Annex 4.A.2 (table 4.A.2, page 4.114 [513])*” (IPCC, 2003): Procedures are also presented in section 3.1.2.1, step 2 of PDD.

Aboveground tree biomass by plot: To calculate the Aboveground Tree Biomass by plot, all the results of the dry matter of each tree and palm in a same plot were added.

Results by plot are in “REDD+ Project RIU-SM Folder “calculation_tables” of PDD, file “plot_study_fustales.xlsm”, Sheet “estad grals”

Aboveground tree biomass by hectare: To calculate the Aboveground Tree Biomass by hectare, Equation 14 of “Protocol for the national and subnational estimates of biomass - carbon Colombia - IDEAM, 2011” (Yepes, et al., 2011) (Annex 13 of PDD – VCS Module VMD0001, page 17)

Equation used for estimation of biomass by hectare:

$$BA \text{ (t/ha)} = BA \text{ (kg/plot)} * (1 \text{ t/1000 kg}) * 4$$

Where:

BA (t/ha): aboveground tree biomass by hectare (tones of dry matter in each hectare)

BA (kg/par): aboveground tree biomass by plot (kg of dry matter in each plot)

(1 t/1000 kg): conversion factor from kg to tones

4: conversion factor from plots to hectares (depended on the size of plot used: 50x50m=0,25 ha)

Results of Aboveground tree biomass by hectare can see in Table 48 of PDD.

3: Estimate Carbon stock in Aboveground Tree Biomass

The aboveground tree biomass of each individual already was estimated using the appropriate Equations (as it was explained before). Standard defines a parameter factor of 0.47 (CF in VCS Module VMD0001, page 12; (IPCC, 2006) INV GLs AFOLU, chapter 4 table 4.3) to estimate Carbon stock from Aboveground Tree Biomass.

According the Equation 1 of Module VCS-VMD0001 (page 5):

$$C_{AB_tree,sp,i} = \sum_j^S \sum_{l=1}^{N_{j,sp,i}} f_j(X, Y \dots) * CF_j$$

Where:

C_{AB_tree,sp,i} : Carbon stock in aboveground biomass of trees in plot sp in stratum i (ton C)

CF_j : Carbon fraction of biomass for species group j (0.47 ton C / ton d.m.)

f_j(X, Y ...) : Aboveground biomass of trees based on allometric equation for species group j based on measured tree variable(s) (1 / ton d.m. tree)

Equation 1 of Module VCS-VMD0001 is equivalent to:

$$CBA = BA \text{ (t/ha)} * CF$$

Where:

CBA: Carbon stock in aboveground tree biomass (tones of C / ha)

BA (t/ha): Aboveground tree biomass already converted to “ton dry matter / ha” from “ton dry matter / plot”

CF : Carbon fraction of biomass for species group j (0.47 ton C / ton d.m.)

Results for each tree, each plot and by hectare can see in: PDD Folder “calculation_ tables”, file “plot_study_fustales.xlsm”, in Sheets for each plot in each stratum, for example (for plot 10 of helobiome, the sheet is called H-10). A mean by stratum *i* of Carbon stock in aboveground tree biomass can see in

REDD+ Project RIU-SM Folder “calculation_ tables”, file “plot_study_fustales.xlsm”, Sheets “estad H”, “estad P”, “estad L”, “estad Z”.

Results of Aboveground tree biomass Carbon stock by hectare can see in Table 48 of PDD.

4: Calculate Aboveground Tree Biomass Carbon stock converted to Carbon Dioxide equivalent

According the Equation 2 of Module VCS-VMD0001 (page 5):

$$C_{AB_tree,i} = \sum_{sp=1}^{Pi} (C_{AB_tree,sp,i} / A_{sp,i}) * 44/12$$

Where:

$C_{AB_tree,i}$: Mean aboveground biomass carbon stock in stratum i (t CO₂-e / ha)

$C_{AB_tree,sp,i}$: Aboveground biomass carbon stock of trees in sample plot sp of stratum i (t C / plot)

$A_{sp,i}$: Area of sample plot sp in stratum i (ha)

To convert the values of “Aboveground Tree Biomass Carbon stock CAB (already converted in tones of C / ha)” into Carbon Dioxide Equivalent $C_{AB_tree,i}$ (tones of CO₂-e / ha) the factor of $44/12 \approx 3.67$ was used (this factor by dividing the atomic weight of a molecule of carbon dioxide, by the specific weight of carbon), as recommended by the IPCC 2003, 2006. That is, the number of tones of “ CAB ” is multiplied by 3.67.

Results of aboveground tree biomass (BA), Carbon stock in aboveground tree biomass (CBA) and $C_{AB_tree,i}$ can be seen in the Table 48 of PDD.

Detailed results by hectare in each plot are in PDD Folder “calculation_tables”, file “plot_study_fustales.xlsm”, Sheet “estad grals”

4.1.1.2 Estimation of carbon stocks in belowground tree biomass ($C_{BB_tree,i}$)

To calculate Belowground Tree Biomass CO₂-e ($C_{BB_tree,i}$) (Annex 13 of PDD – VCS Module VMD0001, part 2) following steps were fulfilled:

1: Calculate the belowground tree biomass carbon stock for each plot:

According the Equation 5 of Module VCS-VMD0001 (page 7):

$$C_{BB_tree,sp,i} = R * C_{AB_tree,sp,i}$$

Where:

$C_{BB_tree,sp,i}$: Belowground tree biomass carbon stock of trees in plot sp , in stratum i ; (t C / plot)

$C_{AB_tree,sp,i}$: Aboveground tree biomass carbon stock in sample plot sp , in stratum i (t C / plot)

R : Root to shoot ratio (t root d.m. / t shoot d.m.)

The Belowground Tree Biomass Carbon stocks of each tree were obtained by multiplying the results of Part 1, Step 3 (Aboveground Tree Biomass Carbon stock (tones of C / ha)) with the Root to Shoot Ratio, equal to 0.24. This value is for tropical moist forest with Aboveground Tree Biomass higher than 125 t/ha, and was taken from the Module VCS VMD0001 CP-AB, version 1.1 [in Module VCS VMD0001 CP-AB a modified table 4.4 of the AFOLU Guidelines (IPCC 2006, Chapter 4, page 4.49) is presented in page 17].

Results of Belowground tree biomass Carbon stock by hectare can see in Table 51 of PDD.

2: Calculate Belowground Tree Biomass Carbon stock converted to Carbon Dioxide equivalent

According the Equation 6 of Module VCS-VMD0001 (page 7):

$$C_{BB_tree,i} = \sum_{sp=1}^{Pi} (C_{BB_tree,sp,i} / A_{sp,i}) * 44/12$$

Where;

$C_{AB_tree,i}$: Mean belowground biomass carbon stock in stratum i (t CO₂-e / ha)

$C_{AB_tree,sp,i}$: Mean belowground tree biomass carbon stock of trees in plot sp of stratum i (t C / plot)

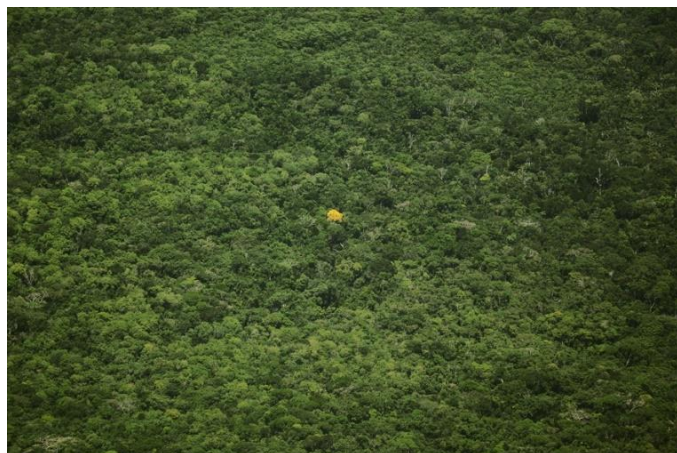
$A_{sp,i}$: Area of sample plot sp in stratum i (ha)

To convert the values of “Belowground Tree Biomass Carbon stock C_{BB} (already converted in tones of C / ha)” into Carbon Dioxide Equivalent $C_{BB_tree,i}$ (tones of CO₂-e / ha) the factor of $44/12 \approx 3.67$ was used (this factor by dividing the atomic weight of a molecule of carbon dioxide, by the specific weight of carbon), as recommended by the IPCC 2003, 2006. That is, the number of tones of “ C_{BB} ” is multiplied by 3.67.

Results of belowground tree biomass carbon stock (BB), Carbon stock in belowground tree biomass (C_{BB}) and $C_{BB_tree,i}$ can be seen in the Table 51 of PDD.

A study of the biomass in “vegetation on regeneration” was also carried out, but for conservative effects these amounts of carbon were not included in the total used in baseline.

Illustration 33. Aerial shot of the Matavén Forest, 2016



4.1.1.3 Estimation of carbon stocks in soil organic

To calculate Soil Organic CO₂-e ($C_{SOC,i}$) (Annex 14 of PDD – VCS Module VMD0004, part 1) following steps were fulfilled:

1: Calculate of the Soil Organic Carbon stock

In some plots where Aboveground and Belowground were calculated, samples of ground were extracted as field sampling of soil organic.

To determine the bulk density of the soil samples, the protocol of Burton & Pregitzer (2008) was used. Volume and density of the rocks and fractions were calculated using the Equations 32, 33, 34 and 35 of such protocol.

For the determination of total organic carbon in a soil sample, method of wet combustion of Walkley - Black (Mendoza Squares, 2011) was used by sugerence of Soil Laboratory of IDEAM (see report analyzing soil organic carbon and bulk density “Annex14-1_report_soil_analysis” of PDD, and the format standardization “determination of organic carbon in soils-Walkley Black Method”, IDEAM 2011 “Annex14-2_Walkley-Black_method” of PDD).

The calculation of carbon stock was performed for each sampled depth in the pit in selected sample plot by stratum.

Equation 1 of VCS Module VMD0004 (page 2) is used to calculate the Carbon stock in soil organic carbon for each sample of ground.

(Equation 1 of VCS Module VMD0004 is equal to Equation 37 Burton & Pregitzer -2008)

$$C_{SOC,sp,i} = C_{SOCsample,sp,i} * BD_{sample,sp,i} * Dep_{sample,sp,i} * 100$$

Where:

$C_{SOC,sp,i}$: Carbon stock in soil organic carbon for sample plot sp , stratum i (t C / ha).

$C_{SOCsample,sp,i}$: Soil organic carbon of the sample in sample plot sp , stratum i ; determined in the laboratory (fine fraction <2 mm) (g C / 100 g soil).

$BD_{sample,sp,i}$: Bulk density of fine (<2 mm) fraction of mineral soil in sample plot sp , stratum i ; determined in the laboratory (g fine fraction / cm³ total sample volume).

$Dep_{sample,sp,i}$: Depth to which soil sample is collected in sample plot sp in stratum i (cm).

$C_{SOCsample,sp,i}$ is determined in the laboratory. This % value is calculated to each plot in each stratum. Results can see in PDD Folder “calculation_tables”, file “soil_analysis.xlsx”, where each plot is identified by its code (for example, for plot 10 of helobiome, the sheet is called H-10).

In each plot $C_{SOC,sp,i}$ is calculated for each depth. Results can see in PDD Folder “calculation_tables”, file “soil_analysis.xlsx”, Sheet “COS ac biom” for each plot in each stratum.

Results of Soil Organic Carbon stock by hectare can see in Table 99 of PDD.

2: Calculation of Soil Organic Carbon stock converted to Carbon Dioxide equivalent:

Equation 2 of VCS Module VMD0004 (page 3) is used to calculate the Carbon stock in soil organic carbon converted to Carbon Dioxide equivalent for each sample of ground.

(Equation 2 of VCS Module VMD0004 is equal to Equation 38 Burton & Pregitzer -2008)

$$C_{SOC,i} = \sum_{sp=1}^{P_i} (C_{SOC,sp,i} / P_i) * 44/12$$

Where:

$C_{SOC,i}$: Mean carbon stock in soil organic carbon for stratum i (t C / ha).

$C_{SOC,sp,i}$: Carbon stock in soil organic carbon for sample plot sp , stratum i (t C / ha).

sp : 1, 2, 3, ... P_i sample plots in stratum i .

To convert the values of "Soil Organic Carbon stock SOC" into Carbon Dioxide Equivalent $C_{SOC,i}$ (tones of CO₂-e / ha) the factor of $44/12 \approx 3.67$ was used (this factor by dividing the atomic weight of a molecule of carbon dioxide, by the specific weight of carbon), as recommended by the IPCC 2003, 2006. That is, the number of tones of "SOC" is multiplied by 3.67.

Results have been calculated for different depths, but for REDD+ Project RIU-SM only a cumulative Soil Organic Carbon stock to depth 30 cm was considered. Results of Soil Organic Carbon stock and $C_{SOC,i}$ for depth 30 cm can be seen in the following Table 13:

Table 13. Average of Soil Organic Carbon stock (tones C /ha) and Carbon Dioxide equivalent $C_{SOC,i}$ (tones CO₂ /ha) in depth 30 cm according stratum i

$i=1$ Helobiome		$i=2$ Peinobiome		$i=3$ Litobiome		$i=4$ Zonobiome	
SOC (ton C/ha)	$C_{SOC,i}$ (ton CO ₂ /ha)	SOC (ton C/ha)	$C_{SOC,i}$ (ton CO ₂ /ha)	SOC (ton C/ha)	$C_{SOC,i}$ (ton CO ₂ /ha)	SOC (ton C/ha)	$C_{SOC,i}$ (ton CO ₂ /ha)
33.7	123.5	53.4	195.8	56.7	207.8	54.3	199.2

Source: REDD+ Project RIU-SM PDD Folder "calculation_ table", file "soil_analysis.xlsx", Sheets "COS ac biom" and "CO2 ac biom"

4.1.2 Determination of the unplanned deforestation within the RRD during historical reference period (HRP), to estimate the threat of deforestation within Project Area (PA)

In VMD0007 (Annex 10 of PDD) the estimation of annual areas of unplanned deforestation was calculated (Part 2, page 35). The procedure was implemented by applying the following steps

4.1.2.1 Analysis of historical deforestation

A historical reference period (HRP) was defined to realize the study of historical deforestation in RRD. HRP consists in a period from 2001 to 2011, with three points (2001, 2005 and 2011).

Collection of appropriate data Sources: Landsat TM and ETM + images were used to identify the deforestation. A list of these images is in Annex 10 of PDD – VCS Module VMD0007, Table 16, page 36.

Mapping of historical deforestation: Different procedures were implemented to analyze and interpret the digital information available in satellite images. These procedures are described in Annex 10 of PDD – VCS Module VMD0007, pages 37 - 42.

Calculation of the historical deforestation rate: Deforestation during historical reference period (hrp) is in section 3.1.2.5 of PDD:

Map accuracy assessment: An evaluation of the verifiable accuracy of maps produced in the former step 2.1.4 (Annex 10 of PDD – VCS Module VMD0007) was required to produce a reliable estimate of the historical deforestation rate.

4.1.2.2 Estimation of the annual areas of unplanned baseline deforestation in the RRD, PA, LB

$A_{BSL,RRD,unplanned,t} = 13,857 \text{ ha / year}$

$A_{BSL,RR,unplanned,t} = 15,694 \text{ ha / year}$

$A_{BSL,PA,unplanned,t} = 11,031 \text{ ha / year}$

$A_{BSL,LK,unplanned,t} = 4,663 \text{ ha / year}$

The procedures and their results are in section 3.1.2.6 of PDD.

Projected area of unplanned baseline deforestation in the project area / year was estimated by applying spatial model. Results are presented in the Table 61 for PA and Table 62 for LB of PDD:

Total projected area in Project crediting period (2013-2042), in PA and LB:

$A_{BSL,PA,unplanned} = 298,410 \text{ ha}$

$A_{BSL,LK,unplanned} = 169,828 \text{ ha}$

4.1.3 Calculation of baseline carbon stock changes and GHG emissions

4.1.3.1 Forest carbon stocks pre-deforestation

Baseline Carbon Stocks by pool per forest stratum i are presented in Table 53 of PDD:

4.1.3.2 Calculation of post-deforestation carbon stocks

Historical area-weighted average was used to estimate the post-deforestation carbon stocks.

Weightings by classes of land uses post-deforestation (2001-2011) are presented in Table 63 of PDD.

Estimations of carbon stocks after deforestation for land use by stratum are presented in Tables 64, 65, 66 and 67 of PDD.

Estimations of carbon stocks after deforestation for stratum are presented in Table 68 of PDD.

4.1.3.3 Calculation of changes of Carbon Stocks for stratum

Procedures and results of changes of Carbon Stocks for stratum are presented in section 3.1.2.8 of PDD and Table 69 of PDD.

4.1.3.4 Calculation of the sum of baseline carbon stock changes

Procedures and results of changes of sum of baseline carbon stock changes in section 3.1.2.9 of PDD and Table 70 for PA and Table 71 for LB, in PDD.

4.1.4 Baseline Emissions in 2016-2017 period

The net GHG emissions under the baseline scenario in the 2016-2017 period (Table 70 years 2014 and 2015):

Table 14. Net GHG emissions under the baseline scenario, 2016-2017 period

t	Year	$\Delta C_{BSL,unplanned}$ (t CO ₂ -e)
4	2016	5,499,384
5	2017	3,686,093
Total		9,185,476

Source: Annex 10 of PDD – VCS Module VMD0007, Table 46; PDD File “monitoring.xlsx”, sheet “Monitoring_summary”, period “2016-2017”, section “Baseline Emissions” and File “VMD0007.xlsx”, sheet “P4 Step4.3 Eq24(PA) C stck chng” (folder “calculation_tables”)

4.2 Project Emissions

To calculate the Project Emissions the following stages were fulfilled:

1. Calculation of Baseline Carbon stock by pool / stratum.
2. Calculation of Carbon stock after deforestation in all pools for land use / stratum.
3. Calculation of Net Carbon stock changes after deforestation in all pools for land use / stratum.
4. Determination of deforested area in Project Area in all pools for land use / stratum.
5. Calculation of Net Carbon stock changes after deforestation in Project Area, in all pools for land use / stratum.

The following is a summary of each stage:

4.2.1 Calculation of Baseline Carbon stock by pool / stratum

Annex 10 of PDD – VCS Module VMD0007, Part 4, Step 4.2.1, presents the “Estimation of Carbon stock changes by each pool in each stratum”

$C_{BSL,i}$ is the subtotals from Table 53 of PDD, by each stratum.

Table 15. Baseline Carbon Stocks by pool per forest stratum i

C Pool	$i=1$ Helobiome	$i=2$ Peinobiome	$i=3$ Litobiome	$i=4$ Zonobiome
	$t \text{ CO}_2\text{-e} / \text{ha}$	$t \text{ CO}_2\text{-e} / \text{ha}$	$t \text{ CO}_2\text{-e} / \text{ha}$	$t \text{ CO}_2\text{-e} / \text{ha}$
$C_{BSL,i}$	718.5	663.4	682.3	799.4

Source: REDD+ Project RIU-SM. PDD Folder "calculation_tables" file "VMD0007.xlsx", Sheet "P4 Step4.2.1 forest C stock"

4.2.2 Calculation of Carbon stock after deforestation by pool for land use / stratum

Equation 6 of VCS Module VMD0015 was used to calculate the Carbon stock in all pools in post-deforestation land use u in stratum i . Equation 6 is presented in section 3.2, numeral 2°.

$C_{post,u,i}$ are in Table 73 of PDD, by each stratum:

Table 16. Estimation of Carbon Stocks after deforestation for land use ($C_{post,u,i}$) ($t \text{ CO}_2\text{-e} / \text{ha}$)

C Pool	$i=1$ Helobiome			$i=2$ Peinobiome			$i=3$ Litobiome			$i=4$ Zonobiome		
	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL
$C_{post,u,i}$	258.2	203.6	149.3	329.6	240.4	219.4	341.5	246.5	231.1	333.0	242.1	222.7

Land Uses: VR: vegetation on regeneration; HAA: Heterogeneous Agricultural Areas; GL: Grassland

Source: REDD+ Project RIU-SM. PDD Folder "calculation_tables" file "VMD0015.xlsx", Sheet "Eq6 $C_{post,u,i,t}$ " and file "VMD0007.xlsx", Sheet "P4 Step4.2.2 postdef C stock"

4.2.3 Calculation of Net Carbon stock changes after deforestation in all pools for land use / stratum

Equation 5 of VCS Module VMD0015 was used to calculate the Net Carbon stock changes in all pools as a result of deforestation in the project scene in land use u in stratum i . Equation 5 is presented in section 3.2, numeral 2°.

$\Delta C_{pools,Def,u,i,t}$ are in Table 74 of PDD, by each stratum:

Table 17. Estimation of Net Carbon stock changes after deforestation for land use ($\Delta C_{pools,Def,u,i,t}$) ($t \text{ CO}_2\text{-e} / \text{ha}$)

	$i=1$ Helobiome			$i=2$ Peinobiome			$i=3$ Litobiome			$i=4$ Zonobiome		
	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL
$\Delta C_{pools,Def,u,i,t}$	460.3	514.9	569.2	333.8	423.0	444.0	340.8	435.8	451.2	466.4	557.3	576.6

Land Uses: VR: vegetation on regeneration; HAA: Heterogeneous Agricultural Areas; GL: Grassland

Source: REDD+ Project RIU-SM. PDD Folder "calculation_tables" file "VMD0015.xlsx", Sheet "Eq5 $C_{pools,Def,i,t}$ "

4.2.4 Determination of deforested area in Project Area in all pools for land use / stratum

Through cartographic review and field verification area of recorded deforestation in the Project Area (PA) stratum i ($A_{DefPA,u,i,t}$) converted to land use u at period 2016-2017 was identified. Results are:

Table 18. Deforested area in Project Area in all pools for land use / stratum ($A_{DefPA,u,i,t}$, ha)

Period	i=1 Helobiome			i=2 Peinobiome			i=3 Litobiome			i=4 Zonobiome			TOTAL		
	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL
2016-2017	0.0	806.5	41.2	4.8	78.0	1.9	0.0	89.9	10.7	0.0	431.3	1.0	4.8	1,405.8	54.9
TOTAL	$\Sigma = 847.8$			$\Sigma = 84.6$			$\Sigma = 100.6$			$\Sigma = 432.3$			$\Sigma = 1,465.4$		

Land Uses: VR: vegetation on regeneration; HAA: Heterogeneous Agricultural Areas; GL: Grassland

Source: Deforested area in the Project Area in all pools for land use / stratum ($A_{DefPA,u,i,t}$) during 2016-2017 period, by strata and land use, according to monitoring study, is in Folder "calculation_tables", file "monitoring.xlsx" Sheet "Defor2016-2017". Also, Folder "calculation_tables" file "VMD0015.xlsx", Sheet "Eq3 CPDefPA,i,t Expot"

4.2.5 Calculation of Net Carbon stock changes after deforestation in Project Area, in all pools for land use / stratum

Equation 3 of VCS Module VMD0015 was used to calculate the Net Carbon stock change as a result of deforestation in the project scene in the Project Area in stratum i :

$$\Delta C_{P,DefPA,i,t} = \sum_{u=1}^U (A_{DefPA,u,i,t} * \Delta C_{pools,P,Def,u,i,t})$$

Where:

Acronym	Unit	Description
$\Delta C_{P,DefPA,i,t}$	t CO ₂ -e	Net carbon stock change as a result of deforestation in the project case in the project area in stratum i at time t
$A_{DefPA,u,i,t}$	ha	Area of recorded deforestation in the project area stratum i converted to land use u at time t
$\Delta C_{pools,P,Def,u,i,t}$	t CO ₂ -e ha ⁻¹	Net carbon stock changes in all pools in the project case in land use u in stratum i at time t

Source: VCS - VMD0015- Methods for monitoring of GHG emissions and removals (M-MON) Equation 3, page 8

Table 19. Net Carbon stock change ($\Delta C_{P,DefPA,i,t}$) as a result of deforestation in the project scene in the Project Area in stratum i . Period 2016 - 2017

	i=1 Helobiome			i=2 Peinobiome			i=3 Litobiome			i=4 Zonobiome		
	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL
$\Delta C_{pools,Def,u,i,t}$	460.3	514.9	569.2	333.8	423.0	444.0	340.8	435.8	451.2	466.4	557.3	576.6
$A_{DefPA,u,i,t}$ 2016-2017	0.0	806.5	41.2	4.8	78.0	1.9	0.0	89.9	10.7	0.0	431.3	1.0
$\Delta C_{pools} * A_{DefPA}$	0,0	415,276	23,480	1,592	33,001	830	0,0	39,196	4,828	0,0	240,355	599
$\Delta C_{P,DefPA,i,t}$	$\Sigma_{i:1} = 438,756$			$\Sigma_{i:2} = 35,423$			$\Sigma_{i:3} = 44,024$			$\Sigma_{i:4} = 240,954$		

Land Uses: VR: vegetation on regeneration; HAA: Heterogeneous Agricultural Areas; GL: Grassland

Source: REDD+ Project RIU-SM. Folder "calculation_tables" file "VMD0015.xlsx", Sheet "Eq3 CPDefPA,i,t Expost"

4.2.6 Project Emissions in 2016-2017 period

Net greenhouse gas emissions under the project scenario (PA)

Table 20. Net greenhouse gas emissions under the project scenario (PA) (ΔC_p), 2016-2017 period

Stratum	$\Delta C_{pDef,PA,i,t}$	$\Delta C_{pDeg,PA,i,t}$	$\Delta C_{pDist,PA,i,t}$	$GHG_{p-E,i,t}$	$\Delta C_{p,Enh,i,t}$	TOTAL ΔC_p
Helobiome	438,756	0	0	0	0	438,756
Peinobiome	35,423	0	0	0	0	35,423
Litobiome	44,024	0	0	0	0	44,024
Zonobiome	240,954	0	0	0	0	240,954
TOTAL	759,157	0	0	0	0	759,157

Source: Annex 11 of PDD – VCS Module VMD0015, Table 14; File "monitoring.xlsx", sheet "Monitoring_summary", period "2016-2017", section "Project Emissions" and PDD File "VMD0015.xlsx", sheet "Eq3 CPDefPA,i,t Expost" (folder "calculation_tables")

4.3 Leakage

To calculate the Leakage Emissions the following stages were fulfilled:

1. Calculation of area deforested by immigrants in the Project Area and Leakage Belt under the project scenario.
2. Calculation of Total area deforested by immigrant agents in the baseline and project scenario.
3. Calculation of the area deforested by immigrants outside the Leakage Belt and Project Area.
4. Calculation of Net CO₂ emissions due to unplanned deforestation displaced outside the Leakage Belt.
5. Determination of deforested area in Leakage Belt in all pools for land use / stratum.
6. Calculation of Net Carbon stock changes after deforestation in Leakage Belt, in all pools for land use / stratum.
7. Net CO₂ emissions due to unplanned deforestation displaced from the Project Area to the Leakage Belt

The following is a summary of each stage:

4.3.1 Calculation of area deforested by immigrants in the Project Area (PA) and Leakage Belt (LB) under the project scenario

Equation 8 of VCS Module VMD0010 was used to calculate the area deforested by immigrants in the project area and leakage belt under the project scenario in period 2016-2017:

$$A_{LK-ACT-IMM,t} = PROP_{IMM} * (\sum_{i=1}^M A_{DefPA,i,t} + A_{DefLB,it})$$

Where:

$PROP_{IMM} = 0.0976$: Proportion of Resident / Migrant Population that Deforests in the PA and LB = 402 migrants / 4,121 municipal population (Source: File "VMD0010.xlsx" Sheet "S2 defor inm" – Folder "calculation_tables")

Deforested area in the Project Area ($A_{DefPA,i,t}$) and deforested area in the Leakage Belt ($A_{DefLB,it}$) during 2016-2017 period, by strata and land use, according to monitoring study, are in Folder "calculation_tables", file "monitoring.xlsx" Sheet "Defor2016-2017". Also, File "VMD0010.xlsx" Sheet "S4 ADef,PA,LK" – Folder "calculation_tables".

Table 21. Area deforested by immigrants in the project area and leakage belt ($A_{LK-ACT-IMM,t}$)

Period	$A_{DefPA,i,t}$	$A_{DefLB,it}$	$A_{Def} (PA+LB)$	$PROP_{IMM}$	$A_{LK-ACT-IMM,t}$
2016-2017	1,502	2,138	3,640	0.0976	355

Source: File "VMD0010.xlsx" Sheet "S4 Eq8 ALK-ACT-IMM,t" – Folder "calculation_tables"

4.3.2 Calculation of Total area deforested by immigrant agents in the baseline and project scenario

Equation 7 of VCS Module VMD0010 was used to calculate the Total area deforested by immigrant agents in the baseline and project scenario in period 2016-2017:

$$A_{LK-IMM,t} = PROP_{IMM} * A_{BSL,PA,unplanned,t}$$

Where:

$A_{BSL,unplanned,i,t} (PA)$: Projected area of unplanned baseline deforestation in the project area: Annex 10 of PDD - VMD0007, Table 35 and file "spatial_model_results.xlsx" Sheet "PA" - Folder "calculation_tables".

Table 22. Total area deforested by immigrant agents in the BL and project scenario ($A_{LK-IMM,t}$)

Period	$A_{BSL,PA,unplanned,t}$	$PROP_{IMM}$	$A_{LK,IMM,t}$
2016	12,611	0.0976	1,231
2017	8,831		862
2016-2017	21,442		2,093

Source: File "VMD0010.xlsx" Sheet "S4 Eq7 ALK-IMM,t" – Folder "calculation_tables"

4.3.3 Calculation of the area deforested by immigrants outside the Leakage Belt (LB) and Project Area (PA)

Equation 9 of VCS Module VMD0010 was used to calculate the area deforested by immigrants outside the Leakage Belt and Project Area in period 2016-2017:

$$A_{LK-OLB,t} = A_{LK,IMM,t} - A_{LK-ACT-IMM,t}$$

Where:

Acronym	Unit	Description
$A_{LK-OLB,t}$	ha	Area deforested by immigrants outside the Leakage Belt and project area under the project scenario in year t
$A_{LK,IMM,t}$	ha	Total area deforested by immigrant agents in the baseline and project scenario in year t
$A_{LK-ACT-IMM,t}$	ha	Area deforested by immigrants in the project area and Leakage Belt under the project scenario in year t

Table 23. Area deforested by immigrants outside the Leakage Belt and Project Area ($A_{LK-OLB,t}$)

Period	$A_{LK-OLB,t}$	$A_{LK,IMM,t}$	$A_{LK-ACT-IMM,t}$
2016		1,231	355
2017		862	
2016-2017	1,738	2,093	

Source: File "VMD0010.xlsx" Sheet "S4 Eq9 ALK-OLB,t" – Folder "calculation_tables"

4.3.4 Calculation of Net CO₂ emissions due to unplanned deforestation displaced outside the Leakage Belt

Equation 11 of VCS Module VMD0010 was used to calculate the Net CO₂ emissions due to unplanned deforestation displaced outside the Leakage Belt in period 2016-2017:

$$\Delta C_{LK-ASU,OLB} = C_{OLB} * (\sum_{t=1}^t * A_{LK-OLB,t})$$

Where:

C_{OLB} : Average of CO₂ (tCO₂-e/ha) in Tropical wet rainforest. Source: (Phillips, et al., 2011), page 51, Table 3.1 Promedio de Carbono para Bosque húmedo tropical (Carbon Average for Tropical Rainforest) 132.1 ton C / ha = 484.4 tCO₂-e / ha.

$A_{LK-OLB,t}$: Area deforested by immigrants outside the Leakage Belt and Project Area under the project scenario at time t .

Table 24. Net CO₂ emissions due to unplanned deforestation displaced outside the Leakage Belt ($\Delta C_{LK-ASU,OLB}$)

Period	$\Delta C_{LK-ASU-OLB}$	C_{OLB}	$A_{LK-OLB,t}$
2016-2017	841,860	484.4	1,738

Source: File "VMD0010.xlsx" Sheet "S4 Eq11 CLK-ASU,OLB" – Folder "calculation_tables"

4.3.5 Determination of deforested area in Leakage Belt in all pools for land use / stratum

Through cartographic review and field verification Area of recorded deforestation in the Leakage Belt (LB) stratum i ($A_{DefLB,u,i,t}$) converted to land use u at period 2016-2017 was identified. Results are:

Table 25. Deforested area in Leakage Belt in all pools for land use / stratum ($A_{DefLB,u,i,t}$, ha)

Period	i=1 Helobiome			i=2 Peinobiome			i=3 Litobiome			i=4 Zonobiome			TOTAL		
	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL
2016-2017	0.2	360.3	10.9	0.7	472.2	18.5	56.9	313.3	18.2	111.5	645.5	69.4	169.2	1,791.4	117.0
TOTAL	$\Sigma = 371.4$			$\Sigma = 491.3$			$\Sigma = 388.4$			$\Sigma = 826.5$			$\Sigma = 2,077.6$		

Land Uses: VR: vegetation on regeneration; HAA: Heterogeneous Agricultural Areas; GL: Grassland

Source: Deforested area in the Leakage Belt in all pools for land use / stratum ($A_{DefLB,u,i,t}$) during 2016-2017 period, by strata and land use, according to monitoring study, is in Folder "calculation_tables", file "monitoring.xlsx" Sheet "Defor2016-2017". Also, Folder "calculation_tables" file "VMD0015.xlsx", Sheet "Eq4 CPDefLB,i,t Expost"

4.3.6 Calculation of Net Carbon stock changes after deforestation in Leakage Belt, in all pools for land use / stratum

Equation 4 of VCS Module VMD0015 was used to calculate the Net Carbon stock change as a result of deforestation in the project scene in the Leakage Belt in stratum i :

$$\Delta C_{P,DefLB,i,t} = \sum_{u=1}^U (A_{DefLB,u,i,t} * \Delta C_{pools,P,Def,u,i,t})$$

Where:

Acronym	Unit	Description
$\Delta C_{P,DefLB,i,t}$	t CO ₂ -e	Net carbon stock change as a result of deforestation in the project case in the leakage belt in stratum i at time t
$A_{DefLB,u,i,t}$	ha	Area of recorded deforestation in the leakage belt stratum i converted to land use u at time t
$\Delta C_{pools,P,Def,u,i,t}$	t CO ₂ -e ha ⁻¹	Net carbon stock changes in all pools in the project case in land use u in stratum i at time t

Table 26. Carbon stock change ($\Delta C_{P,DefLB,i,t}$) as a result of deforestation in the project scene in the Leakage Belt in stratum i . Period 2016 - 2017

	i=1 Helobiome			i=2 Peinobiome			i=3 Litobiome			i=4 Zonobiome		
	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL	VR	HAA	GL
$\Delta C_{pools,Def,u,i,t}$	460.3	514.9	569.2	333.8	423.0	444.0	340.8	435.8	451.2	466.4	557.3	576.6
$A_{DefLB,u,i,t}$ 2016-2017	0.2	360.3	10.9	0.7	472.2	18.5	56.9	313.3	18.2	111.5	645.5	69.4
$\Delta C_{pools} * A_{DefLB}$	78	185,532	6,200	220	199,752	8,214	19,379	136,556	8,211	52,022	359,740	40,020
$\Delta C_{P,DefLB,i,t}$	$\Sigma_{i:1} = 191,810$			$\Sigma_{i:2} = 208,187$			$\Sigma_{i:3} = 164,145$			$\Sigma_{i:4} = 451,783$		

Land Uses: VR: vegetation on regeneration; HAA: Heterogeneous Agricultural Areas; GL: Grassland

Source: REDD+ Project RIU-SM. Folder "calculation_tables" file "VMD0015.xlsx", Sheet "Eq4 CPDefLB,i,t Expost"

4.3.7 Net CO₂ emissions due to unplanned deforestation displaced from the Project Area to the Leakage Belt

Equation 1 of VCS Module VMD0010 was used to calculate the Net CO₂ emissions due to unplanned deforestation displaced from the Project Area to the Leakage Belt in period 2016-2017:

$$\Delta C_{LK-ASU-LB} = \Delta C_{P,LB} - \Delta C_{BSL,LK,unplanned}$$

Where:

$\Delta C_{P,LB}$ from previous Table 26 (for 2016-2017 period)

$\Delta C_{BSL,LK,unplanned}$: REDD+ Project RIU-SM. Folder "calculation_tables" file "VMD0007.xlsx", Sheet "P4 Step4.3 Eq24(LK) C stck chng"

Table 27. Net CO₂ emissions ($\Delta C_{LK-ASU-LB}$) due to unplanned deforestation displaced from PA to LB. Period 2016 - 2017

	i=1 Helobiome	i=2 Peinobiome	i=3 Litobiome	i=4 Zonobiome	
	t CO ₂ -e / ha	t CO ₂ -e / ha	t CO ₂ -e / ha	t CO ₂ -e / ha	Subtotal
$\Delta C_{P,DefLB,i,t}$	191,810	208,187	164,145	451,783	1,015,925
$\Delta C_{BSL,LK,unp\ 2016}$	1,276,116	122	98	31,403	1,307,740
$\Delta C_{BSL,LK,unp\ 2017}$	2,127,151	542,663	228	29,769	2,699,811
$\Delta C_{BSL,LK,unplanned\ 2016-2017}$	3,403,268	542,785	326	61,172	4,007,551
$\Delta C_{LK-ASU-LB}$	-3,211,458	-334,599	163,820	390,611	-2,991,626

Source: REDD+ Project RIU-SM. File "VMD0010.xlsx" Sheet "S3 Expost Eq1 CLK-ASU, LB" – Folder "calculation_tables"

If $\Delta C_{LK-ASU-LB} < 0$, then $\Delta C_{LK-ASU-LB} = 0$

As $\Delta C_{LK-ASU-LB}$ in period 2016-2017 < 0 (-2,991,626), then

$$\Delta C_{LK-ASU-LB(2016-2017)} = 0$$

4.3.8 Leakage in 2016-2017 period

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

Eq.16 VMD0010 LK-ASU

Where:

Acronym	Unit	Description
$\Delta C_{LK-AS,unplanned}$	t CO ₂ e	Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation Net CO ₂ emissions
$\Delta C_{LK-ASU-OLB}$	t CO ₂ e	Net CO ₂ emissions due to unplanned deforestation displaced outside the Leakage Belt
$\Delta C_{LK-ASU-LB}$	t CO ₂ e	Net CO ₂ emissions due to unplanned deforestation displaced from the project area to the Leakage Belt

Acronym	Unit	Description
$GHG_{LK,E}$	t CO ₂ -e	Greenhouse gas emissions as a result of leakage of avoiding deforestation activities

Table 28. Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation net CO₂ emissions, 2016-2017 period

$\Delta C_{LK-ASU-LB}$	$\Delta C_{LK-ASU,OLB}$	$\Delta C_{LK-ASU-PEAT}$	$GHG_{LK,E}$	$\Delta C_{LK-AS,unplanned}$
0	841,860	0	0	841,860

Source: Annex 12 of PDD - VMD0010, Table 15; File "monitoring.xlsx", sheet "Monitoring_summary", period "2016-2017", section "Leakage" and File "VMD0010.xlsx", sheet "S7 Eq16 CLK-AS,unp Expost" (folder "calculation_tables")

4.4 Net GHG Emission Reductions and Removals

4.4.1 Net GHG Emission Reductions and Removals in 2016-2017 period

Summary of GHG Emission Reductions and Removals

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

Eq.2 VM0007 REDD-MF

Where:

Acronym	Unit	Description
NER_{REDD}	t CO ₂ e	Total net GHG emission reductions of the REDD project activity up to year t^*
$\Delta C_{BSL-REDD}$	t CO ₂ e	Net GHG emissions in the REDD baseline scenario up to year t^*
$\Delta C_{WPS-REDD}$	t CO ₂ e	Net GHG emissions in the REDD project scenario up to year t^*
$\Delta C_{LK-REDD}$	t CO ₂ e	Net GHG emissions due to leakage from the REDD project activity up to year t^*

Table 29. Total net GHG emission reductions of the REDD project activity, 2016-2017 period

Year	Baseline emissions or removals (tCO ₂ e) $\Delta C_{BSL,unplanned}$	Project emissions or removals (tCO ₂ e) ΔC_{WPS}	Leakage emissions (tCO ₂ e) $\Delta C_{LK-AS,unplanned}$	Net GHG emission reductions or removals (tCO ₂ e) NER_{REDD}
2016-2017 period	9,185,476	759,157	841,860	7,584,460

Source: File "monitoring.xlsx", sheet "Monitoring_summary", period "2016-2017", section "GHG Emission Reductions and Removals" (folder "calculation_tables")

4.4.2 Buffer, 2016-2017 period

A final discount due to Permanence Risk Buffer was made.

$$Buffer_{UNPLANNED} = \left\{ \begin{array}{l} (\Delta C_{BSL,unplanned} - \sum_{t=1}^{t^*} \sum_{i=1}^M (E_{FC,i,t} + N_2O_{direct,i,t}) - \\ \text{Baseline Unplanned} \\ (\Delta C_{Punplanned} - \sum_{t=1}^{t^*} \sum_{i=1}^M (E_{FC,i,t} + N_2O_{direct,i,t}) \\ \text{Project Unplanned} \end{array} \right\} * (Buffer \%)$$

Eq.9 VM0007 REDD-MF

Where:

Acronym	Unit	Description
$Buffer_{Unplanned}$	t CO ₂ -e	Buffer withholding for avoiding unplanned deforestation project activities
$\Delta C_{BSL,unplanned}$	t CO ₂ -e	Net GHG emissions in the baseline from unplanned deforestation
$E_{FC,i,t}$	t CO ₂ -e	Emission from fossil fuel combustion in stratum i in year t
$N_2O_{direct,i,t}$	t CO ₂ -e	Direct N ₂ O emission as a result of nitrogen application on the alternative land use within the project boundary in stratum i in year t
ΔC_P	t CO ₂ -e	Net GHG emissions within the project area under the project scenario (The project emissions must be divided between the emissions arising from the respective project areas for planned and unplanned deforestation and degradation through fuelwood extraction/charcoal production.)
$Buffer\%$	t CO ₂ -e	Buffer withholding percentages are based on the project's overall risk classification, the percentage of carbon credits generated by the approved project activity that must be deposited into the AFOLU pooled buffer account to cover non-permanence related project risks. Buffer withholding percentage was calculated using "VCS TOOL T-BAR: AFOLU Non-Permanence Risk Tool, VCS Version 3.3" (Annex 12 of this Monitoring Report; also file "VCS_risk_calculation_toolV3_1.xls" in folder "calculation_tables"). Obtained value was 14%.
i		1, 2, 3, ... M (4) strata
t	years	1, 2, 3, ... t* (30) years elapsed since the start of the REDD VCS project activity

$$Buffer_{UNPLANNED} = ((\Delta C_{BSL,unplanned} - 0) - (\Delta C_P - 0)) * 14\%$$

Source: Equation 9 VM0007 REDD-MF

[14% according to "VCS TOOL T-BAR: AFOLU Non-Permanence Risk Tool, VCS Version 3.3" (Annex 12 of this Monitoring Report; also file "VCS_risk_calculation_toolV3_1.xls" in folder "calculation_tables").]

So the final result is:

$$Buffer_{UNPLANNED} = ((9,185,476.46 - 0) - (759,156.92 - 0)) * 14\% = 1,179,685 \text{ t CO}_2\text{-e}$$

$$Buffer_{UNPLANNED} = 1,179,685 \text{ t CO}_2\text{-e}$$

Source: File "monitoring.xlsx", sheet "Monitoring_summary", period "2016-2017", section "GHG Emission Reductions and Removals" (folder "calculation_tables")

4.4.3 Uncertainty, 2016-2017 period

Then, this result was adjusted to account for the uncertainty analysis:

$$\text{Adjusted_NER}_{\text{REDD}} = \text{NGR}_{\text{ARR}} + (\text{NER}_{\text{REDD}} + \text{NER}_{\text{WRC}}) * (100\% - \text{NER}_{\text{REDD+ERROR}} + 15\%)$$

Eq.16 VMD0017 X-UNC

Where:

Acronym	Unit	Description
$\text{Adjusted_NER}_{\text{REDD}}$	t CO ₂ e	Total net GHG emission reductions of the REDD+ project activities up to year t^* adjusted to account for uncertainty
NGR_{ARR}	t CO ₂ e	Total net GHG removals of the ARR Project activity up to year t^*
NER_{REDD}	t CO ₂ e	Total net GHG emission reductions of the REDD project activity up to year t^*
NER_{WRC}	t CO ₂ e	Total net GHG emission reductions of the WRC project activity up to year t^*
$\text{NER}_{\text{REDD+ERROR}}$	%	Cumulative uncertainty for the REDD+ (REDD and WRC) project activities up to year t^*

$$\text{Adjusted_NER}_{\text{REDD}} = 7,584,460 * (100\% - 15\% + 15\%) = 7,584,460 \text{ t CO}_2\text{-e}$$

Uncertainty does not exceed the 15%, is **8.4%**. (File “VMD0017.xlsx”, sheet “RIU-SM soils”, folder “calculation_tables”)

4.4.4 VCUs, 2016-2017 period

In this way, the total emission reductions due to project activity for 2016-2017 period were obtained:

$$\text{VCU}_t = (\text{Adjusted_NER}_{\text{REDD},t2} - \text{Adjusted_NER}_{\text{REDD},t1}) - \text{Buffer}_{\text{Total}}$$

Equation 13 VM0007 REDD-MF

Where:

Acronym	Unit	Description
VCU_t	VCU	Number of Verified Carbon Units at year $t = t_2 - t_1$
$\text{Adjusted_NER}_{\text{REDD},t2}$	t CO ₂ e	Total net GHG emission reductions of the REDD+ project activity up to year t_2 adjusted to account for uncertainty
$\text{Adjusted_NER}_{\text{REDD},t1}$	t CO ₂ e	Total net GHG emission reductions of the REDD+ project activity up to year t_1 adjusted to account for uncertainty
$\text{Buffer}_{\text{Total}}$	t CO ₂ e	Total permanence risk buffer withholding

Table 30. Number of Verified Carbon Units, 2016-2017 period

	<i>NER_{REDD}</i>	<i>Adjusted NER_{REDD,t}</i>	<i>Buffer_{UNPLANNED}</i>	<i>VCU_t</i>
Period 2016-2017	7,584,460	7,584,460	1,179,685	6,404,775

Source: File "monitoring.xlsx", sheet "Monitoring_summary", period "2016-2017", section "VCU_t" (folder "calculation_tables")

FINAL EVALUATION OF THE MONITORING PERIOD 2016-2017

The evaluation of the monitoring of these two years (2016-2017) allows us to conclude the following:

1. The Project has been implemented as designed (Matrix of Logical Structure, Management Plan) in a highly satisfactory manner (see compliance with objectives, section 2.1.1 of this Monitoring Report). Some adjustments will be made as indicated in mentioned section.
2. Deforestation has been stopped with an efficiency of 88.3%, indicating an achievement of products and objectives very good. Project efficiency decreased due to the immigration of Venezuelans. Contingency measures were established, as explained in section 2.1.1 of this Monitoring Report.
3. Once verification and registration of Project were accomplished, VCUs have been selling, in such a way that the breakeven point of the Project was achieved in year 2017, according to the projections. The Project was stabilized in its cash flow, as it was designed, and the investments approved by the zone meetings in the reservation were made.
4. The team (ACATISEMA and MEDIAMOS) has been participating in the project as a good guarantee for success.
5. The ACATISEMA unit was strengthened adequately, resolving its internal differences, based on its statutes. Strategic alliance between ACATISEMA and MEDIAMOS has been strengthened through the support of the communities.
6. The continuity of the Project was approved by ACATISEMA for an additional cycle of 30 years.



REFERENCES

- Cabrera, E., Galindo, G., & Vargas, D. M. (2011). Protocolo de Procesamiento Digital de Imágenes para la Cuantificación de la Deforestación en Colombia, Nivel Nacional Escala Gruesa y Fina. 44. Bogotá D.C., Colombia: Instituto de Hidrología, Meteorología, y Estudios Ambientales-IDEAM.
- Chavez, J. (1996, September). Image-Based Atmospheric Corrections - Revisited and Improved. *Photogrammetric Engineering & Remote Sensing PE&RS*, 62(9), 1025-1036. Retrieved from http://info.asprs.org/publications/pers/96journal/september/1996_sep_1025-1036.pdf
- Cochran, W. G. (1997). Sampling Techniques. *Third*, 428. United States of America: John Wiley & Sons.
- Congreso de Colombia. (2011). Ley 1450 de 2011 por la cual se expide el Plan Nacional de Desarrollo 2010-2014. 165. Bogotá, D. C., Colombia: Congreso de Colombia.
- Congreso de Colombia. (2015). Ley 223 de 2015 por la cual se crean y se desarrollan las Zonas de Interés de Desarrollo Rural, Económico y Social, ZIDRES. 18. Bogotá D.C., Colombia: Imprenta Nacional de Colombia.
- Congreso de la República. (2015). Ley 1753 de 2015 por la cual se expide el Plan Nacional de Desarrollo 2014-2018. 104. Bogotá, D. C., Colombia: Diario Oficial. doi:ISSN 0122-2112
- CONPES. (2011). Estrategia Institucional para la articulación de políticas y acciones en materia de cambio climático en Colombia. 139. Bogotá D.C., Colombia: Departamento Nacional de Planeación. Retrieved from <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/3700.pdf>
- CONPES. (2014, January 12). Política para el desarrollo integral de la Orinoquía: Altillanura - Fase I. 83. Bogotá D.C., Colombia: Departamento Nacional de Planeación.
- Correa, H. D., Ruiz, S. L., & Arévalo, L. M. (2005). Plan de Acción en Biodiversidad de la Cuenca del Orinoco - Colombia 2005-2015 - Propuesta Técnica. 273. Bogotá D.C., Colombia: Corporinoquia, Cormacarena, I.A.v.H, Unitrópico, Fundación Omacha, Fundación Horizonte Verde, Universidad Javeriana, Unillanos, WWF - Colombia, GTZ -Colombia.
- DNP. (2011). *Plan Nacional de Adaptación al Cambio Climático - PNACC*. Retrieved from <https://www.dnp.gov.co/programas/ambiente/CambioClimatico/Paginas/Plan-Nacional-de-Adaptacion.aspx>
- GOFC-GOLD. (2013). A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation. Retrieved from http://www.wmo.int/pages/prog/gcos/documents/Mitigation_GOFC-GOLD_REDD_Sourcebook.pdf
- GOFC-GOLD. (2013). *A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation*. Retrieved from http://www.wmo.int/pages/prog/gcos/documents/Mitigation_GOFC-GOLD_REDD_Sourcebook.pdf
- IPCC. (2003). Good Practice Guidance for Land Use, Land-Use Change and Forestry. 632. (J. Penman, M. Gytarsky, T. Hiraishi, T. Krug, D. Kruger, R. Pipatti, . . . F. Wagner, Eds.) Japan: The Intergovernmental Panel on Climate Change.

- IPCC. (2006). *Guidelines for National Greenhouse Gas Inventories* (Vol. 4 AFOLU). (I. f. (IGES), Ed.) Hayama, Japan: Intergovernmental Panel on Climate Change (IPCC).
- MADS. (2011). *ENREDD+*. Retrieved from <http://www.minambiente.gov.co/index.php/component/content/article?id=439:plantilla-bosques-biodiversidad-y-servicios-ecosistematicos-32#imagenes>
- MADS. (2011). *Estrategia Colombiana de Desarrollo Bajo en Carbono*. Retrieved from <http://www.minambiente.gov.co/index.php/component/content/article/469-plantilla-cambio-climatico-25#estrategia-colombiana-de-desarrollo-bajo-en-carbono>
- MADS. (2013). Propuesta de preparación para REDD+ (R-PP) Colombia. 8, 251. Bogotá D.C., Colombia: Ministerio de Ambiente y Desarrollo Sostenible.
- MADS. (2017, 05 25). Decreto 870 de 2017. 14. Bogotá D.C., Colombia.
- MADS. (n.d.). Intended Nationally Determined Contribution iNDC. Bogotá D.C., Colombia. Retrieved from http://www.minambiente.gov.co/images/cambioclimatico/pdf/colombia_hacia_la_COP21/iNDC_ingles.pdf
- MAVDT. (2010). Estrategia Nacional de prevención, seguimiento, control y vigilancia forestal. 56. Bogotá D.C., Colombia: Ministerio de Ambiente, Vivienda y Desarrollo Territorial.
- Minhacienda. (2010, 12 29). Decreto 4819 de 2010. 9. Bogotá D.C., Colombia. Retrieved from <http://wsp.presidencia.gov.co/Normativa/Decretos/2010/Documents/Diciembre/29/dec481929122010.pdf>
- Minhacienda, MADS. (2017, 06 01). Decreto 926 de 2017. 13. Bogotá D.C., Colombia.
- OIMT. (2009). *Manual de la OIMT para la formulación de proyectos* (Tercera ed.). Yokohama: OIMT. doi:ISBN 4-902045-47-8
- Phillips, J. F., Duque, A. J., Yepes, A. P., Cabrera, K. R., García, M. C., Navarrete, D. A., . . . Cárdenas, D. (2011). *Estimación de las reservas actuales (2010) de carbono almacenadas en la biomasa aérea en bosques naturales de Colombia. Estratificación, alometría y métodos analíticos*. Bogotá D.C., Colombia: Instituto de Hidrología, Meteorología, y Estudios Ambientales - IDEAM.
- USGS. (n.d.). USGS Global Visualization Viewer. Retrieved from <http://glovis.usgs.gov>
- World Bank. (2011, May). Estimación de los Costos de Oportunidad de REDD+. 292. Washington, D.C., E.E. U.U.: The World Bank; ASB; CGIAR; Forest Carbon Partnership; IDB; ASSIST.
- Yepes, A. P., Navarrete, D. A., Duque, A. J., Phillips, J. F., Cabrera, K. R., Álvarez, E., . . . Ordoñez, M. F. (2011). Protocolo para la estimación nacional y subnacional de biomasa - carbono en Colombia. 162. Bogotá, Colombia: Instituto de Hidrología, Meteorología, y Estudios Ambientales-IDEAM.