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GABARRA CATALAURA AND MOTILON BARI REDD+

PRE-FEASIBILITY REPORT

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GABARRA CATALAURA AND MOTILON BARI REDD+

PRE-FEASIBILITY REPORT

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Cover photo: Pozo Azul in Catatumbo, Colombia (credit: Rafael Ayala Castillo)

EXECUTIVE SUMMARY

This study analyzed the feasibility of a REDD+ project in two adjacent Indigenous *resguardos* (IRs) in the Catatumbo region of northeast Colombia. The Gabarra Catalaura (GC) and Motilón Barí (MB) *resguardos* are legally recognized territories of the Barí people situated within Catatumbo Barí National Park in the department of Norte de Santander. The communities have inalienable rights to manage the land within their territories. However, historically weak governance in the national park and surrounding area, a strategically important region on the border with Venezuela, has led to illegal armed actors controlling much of the territory, threatening its inhabitants and the natural resources on which they depend.

The GC and MB communities aim to implement project activities that provide alternative livelihoods while preventing further deforestation and degradation, and also restore degraded lands. The most serious drivers of deforestation are coca cultivation and poor fire management associated with shifting agriculture. Timber extraction and agricultural frontier expansion are also prevalent and are worsening due to increased migration to the region. The communities have identified potential project activities and alternative livelihoods to reduce deforestation and restore degraded lands, including agroforestry, fuelwood management, ecosystem restoration, environmental education, production of handicrafts, and strengthening natural resource management and territorial governance.

In order to assess the general feasibility of the project, EP Carbon analyzed land use land cover (LULC) change in the project region in order to determine the most suitable GHG program and methodology. This was used to estimate two different GHG crediting scenarios using a jurisdictional baseline approach based on Colombia's National Forest Reference Emission Levels (FREL, i.e. NREF), combined with an estimate for forest degradation developed by EP Carbon. The potential effectiveness of the project activities were also evaluated. Finally, the financial viability of the project was assessed by combining the projected GHG volumes from the two crediting scenarios, and evaluating potential costs and revenues using three different carbon price scenarios.

In accordance with Colombian law, all projects need to use the recently approved NREF to estimate baseline emissions and risk of deforestation (MINAMBIENTE & IDEAM, 2019). In the case of the GCMB *resguardos* which have large areas with no deforestation in recent years, this jurisdictional-based allocation of deforestation risk results in fairly low crediting estimates. Including crediting from reduced forest degradation, however, significantly improves the feasibility of the project. Using the VM0006 methodology, the project can be credited for avoiding unplanned forest degradation, even though this is not included in the Colombian NREF.

Even with the inclusion of crediting from avoided forest degradation, it is unlikely that the project would be financially viable if credits were not sold at a premium price. We recommend using the Verified Carbon Standard (VCS) program, which is more attractive to buyers on the international voluntary market where prices are conservatively in excess of [redacted]/ton. We also recommend a grouped project approach, allowing the project to leverage economies of scale and exert a concerted influence over a great area by enabling the participation of the Gabarra-Catalaura *resguardo*. Additionally, the project is in an advantageous position to add community and biodiversity co-benefit layers, such as Climate, Community, and Biodiversity project design standards, or SD VISta, which would further increase the credit sale price. There is also a possibility of separately crediting restoration and reforestation activities through an ARR or ANR methodology.

While there is an opportunity for a REDD+ project in MB and GC IRs, there are serious gaps in information and risks to project efficacy. The security situation in the area is tenuous, with armed illegal groups exerting much control over the natural resources and local economies. Not only is this a concern for community members and project staff safety, but coca cultivation, one of activities most severely causing deforestation, is controlled by these groups. Additionally, shifting agriculture and an encroaching agricultural frontier are significant source of deforestation, but currently no proposed activities address sustainable agriculture alternatives, or propose a clear strategy for monitoring and enforcing illegal land uses. Thus, it is unclear if the current portfolio of proposed project activities could meaningfully reduce the primary drivers of deforestation. Therefore, we recommend that agents and drivers be linked to specific interventions and outcomes through a formal Theory of Change exercise involving a range of key stakeholders from the communities, state agencies, and civil society, to maximize the effectiveness of project activities.

SECTION 1

INTRODUCTION

EP Carbon conducted a pre-feasibility study for a potential carbon project in the Gabarra Catalaura (GC) and Motilón-Barí (MB) Indigenous reserves located within Catatumbo National Park in northeastern Colombia. This study was executed on behalf of the U.S. Agency for International Development (USAID) Paramos and Forests (P&F) program. This initiative seeks to protect high elevation *paramo* and other forest ecosystems by supporting sustainable activities and alternative livelihoods through carbon finance. USAID has identified communities participating in the *Programas de Desarrollo con Enfoque Territorial* (PDET, "Development Programs with a Territorial Approach"), which were selected by Colombia's *Agencia de Renovación del Territorio* (ART, "Territorial Renewal Agency"). This initiative aims to stabilize and transform territories most affected by violence and poverty by promoting rural economic development and capacity building.

This project would be implemented by the Indigenous communities themselves with national implementation partners supporting their technical and territorial governance capacity. The primary project design considered in this study is avoided forest conversion through a Reducing Emissions from Deforestation and Forest Degradation (REDD) methodology. The intention is to use the revenues from the sale of carbon credits to support activities that address the agents and drivers of deforestation, provide alternative livelihoods, and fund community development projects. The primary drivers of deforestation in this region are cattle ranching and small-scale agriculture, including illicit coca cultivation. The Indigenous communities have legal land title to the territories considered in this study and carbon finance could support forest protection, sustainable agriculture, and other activities that reduce the current levels of deforestation and forest degradation in the project area while enhancing their traditional identity.

This study analyzes the technical and financial feasibility of a potential carbon project for these communities. We assess the national REDD policy and context in Colombia and compare greenhouse gas (GHG) programs and methodologies for their suitability. We then ascertain the baseline conditions and rates of deforestation through remote sensing and site visits. Baseline estimates were used to determine potential project crediting scenarios. We assess financial feasibility by comparing estimated revenues with project implementation costs and assessing marketability. Finally, we assess potential risks to the project and propose recommendations for risk mitigation and further project development.

SECTION 2

PROJECT OVERVIEW

This project will be designed and implemented by the Indigenous communities of GC and MB with the support of additional organizations as needed. They aim to implement activities that reduce deforestation and forest degradation in the project area by providing alternative livelihoods, community economic development opportunities, and improved land use planning and management.

Key Takeaways:

- Both MB and GC *Resguardos Indigenas* (RI) are located within Catatumbo Bari PNN, meaning National Park regulations and management influence conservation practices in and around the RIs. Further coordination with National Parks is likely needed to design an effective REDD+ project.
- The Catatumbo region located in the Andes biome is highly biodiverse and an important source of water resources for the surrounding regions
- The Barí people have an association that legally represents the individual *resguardos* as well as traditional authorities in each community.
- The Barí, as Indigenous people, have undisputed land tenure on their legally titled lands, the *resguardos*, and could be legal managers of a REDD+ project. They aim to expand their territory to include more ancestral lands. However, territory expansion has not been legally approved and as such, these lands cannot be currently considered under a REDD+ project under Barí management.
- Other key stakeholder groups, including peasant farmers (campesinos), recent migrants (*colonos*), and PNN staff would need to be consulted or otherwise considered in a potential REDD project design. Illegal actors also have much control over land use behaviors and their influence must be considered in REDD+ project design.
- There are land tenure conflicts in the expansion areas which are currently inhabited by campesino and *colonos*, and which are encroaching on the *resguardos*

2.1 LOCATION

The project is located in northeastern Colombia bordering Venezuela in the department of Norte de Santander. It is situated in the eastern foothills of the Andes Mountains in an area known as the Catatumbo subregion. This biome is characterized by tropical humid forests at low altitudes and sub-Andean forests at mid altitudes. Much of the project is contained within forest reserve areas (Figure 2). The project is located in the Catatumbo river and Rio de Oro basins, important sources for many tributary rivers and freshwater systems throughout northeastern Colombia as well as Lake Maracaibo in Venezuela. Due to its importance biologically, hydrologically, and culturally, Catatumbo Barí National Park was established in 1989 and overlaps with the ancestral territory of the Barí Indigenous group, including some parts of this project (Figure 1).

FIGURE 1: MAP OF THE BOUNDARIES OF THE GCMB SITES ASSESSED

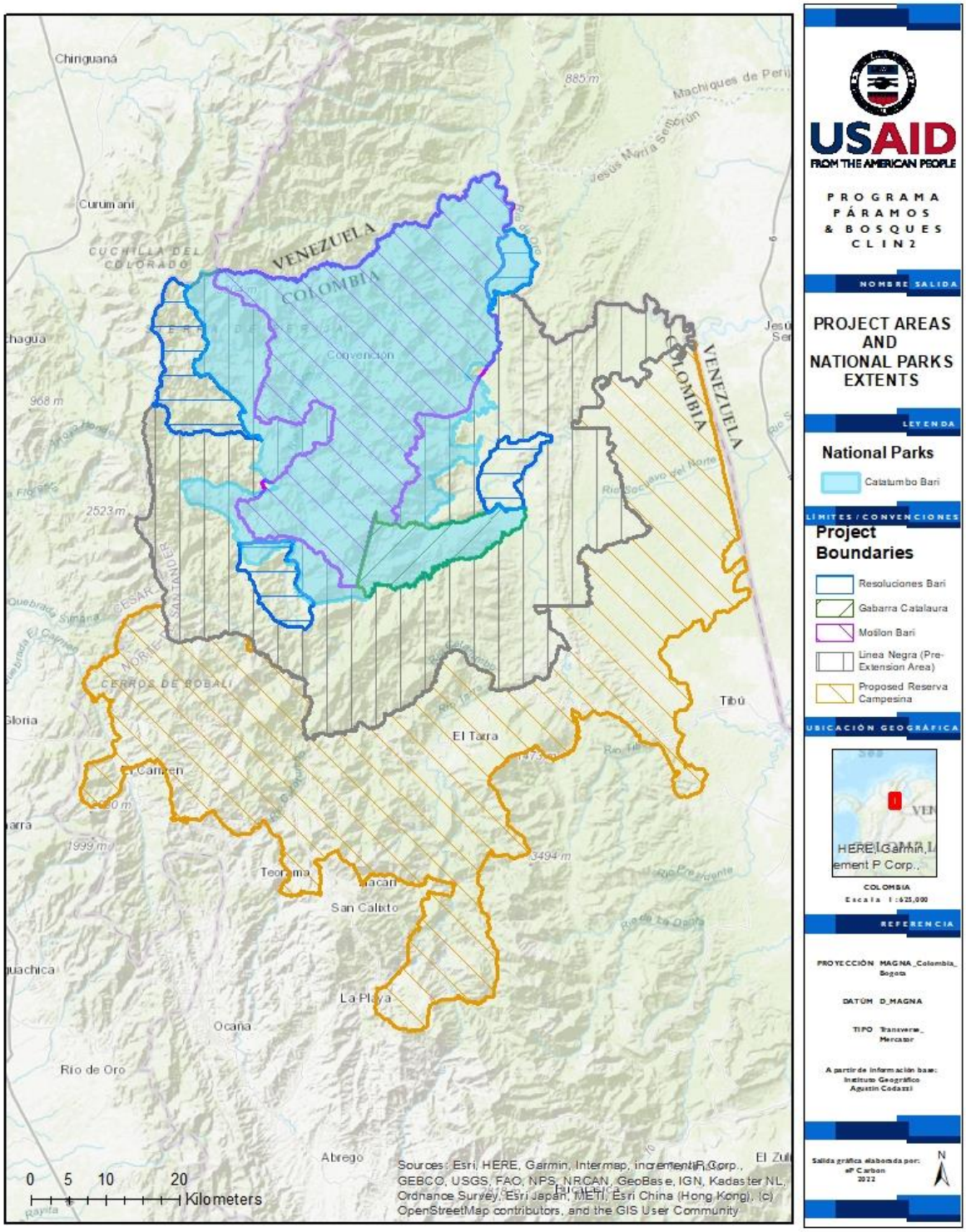
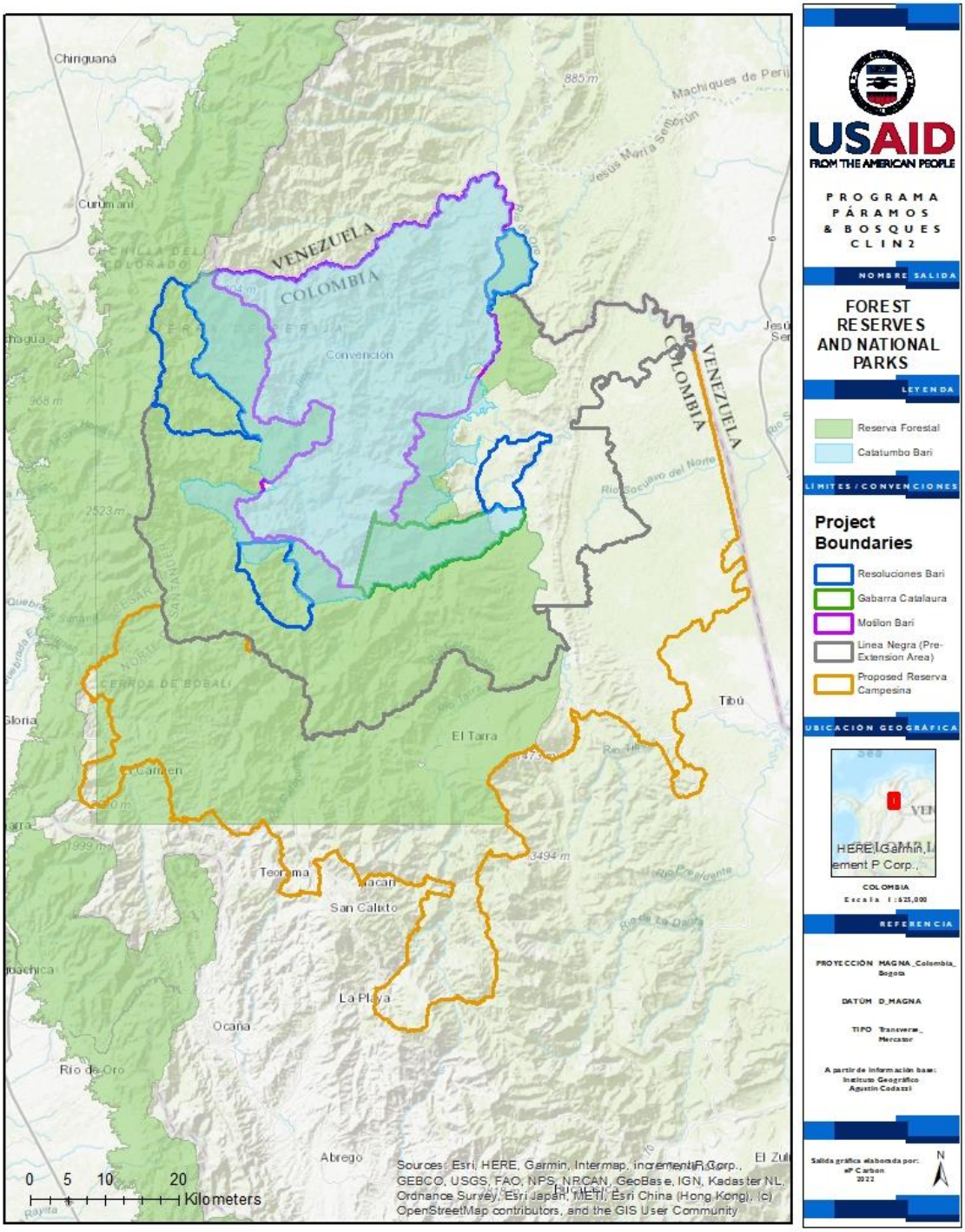


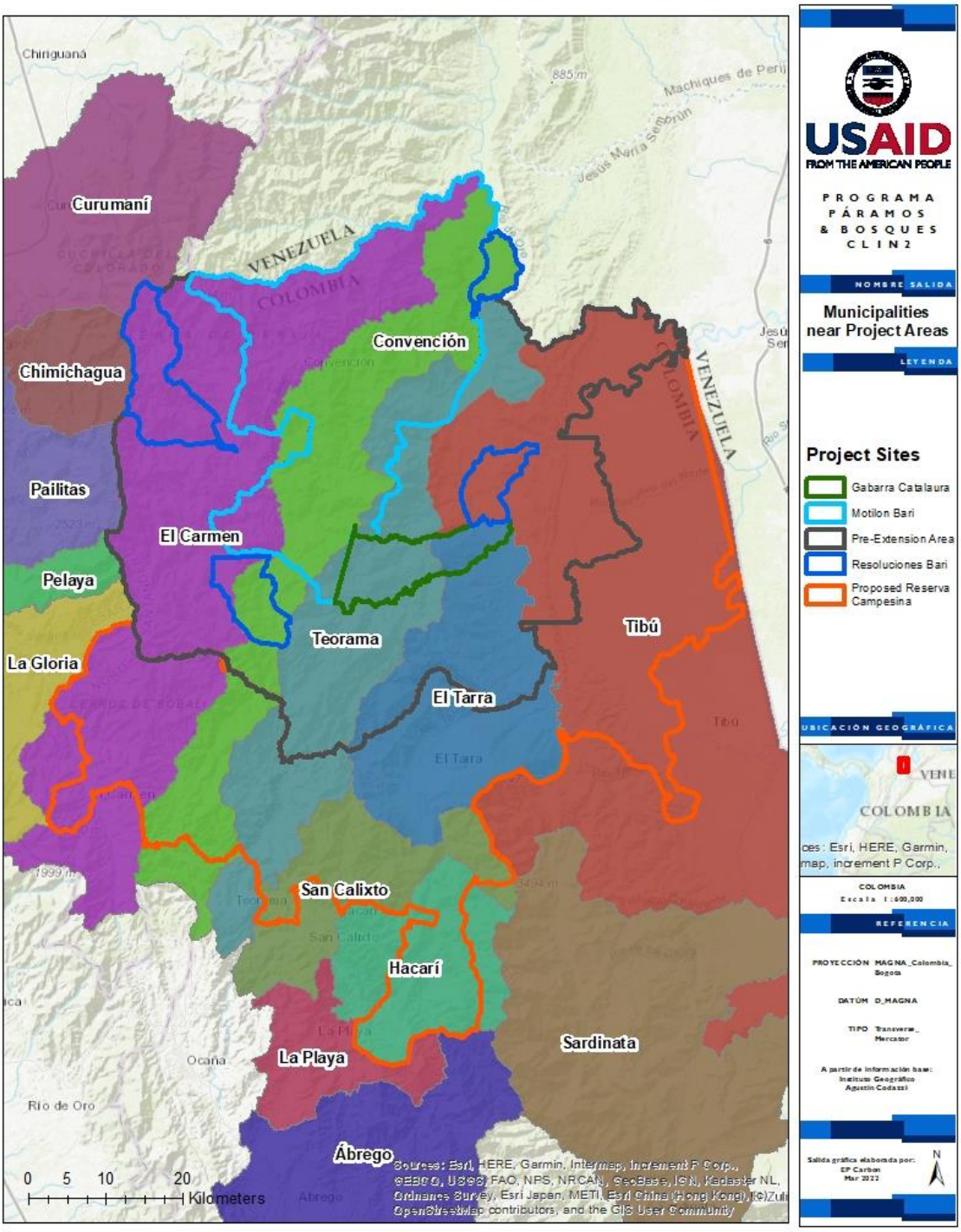
FIGURE 2: FOREST RESERVES AND THE NATIONAL PARK OF CATATUMBO IN RELATION TO THE PROJECT AREAS



The Catatumbo region has historically been the territory of the Barí ethnic group and currently includes the MB and GC reserves, where the Barí Indigenous people live

(Agencia de Renovación del Territorio, 2020). It is made up of the municipalities of Tibú, El Tarra, Sardinata, Hacarí, San Calixto, La Playa de Belén, Ocaña, Teorama, Convención and El Carmen (Figure 3).

FIGURE 3: MUNICIPALITIES IN AND NEAR THE PROJECT SITES



2.2 GENERAL SITE DESCRIPTION

According to data from the 2018 official population census, more than 180,000 people live in the Catatumbo subregion, of which approximately 2,000 belong to the Barí community (Agencia de Renovación del Territorio, 2020). The Barí people are one of the most representative Indigenous communities of the Santander and Norte de Santander regions. They live on the border between Colombia and Venezuela in an area called the Serranía de los Motilones.

Due to its wide altitudinal gradient and persistence of the tropical rainforest of the Maracaibo-Zulia region, the Catatumbo region is one of the most important areas for biodiversity conservation in the country (Cesar Alirio Leal Molina et al., 2014). The ecosystems of this region are mainly characterized as Tropical Humid Forest of the Catatumbo Tropical Humid Zonobiome (warm-superhumid and warm-humid climate) with geoforms typical of Alluvial Valley and Alluvial Plain, and the Low Orobiome of the Andes, with humid and very humid temperate climates and in some sectors warm humid and warm superhumid climates, with predominant mountain geoforms. The area is home to a biodiverse array of flora and fauna, many of which are threatened or near-threatened, including endemic orchid species, jaguar (*Panthera onca*), tapir (*Tapirus terrestris*), and threatened birds such as the great curassow (*Crax rubra*). Seventy-nine (79) endangered species have been recognized in the region, of which twelve (12) are critically endangered. The Catatumbo National Park Management Plan identifies multiple values for conservation, including species identified by the Barí people as key to their culture and survival in the region (Cesar Alirio Leal Molina et al., 2014).

The extent of the Barí territory has been consistently declining for two centuries, primarily due to confrontations with settlers, epidemics, and displacements from armed conflict. Current territorial dynamics date back to the 16th century during the periods known as the Conquest and European Colonization. The subsequent process of assimilation of new circumstances of the republican era during the 19th century, oil extraction from the early 20th century to the present, and the continuing armed conflict at the end of the 20th century have all shaped the current territorial dynamics. From the mid-20th century to the present, the Barí territory has undergone profound transformations because of the occupation of ancestral territory by *campesinos* (long-time resident farmers) and settlers, the boom in illicit coca cultivation, as well as agro-industrial projects and extensive cattle ranching. As a border territory, Venezuela's demographic and economic dynamics over the last 20 years, including significant migration, have also greatly influenced the Barí people.

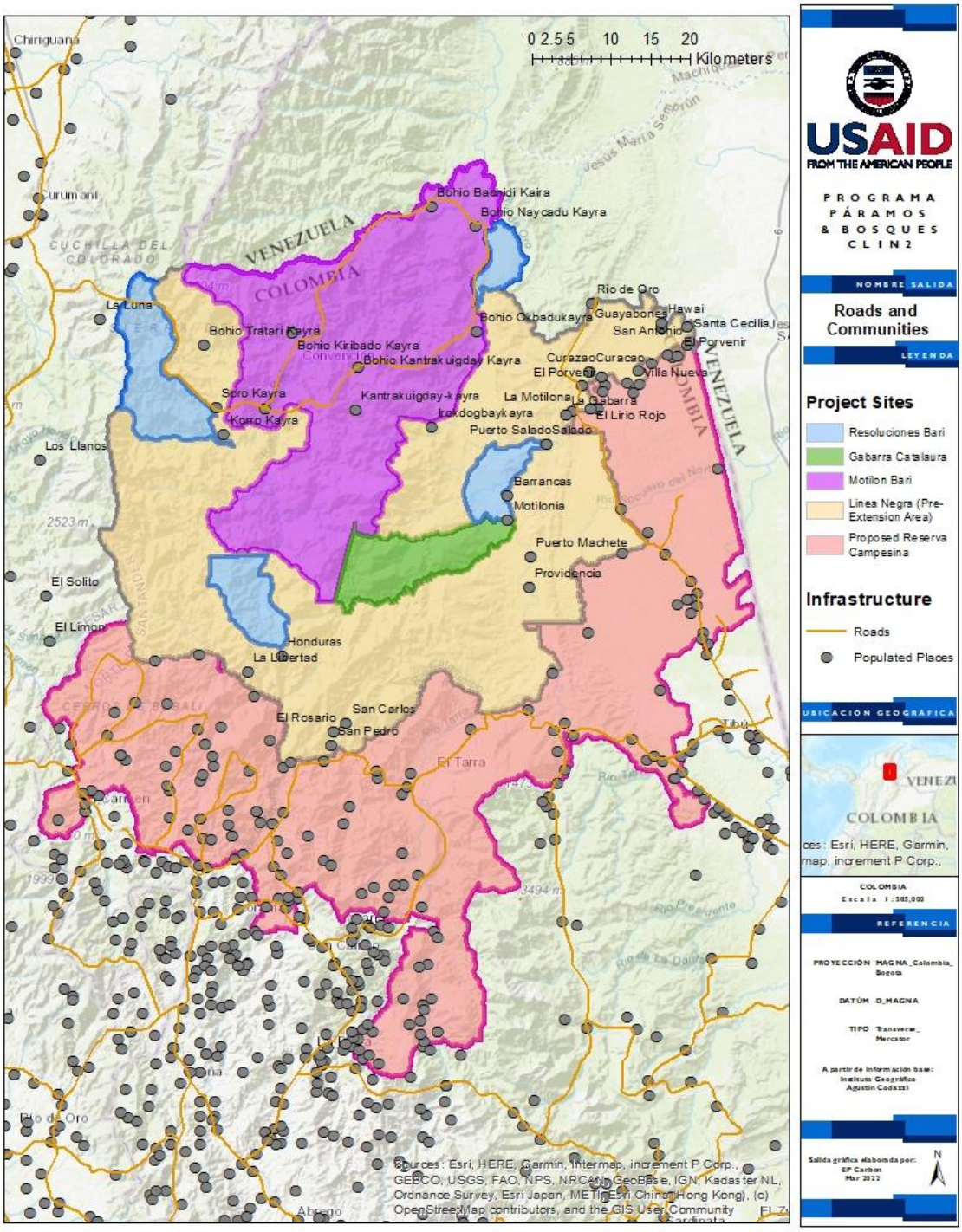
The Barí people have achieved legal recognition of two Indigenous reserves in the Catatumbo region, which are fully encompassed by Catatumbo National Park. The MB indigenous reserve was formed by Resolution 102 on November 28, 1988, and was formalized through public deeds in the name of the Barí People in 2013. The Indigenous reserve is 108,900 hectares and spans the municipalities of El Carmen, Teorama, Convención, El Tarra and Tibú. These include the communities of Corroncayra,

Bridikayra, Chirrindakayra, Pathuina, Acdosarira, Aratocbarí, Iquiacarora, Caxbaringcayra, Batroctrora, Saphadana, Brubucanina, Ocbabura, Suerera, Asacbaríngcayra, Shubacbarina, Yera, Youkayra, Boysobi, Ayatuina, Irocobincayra, Isthoda and Beboquira.

The GC Indigenous reserve is 13,300 hectares and was created by Resolution 105 of December 15, 1981, with the help of the missionary Sisters of Mother Laura. It falls within the jurisdiction of the municipality of Tibú. Two Barí communities currently live there: Caricachaboquira and Bacuboquira (Centro Nacional de Memoria Historica, 2018).

The Catatumbo region represents a complex mosaic of overlapping areas that are protected to varying degrees. Approximately 38% of the region has been granted protected area status of some kind, with 14% lying within Catatumbo-Barí National Park and 24% within the Serranía de los Motilones Forest Reserve. Most of this protected area is under Category A, which implies a series of restrictions for the development of productive agricultural, livestock, mining, and hydrocarbon activities. The two Indigenous reserves are located inside Catatumbo Barí National Park and their combined 122,200 hectares is equivalent to 80% of the park (Cesar Alirio Leal Molina et al., 2014).

FIGURE 4: COMMUNITIES IN AND NEAR THE PROJECT SITES



2.3 STAKEHOLDER IDENTIFICATION

The following section presents a preliminary stakeholder identification based on perspectives provided by community members from the *resguardos* during a workshop with EP Carbon. The workshop outputs were combined with professional knowledge concerning recent and historical land use dynamics, as well as the formal and informal governance structures of the area. A more thorough stakeholder identification and analysis will be necessary in the future to more precisely identify and evaluate the relevant stakeholders and to design effective and efficient REDD+ strategies with priority stakeholder groups.

The primary stakeholders within the potential project area fall into five broad groups, with each group discussed more detail in this section:

1) The Indigenous Barí people in the Motilón Barí (MB) and Gabarra Catalaura (GC) Indigenous *resguardos* (IRs)
2) *Campesino* subsistence farmer groups, individuals, and families
3) Migrant populations and recent settlers, known as *colonos*
4) State entities—most importantly PNN Catatumbo Barí
5) Illegal actors in the area.

THE BARÍ PEOPLE

Represented by:

- General Assemblies of MB and GC IRs
- Ñatubaiyibarí (Association of Traditional Authorities of the Barí people).
- Barí community members

The Barí people are the legal stewards of the Motilón Barí and Gabarra Catalaura *resguardos* respectively, which are encompassed by the PNN Catatumbo Barí, and have secure land rights as well as resource rights as defined by the terms of the *resguardo* designation. They would presumably be the major project proponents in the event that a REDD+ project were to be developed within the *resguardos*.

25 Barí communities live within the two *resguardos* (2 in GC and 23 in MB) totaling approximately 3,682 people who mostly rely on subsistence-level activities and small irregular wage-oriented labor. Due to economic need, some members of the Barí communities engage in land use activities that create emissions from deforestation and forest degradation, as was identified in a community workshop with EP Carbon staff and is summarized below. This implies that a portion of the REDD+ project design and resources would be devoted to addressing the underlying causes that are compelling members of the Barí community to create GHG emissions from deforestation and forest degradation.

The General Assemblies and the Ñatubaiyibarí (Association of Traditional Authorities of the Barí people) constitute the principal governance and legal structures for the Barí the General Assembly is the highest legal authority, a space where decisions are made by majority, with individual and public votes. Boys and girls from the age of 12 and other Barí men and women can vote. Each vote has equal value. Extraordinary assemblies are convened so that the Barí communities and their authorities meet with the institutions and organizations with whom they work. Senior officials from local, departmental, and national governments are invited to these meetings, as well as international organizations that are implementation partners for projects in the communities (Centro Nacional de Memoria Historica, 2018). Meanwhile, in 2013, the special public entity Ñatubaiyibarí (Association of Traditional Authorities of the Barí people) was recognized, which represents 23 communities and whose administrative body is the Board of Directors, a permanent body that is subject to the guidelines and policies of the General Assembly. and the Barí Life Plan (Centro Nacional de Memoria Historica, 2018).

CAMPESINOS

Represented by:

- Campesino community members
- *Campesino* Association of Catatumbo / Asociación Campesina del Catatumbo (ASCAMCAT)
- National Association of Indigenous Reserve Zones / Asociación Nacional De Zonas De Reserva Campesina (ANZORC)

C*ampesinos* are long-term resident subsistence small-holder farmers that commonly cultivate crops and rear livestock in the Catatumbo area. There are many campesino settlements just outside of the *resguardos*. While *campesinos* do not have the same inalienable land rights as Indigenous and Afro-Colombian groups, they can petition the government to create *campesino* zones, called *Reservas Campesinas*, in which they have collective land title. The Campesino Association of Catatumbo was formed for these subsistence farmers to collectively advocate for their land use rights, and requested the creation of a *Reserva Campesina* by the Colombian government in that area in 2011 but it has still not been officially formed (see 2.4 Land Tenure for more information). While their activities are legally restricted to outside of the Barí *resguardo*, agricultural frontier expansion from *campesinos* encroaches on the *resguardo* borders. Additionally, they are currently strongly against the expansion of the Barí's titled territory, as it could potentially remove land from their proposed *Reserva Campesina,* which they claim could significantly impact their livelihoods.

According to the Barí peoples that participated in a workshop with EP Carbon, *campesinos* are responsible for a significant amount of deforestation within and around the *resguardos* as driven by illicit crop production, cattle and agricultural production, and for forest degradation related to fuelwood and selective logging.

Campesino groups will likely not be REDD+ project proponents in the official sense, but will necessarily have to be included in, and benefit from project activities designed to reduce emissions from deforestation and forest degradation. A significant portion of project success will likely depend on the degree of effectiveness project activities have with this stakeholder group.

COLONOS

The term "*colonos*" refers to a mix of more recent migrants to the region driven by a search for economic opportunity. They are generally unorganized in nature and can include individuals from different parts of Colombia or other countries, such as the recent influx of migrants from Venezuela. According to the Barí community members that participated in the workshop with EP Carbon, *colonos* contribute to similar drivers of deforestation and forest degradation as *campesinos* but with an underlying motivation more heavily guided by the need for immediate income generation. This stakeholder class has no detectable political organizations that represent their interests but must nonetheless be included in a REDD+ strategy considering their impact on local resource use. As with *campesinos*, *colonos* have been linked to GHG emissions from deforestation related to illicit crop production as well as unsanctioned cattle and agriculture production.

COLOMBIAN STATE ENTITIES

Local, state, and national governmental institutions including:

- National Natural Parks – PNN Catatumbo Barí
- Territory Renewal Agency (ART)
- Ministry of Agriculture - National Land Agency (ANT)
- Corponor (Regional Autonomous Corporation of the northeastern border
- Ecopetrol
- Municipal authorities

There are numerous state entities with jurisdiction in the project area, which creates a complex network of interests and jurisdictional considerations. ART has developed proposals for ethno-development in high-conflict areas such as MB and GC IRs and other municipal, state, and federal agencies influence various aspects of land use and environmental policy in the area. But as the *resguardos* are situated fully within the PNN Catatumbo Barí, National Parks would likely be the most intimately involved state entity in a potential carbon project, which is described below. A more comprehensive analysis of roles and responsibilities of specific stakeholder groups will be needed.

Authorities of the PNN Catatumbo-Barí National Park

Currently, PNN Catatumbo Barí has a management plan built by consensus with the Barí people and overseen by park authorities. The Management Plan was approved by resolution 0278 of July 23, 2018 and was the subject of prior consultation with the Barí

people, approved in 2016 (Parques Nacionales Naturales de Colombia, 2018). This resulted in a series of agreements between the Indigenous authorities and National Parks, which would affect and influence how the national park authority might be involved in a REDD+ project.

The primary objectives of the Management Plan are: 1) to reduce the main anthropogenic pressures threatening the high dense forest, its associated ecosystem services, and other high conservation value areas through the implementation of the Park Management Plan, and 2). to jointly construct an intercultural vision of the territory as a fundamental basis for the survival of the Barí ethnic group as well as for the protection of high conservation value areas. This is intended to occur through the implementation of activities in the areas of governance, territory, and culture in collaboration between the Barí people and Catatumbo National Park.

National Parks entered a special management agreement with each Barí reserve in 2007, and this led to the approval of the Management Plan in 2016, which involved Prior Consultation (Parques Nacionales Naturales de Colombia, 2018). From there, a coordination body was established between Indigenous and National Park authorities, called the Joint Commission, intended as a space for coordinating actions in the territory (Cesar Alirio Leal Molina et al., 2014).

In summary, the agreement between National Parks and the Barí authorities establishes the following:

- Approve the Management Plan as a joint strategy for planning and implementing management actions
- Create and strengthen the Joint Commission, as a coordination body between National Parks and the Barí authorities, to agree on the development of actions related to the Management Plan. This instance will be made up of four members of National Parks and four of the Barí authorities.
- National Parks will support the Barí authorities in management and technical support in their intention to expand and clean up the currently constituted reserves
- Joint actions will be developed to strengthen the exercise of control and protection of the territory, to promote ecological restoration in degraded areas and sites of special cultural importance affected by pressure, in favor of the conservation of biodiversity, environmental goods and services in the area. overlapping, which guarantees the ethnic and cultural survival of the Barí people.
- Specific work agreements are made, such as advancing policies on environmental goods and services, operational support for control and surveillance, among others.

Any future activities as a REDD+ project would likely have to be aligned with and support the existing management plan and the governance structures it created. However, in principle, the existing management plan is broadly aligned with the goals of

a REDD+ project. Rather, a REDD+ project should be designed to enhance the ability of the Barí people, and of the authorities of the national park to implement and enforce the principles of the agreed upon management plan. The effectiveness of a REDD+ project would depend on the degree to which the authorities of the Motilón Barí and Gabarra Catalaura *resguardos* can work effectively and in coordination with National Parks. Effective collaboration may require that the project's benefit sharing mechanism include resources for National Parks to implement and enforce the management plan.

ILLEGAL ACTORS

Primarily made up of the groups:

- Popular Liberation Army (*Ejército Popular de Liberación* - EPL)
- Hope, Peace, Liberty (*Esperanza, Paz y Libertad* - EPL) faction

Illegal armed groups are prevalent in the Catatumbo region, as it is strategically located on the border of Venezuela and is fairly inaccessible. Controlling much of the local economy, they financially incentivize campesinos and *colonos* in the cultivation of coca crops within the *resguardos* and their surrounding areas (described in detail in Project Overview). While they are not official legal "stakeholders" they nonetheless exert much control and influence over the region around the *resguardo* and apply economic pressures, violence, and coercion that greatly influence local stakeholder decision-making that can drive unplanned and unsanctioned deforestation.

The presence and influence of these armed groups in the region is perhaps the greatest challenge facing any natural resource governance strategies and economic development strategies, such as those associated with REDD+ projects. Therefore, the ultimate success of REDD+ projects will likely depend on the degree to which the control and influence of these groups can be reduced. It is not clear that a market-based mechanism for climate finance, such as REDD+ program can achieve this, as it is more squarely a political and governance issue. The potential threats to physical security to participating stakeholders in a REDD+ project are of particular concern, thus determining the extent to which state entities can be involved in REDD+ strategies is of critical importance to consider during future project design phases.

2.4 LAND TENURE

The MB and GC RIs are fully encompassed by the Catatumbo Barí National Natural Park, which was created in 1989 after the declaration of the IRs in 1988 and 1981, respectively, which creates some ambiguity concerning resource rights. EP Carbon could not identify a legal document that clearly defines carbon rights in a situation of overlap between Indigenous *resguardos* and protected areas such as in the Catatumbo Barí National Park, and national parks in general. However, the concept of collective property rights may be key to clarifying ownership/resource rights. The Barí people are recognized by the Colombian State as the legitimate owner of the territory titled through the concept of the "*resguardo indigena*", while management of national parks is entrusted to the relevant state authority. While more information is needed, it is likely

the communities, which have legal land tenure, would retain carbon rights despite being located within a national park.

Within this legal context, the Barí people have led an effort to reclaim their ancestral territory, with specific claims that would expand their territory within the Catatumbo National Park and beyond. It is important to consider that the previous differentiation of management responsibilities would be valid only for areas that are formally recognized as an Indigenous *resguardo*, but not for areas subject to the request for expansion of Barí territory (phase 1 and 2). Until the expansion is consolidated legally, land rights of the Barí people in that area are not established. Ownership of the requested area must go through the processes of property acquisition and legalization, as indicated by the Constitutional Court. Consequently, outside the currently recognized reserve boundaries, the Barí people would not have the right to manage or claim reductions in emissions from deforestation or forest degradation.

There is an appreciable difference between the requested expansion of the current reserves (called Phase 1 in the information provided by ART) versus the entire "*Línea Negra*" area, for which the Barí people could seek legal recognition for during Phase 2 of their Life Plan. The Phase 1 areas sum to 115,636 ha, approximately equivalent to 50% of the territory covered by the *Linea Negra*, which encompasses 224,738 ha. It is important to highlight that a part of the expansion area of phase 2 overlaps with the area requested by ASCAMCAT as a Campesino Reserve Zone. This discrepancy must be adequately resolved through the terms established by the Constitutional Court through ruling T-052 of 2017 (mentioned earlier in this text). Without legal resolution to this land tenure dispute, carbon rights cannot be determined.

The Joint Commission may be the appropriate space in which to explore possible conflict resolutions between the authorities of the Barí people and National Park authorities. This process can ensure that the objectives of a potential REDD project directly support the conservation objectives of Catatumbo Barí National Park while fulfilling the objectives set forth in the Life Plan of the Barí people in each of the reserves. Likewise, it may be necessary to make use of the "*Mesa de Concertación*" (a type of roundtable discussion) as a workspace between the Barí people and the *campesino* communities represented by ASCAMCAT to assuage concerns from the latter regarding the possible implementation of a REDD project in the region.

While the land tenure situations in the *resguardos* and the potential expansion areas are somewhat complicated in regard to *campesino* settlers, the National Park authorities and the Indigenous Barí people have legal collective land tenure within the titled areas. With further consultation and effective conflict mediation, a clearer picture of carbon rights could be determined during project development.

PROPOSED RESERVA CAMPESINA AND THE EXPANSION OF THE BARI TERRITORY

The Proposed *Reserva Campesina* was intended as a mechanism to allow Colombian *campesinos* to delimit, assign and utilize the territory in an organized, planned and

participatory manner, thus recognizing their right to rural property and strengthening their livelihoods in their traditional environment (Bohorquez, 2013). In 2011, the National Government signed an agreement with the Catatumbo Campesino Association (ASCAMCAT) to establish a Campesino Reserve Zone (ZRC) in North Santander.

The Catatumbo ZRC covers 326 villages in seven municipalities, excluding the Indigenous *resguardos* of the Barí people. The requested area covers an area of 346,183 hectares with a population of about 110,000 inhabitants (Agencia Prensa Rural, 2016). In 2012, the national government called a public hearing for the establishment of a ZRC in the municipality of El Tarra.

In turn, the Barí people requested to expand their territory by more than 100,000 ha with the proposed ZRC, an area where an estimated 30,000 farmers live (Centro Nacional de Memoria Historica, 2018). One proposed solution has been to exclude this space from the ZRC in order to create and strengthen intercultural or interethnic territories.

RULING T-052 OF 2017 OF THE CONSTITUTIONAL COURT

On March 19, 2014, the Association of Traditional Authorities of the Barí ÑATUBAIYIBARI People of the department of Norte de Santander filed a *tutela* action against the Board of Directors of INCODER, the Ministries of Agriculture and the Interior, INCODER, the National Mining Agency and the Mayor's Office of Tibú (Norte de Santander), invoking the protection of the fundamental rights of Indigenous peoples to territory, to prior consultation, due process and to the integrity and cultural diversity of the Barí people.

The community alleged that the process for the expansion of the reserves had not been carried out in accordance with previously established commitments but ASCAMCAT had initiated the process for the constitution of a Campesino Reserve Zone. The ZRC may overlap with territory previously requested by the Barí as an expansion of the MB and GC reserves, constituting a land tenure dispute with government mediation needed.

The Constitutional Court responded by ordering Incoder to:

- undertake all the necessary actions for the expansion of the Barí people's reserves;
- authorize the processing of the ZRC requested by Ascamcat prior to the approval of the extension of the reserves; and,
- determine whether the extension of the reserves would trigger the requirement for Prior Consultation with the Barí people for the creation of the ZRC.

It also ordered the creation of a consultative body between the traditional Barí and Ascamcat authorities with the assistance of the National Indigenous Organization (ONIC) and the National Association of Indigenous Reserve Zones (ANZORC) with the assistance of the Ministry of Agriculture, among other entities. This means that the

process of creating either a ZRC or extending the Barí's titled territory would likely require a joint management plan and thorough consultation of both groups.

SECTION 3

NATIONAL CONTEXT

3.1 NATIONAL REDD POLICY OVERVIEW

Key Takeaways:

- Colombia has well-developed national REDD+ policies including rules for projects to quantify their GHG emission reduction estimates
- Colombia's regulations specifically dictate carbon project design and how national deforestation rates should be accounted for by land-based greenhouse gas mitigation projects, like the one evaluated here
- All carbon projects need to use the deforestation rates and carbon stock values for ecosystems established by the government to establish baseline emissions as defined in Colombia's NREF
- Changes to the national baselines can greatly affect the potential for projects to generate GHG credits
- There are Colombian-specific GHG programs, such as Pro-Clima and CerCarbono that align with these regulations and permit the development of carbon projects seeking finance through credit sales
- The latest NREF has been reviewed and accepted by the UNFCCC and is valid for the period of 2018-2022. However, the NREF only establishes baseline emissions from deforestation at the biome level, it does not spatially allocate those emissions across a biome. More details on the spatial allocation of baseline emissions for this analysis are described in

- Annex D. Geospatial Analysis.
- Colombia's NREF does not include baseline emissions from forest degradation, although there may be an opportunity to account for degradation if the selected methodology allows it. This would likely require the establishment of methods to reconcile baseline degradation with the baseline deforestation established by the NREF.

In accordance with UNFCCC guidelines, Colombia's Ministry of Environment and Sustainable Development (MADS) adopted the REDD mechanism under the National Strategy for Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (*Estrategia Nacional para la Reducción de Emisiones por Deforestación y Degradación*, or ENREDD). This ENREDD strategy was included in the CONPES 3700, a national environmental policy planning document released in 2011. This CONPES document underscored the importance of inter-institutional collaboration on environmental policies, plans and programs. This policy framework seeks to reduce deforestation and forest degradation and to promote sustainable forest management in Colombia using a comprehensive sustainable rural development approach.

MADS established a regulatory framework with operational and technical guidelines for REDD programs and projects. Resolution 1447 in 2018 (Ministry of Environment and Sustainable Development, 2018), MADS created the System for Monitoring, Reporting and Verification of Mitigation Actions. GHG mitigation initiatives in both the international voluntary and domestic compliance markets must register with this program to receive payments or other benefits for results. The resolution details the technical and financial regulations to which REDD projects must comply, including baseline establishment, GHG mitigation goals, co-benefits, monitoring and reporting indicators, validation mechanisms, detailed design of REDD activities, and environmental and social safeguards. It also prevents double counting by requiring projects to register with the National Registry of Reduction of GHG Emissions (RENARE) system, which prevents spatial overlap of REDD eligible and non-eligible areas through an online geographic platform. Through these guidelines and tools, Resolution 1447 seeks to ensure the ecological and social integrity of REDD projects in the country.

Resolution 1447 also states that MADS will formally submit a national Forest Reference Emissions Level (*Nivel de Referencia de Emisiones Forestales*, or NREF) to the UNFCCC to account for the mitigation results of projects from 2018 onwards, to be updated every five (5) years. This NREF is based on information in the Forest and Carbon Monitoring System (*Sistema de Monitoreo de Bosques y Carbono*, or SMByC). It stipulates baseline rates of historical deforestation data, broken into sub-national biome jurisdictions. Importantly, the resolution mandates that projects need to use the values in the most recent NREF to allocate baseline emissions from deforestation. It does not, however, include baseline emissions from forest degradation. The resolution also states that projects that have validated their baselines before this law was passed (2018) need to adjust baselines to be consistent with the most updated NREF applicable after January

2020. However, the current NREF only assesses deforestation through 2017. Further discussion on NREF baseline allocation is continued in section 3.2 Forest Reference Emission Level below.

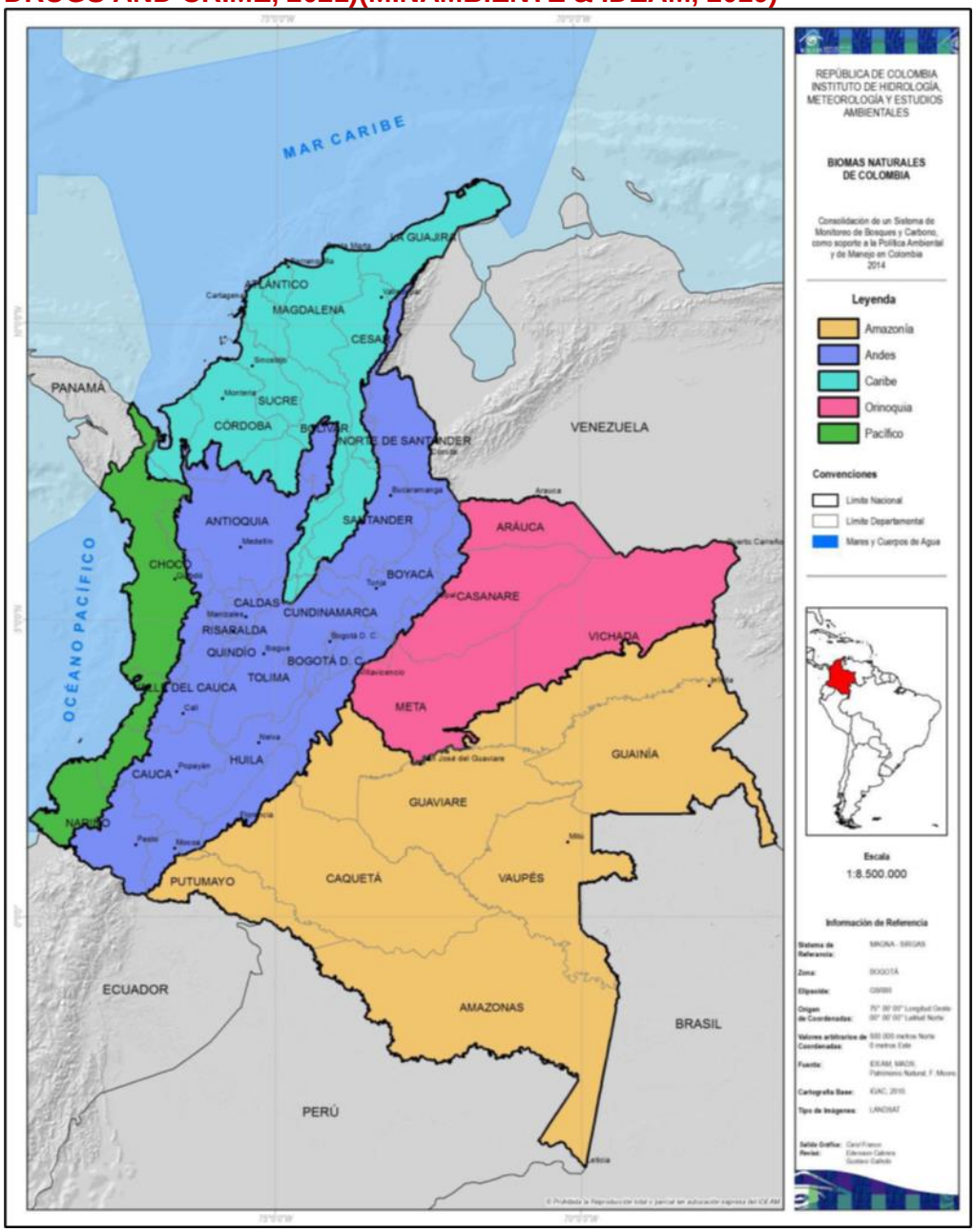
Resolution 1447 further establishes specific guidelines for the use and development of GHG accounting methodologies, including leakage, non-permanence risk, and uncertainty in quantification results. Due to this, several GHG programs have been created in Colombia to ensure projects align with applicable jurisdictional regulations, including ProClima and CerCarbono. This provides a pipeline of credits for sale to the domestic compliance market. Regardless of GHG standard and methodology, however, jurisdictional baselines determined by the Colombian government will have a dramatic impact on project crediting. While standards and methodologies can provide guidance, these legal regulations will ultimately dictate project design—most importantly, the baseline allocation approach used that guides how national deforestation rates should be distributed within individual projects.

3.2 FOREST REFERENCE EMISSION LEVEL

International carbon market demands continue to shift more rapidly towards jurisdictional level frameworks (i.e., at the national, provincial, or other jurisdiction level) and accounting under the UNFCCC. This concept is often called "jurisdictional nesting," as individual projects are "nested" into a larger national or sub-national baseline. The main mechanism for jurisdictional nesting is the creation of Forest Reference Emission Level (FREL) / Nivel de Referencia de Emisiones Forestales (NREFs) that standardize baseline emissions across geographic jurisdictions. All projects in this area will then measure their performance against this baseline rate to receive payments for REDD activities and the results achieved, consistent with the Warsaw Framework guidelines.

Jurisdictional approaches to greenhouse gas accounting are a departure from project-based REDD project designs, which relied on individual projects creating their own GHG emission baselines based on deforestation trends observed in smaller areas. The jurisdictional approach to GHG baseline typically generates lower deforestation and GHG estimates for individual project areas than baselines generated by projects because they average the deforestation rate over a much larger area, grouping areas with very high deforestation together with those with much lower rates. Colombia has made considerable progress in defining national and subnational baselines, broken into 5 subnational biomes: Amazon, Orinoquia, Andes, Pacific, and Caribbean (see Figure 5). The country's first NREF applied only to the Amazon biome and expired in 2018. The current national NREF includes all 5 biomes across Colombia.

FIGURE 5: MAP OF BIOMES WITHIN COLOMBIA (UNITED NATIONS OFFICE ON DRUGS AND CRIME, 2021)(MINAMBIENTE & IDEAM, 2019)



Colombia's current NREF was submitted in early 2020 and was reviewed and endorsed by the UNFCCC in February, 2022. It was created through a logistic regression model based on historical gross deforestation between 2008 and 2017. The model relies primarily on two parameters: the total area under threat of deforestation and the exponential increase of deforestation rates, both reported for each biome. This yields a reference level that exceeds the historical average deforestation between 2008 and 2017, as it is anticipated that deforestation will increase in Colombia without the intervention of activities to mitigate deforestation.

The revised NREF will likely have significant impacts on both existing REDD+ projects in Colombia. Both existing REDD+ projects and projects currently in development will be required to update their baselines to "nest" into the national baseline established at the biome level. Resolution 1447 requires all projects receiving credits for reductions or removals after 2018 to use the NREF, but only the NREF for the Amazon biome was available at the time of the resolution's passage. Consequently, MADS clarified that projects receiving credits for activities before 2018 in all other biomes could use SMByC data to generate a maximum mitigation potential (MMP), meaning the highest amount of GHG reductions the project could be credited for. For credits generated in 2018 and 2019, the new (unreleased) NREF must be "reconstructed" by the user over the project area to determine the MMP for all biomes. This means that a project must use the original national data used to create the NREF and must analyze it in the same way when applying the results to the project. For GHG reductions generated from 2020 onwards, the values in the new NREF must be used.

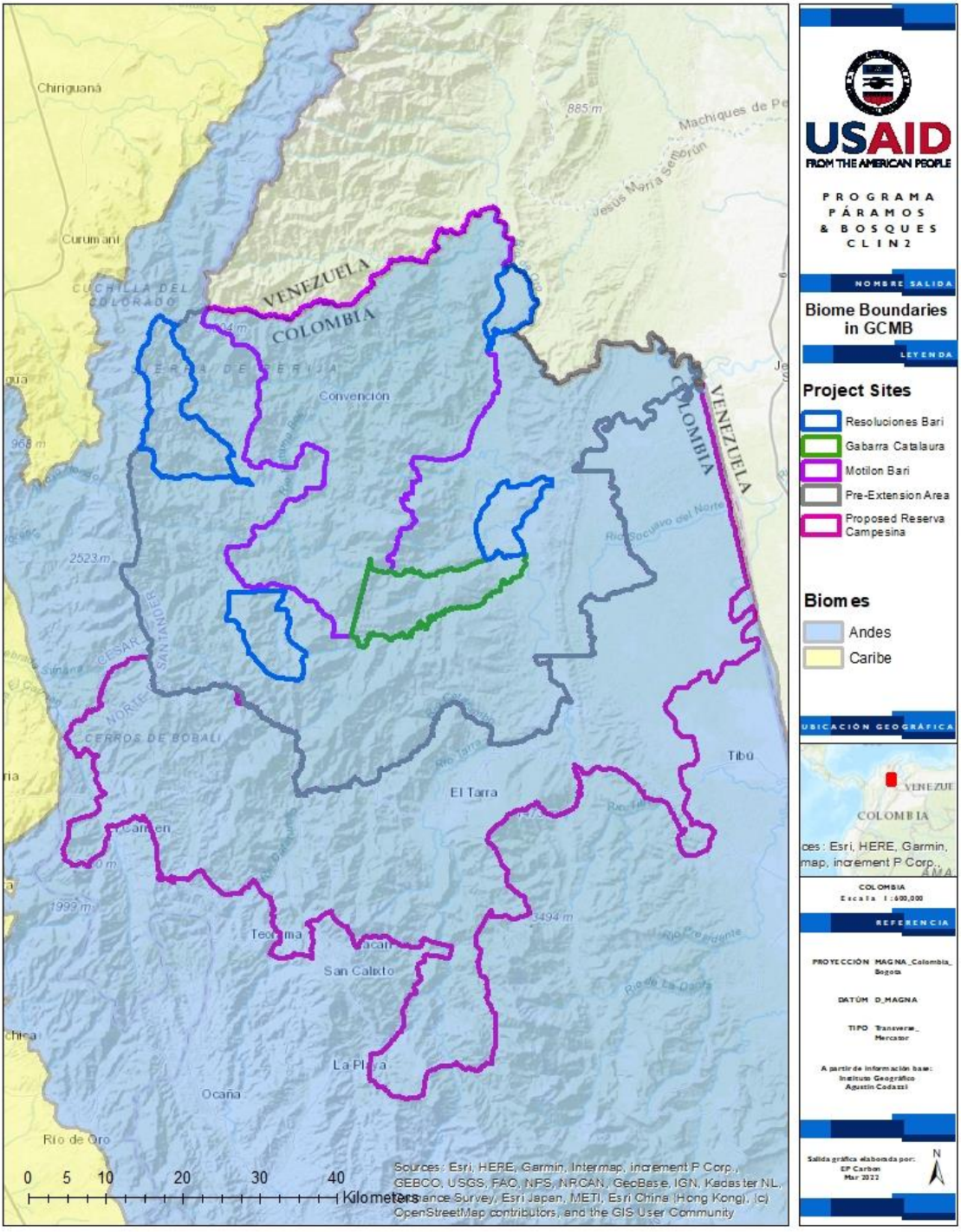
As the NREF has undergone technical review by the UNFCCC, it is assumed that all prospective REDD projects in Colombia will need to nest into the NREF. However, the biggest issue with nesting into the jurisdictional baselines established by the NREF is the spatial allocation of baseline deforestation. It is anticipated that government agencies such as IDEAM will release risk maps that can be used to spatially distribute baseline deforestation and draft documents have been distributed. While the drafts of these documents have been reviewed, they lack the requisite specificity and data to accurately estimate baseline emissions for nested projects.

In our analysis, we reconstructed the NREF with the information and data that were available to us from the Colombian government to estimate baseline emissions. As the project spans a single biome (Andes) we analyzed deforestation dynamics in only that biome. Figure 6 shows how the GCMB boundary overlaps with the national-level biome map. Preliminary risk maps were created for each biome to estimate the spatial allocation of baseline deforestation. However, this spatial allocation could be significantly different from the final allocation likely to be produced by the Colombian government due to differences in methods and data. EP Carbon continues to recommend that communication channels be kept open with the Colombian government in order to receive clarity on updates to the zonal risk map and to allow for iterative preliminary accounting. Our analyses and assumptions used are detailed in

Annex D. Geospatial Analysis, and Annex E. Preliminary Carbon Accounting.

A final source of uncertainty in the crediting estimates provided in this report are due to the exclusion of emissions from degradation in the NREF. While it is understood that there is a pathway for project's to both nest into the NREF and to include baseline degradation, details on how this may work are both unclear within the national context of Colombia and within Verra's consolidated REDD methodology modules. Due to the high proportion of emissions reductions generated from avoided degradation in other REDD projects in Colombia, EP Carbon used available data to estimate potential baseline degradation emissions and tentatively recommends the use of the VM0006 Methodology. However, emissions reductions from avoided degradation are based on very limited data and are made with the assumption that there will be a pathway for including baseline emissions from forest degradation.

FIGURE 6: BIOMES AND GCMB SITES ASSESSED



SECTION 4

GHG PROGRAM, METHODOLOGY, AND PROJECT DESIGN

Key Takeaways:

- The Verified Carbon Standard (VCS) is the best choice for project development using the VM0006 REDD+ methodology that allows for quantification of both avoided emissions from unplanned deforestation and degradation.
- Afforestation/Reforestation (A/R) activities that generate verified emissions reductions, with VCS for example, will need to separately apply and validate/verify using an A/R GHG accounting methodology. If the timing aligns between both REDD and A/R project activities, though, they could be included in one project description and validated at the same time.
- A grouped REDD+ project that combines both the MB and GC *resguardos* could save project development costs and maximize the effectiveness of REDD+ activities. However, a governance agreement between the two *resguardos* would be necessary and is not assured. MB could be developed individually as a project but due to its size, but GC is unlikely to be eligible as an individual project and could only participate as a VCS REDD+ project under a grouped project scenario with MB.

4.1 GHG PROGRAM SELECTION AND JUSTIFICATION

This analysis aimed to determine the most suitable GHG program for the candidate REDD+ project sites to use for project development, which entailed a review of the Verified Carbon Standard and two Colombian GHG programs: ProClima, and the CerCarbono. The final recommendations are based on an analysis of qualitative rating criteria, which is described in detail in Annex A. Standards and Methodologies Review, as well as the results of the financial feasibility analysis. This analysis makes the following recommendations:

1. **The VCS GHG Program is the better candidate for REDD+ project development, despite some notable drawbacks.** The financial modeling scenarios that are presented in this document suggest that the project is not attractive financially at the prices offered by the Colombian compliance market, even when avoided degradation emissions are included. This makes the VCS GHG Program and the higher prices its projects tend to command the more favorable option. Refer to the Financial Feasibility and Marketing section.

2. **While VCS is the best option based on credit pricing and financial feasibility, it has several notable drawbacks relative to the other GHG programs that were assessed**. These drawbacks are as follows:

    a. High fees: The VCS fee structure is approximately 2X higher (3X higher if paired with the CCB Standards) than its Colombian competitors such as ProClima.

    b. English-only: VCS Program documentation is only in English, and project documentation must be in English. This is a disadvantage for many international REDD project stakeholders.

    c. Potential delays due to VCS updates: Project development delays are likely for upcoming VCS projects that may last from 2022 into 2023. These are the result of Verra's ongoing updates to stand-alone project methodologies that will affect projects that need to apply a jurisdictional baseline.

3. **Developing a reforestation project with VCS is possible but pending improvements to the VCS Program could make it temporarily challenging to develop in a time and cost-effective way.** An alternative GHG Program such as the Gold Standard, which focuses on Afforestation/Reforestation, would merit further evaluation for these project activities**.**

4. **If a Colombian GHG program would have been a viable option, this analysis would recommend that future projects consider the ProClima GHG Program under a more favorable financial feasibility scenario**.

    Advantages:

    a. Higher uptake**:** ProClima has demonstrated a higher degree of uptake in Colombia than its competitor CerCarbono.

    b. Easier design than CerCarbono**:** The overall design of its standard and REDD methodology is easier to use and understand than CerCarbono.

    c. Flexible REDD methodology: The ProClima REDD methodology is extremely flexible which may reduce project development costs by having fewer PD requirements to fulfil.

    d. Operates in Spanish: GHG program documentation exists in both Spanish and English and projects can submit their documentation in either language.

    Disadvantages:

a. Level of effort is still high, though potentially not as high as VCS: The level of effort required to develop a project with ProClima may not necessarily be lower than using VCS**.** The flexibility offered by ProClima's REDD methodology -- which, allows proponents to suggest and justify their own methodological approaches at the time of project development-- puts the onus on the project developer to resolve complex GHG accounting considerations that the VCS methodologies may already solve.

b. Uncertain value in the international voluntary market: Although the revenue for ProClima projects sold in the Colombian compliance is more secure, it may be lower than revenue generated from sales made in the global voluntary market. Recent reports on the Colombian compliance market suggest that sale prices tend to be 10-20% lower (about [redacted] USD/ton) than the value of paying the Colombian carbon tax, in order to be an economical alternative to it (Terra Global Capital, 2021). Current estimates of credit prices commanded in the global voluntary market for REDD projects suggest sale price ranges during 2021 that ranged from [redacted] to [redacted]/ton (Forest Trends' Ecosystem Marketplace, 2021) though sources like IHS suggest average prices for REDD grew towards the end of 2021 to [redacted]/ton (IHS Markit, 2022).

4.2 METHODOLOGY SELECTION AND JUSTIFICATION

Choosing the best VCS REDD+ methodology can be a complex process, particularly at the feasibility stage of carbon project development, because the scope of the project is still not clearly defined, and the project idea can still take many different directions. Therefore, these conclusions are only valid under the assumptions and conditions described in this document. Please note that the following conclusions and related analysis are further justified and explained in *Annex A. Standards and Methodologies Review*.

Conclusions:

1. **VM0006 is currently the best VCS REDD+ methodology that allows crediting of both avoided unplanned deforestation and forest degradation (see Scenario II).** VM0009 also offers pathways for quantifying avoided degradation, however we do not recommend it because VM0009 is better suited for quantifying avoided planned degradation and forest degradation. Neither VM0007 nor VM0015 allow for quantification of avoided emissions from unplanned forest degradation and should be discarded for a forest degradation scenario.

2. **Note that quantifying forest degradation with VM0006 would follow process similar to the process used for the BioREDD projects in Colombia.** This would involve using a combination of optical and RADAR satellite sensors combined with field-based biomass calibration plots.

3. **In the unlikely event the project only seeks to quantify avoided deforestation, we recommend VM00015 due to its relative simplicity.**

4. **If the project wishes to credit GHG removals from afforestation/reforestation (A/R) activities, it must select and apply a separate A/R methodology when VM0006 is used for avoided deforestation/degradation.**

    a. VCS is in the process of finalizing its own A/R methodology and CDM A/R methodologies will no longer be allowed in approximately one year**.**

    b. VM0006 does not offer built-in methods for quantifying A/R activities, only "Assisted Natural Regeneration" which refers to activities to enhance forest carbon stocks in areas that already qualify as forests. Enrichment plantings may be eligible for crediting.

    c. VM0007 has a built-in A/R methodology to accommodate avoided deforestation but it will not allow avoided unplanned degradation is likely not an option as a result.

5. **Selecting between VCS REDD methodologies should not be based on their compatibility with jurisdictional baselines.** Once Verra completes its scheduled updates sometime in 2022, it will provide a great deal of clarity for incorporating jurisdictional baselines into VCS project methodologies because Verra proposes that it will be providing the GHG baseline to projects in these scenarios. The updated methodologies will likely utilize a new module for jurisdictional baselines which will alleviate historical concerns of selecting GHG methodologies based on their compatibility with national baselines. Therefore, selecting between VM0006, VM0007, VM0009, or VM00015 will be driven more by the project scenario, ease of use, their applicability conditions, and allowable baseline scenarios, than whether they accommodate jurisdictional baselines easily or not.

Methodology Recommendation: VM0006 v2.2

Scenario 1I: **Avoided Unplanned deforestation and degradation**

TABLE 1: DESCRIPTION OF APPLICABLE METHODOLOGY

Recommended Methodology	VM0006 v2.2
Description	VM0006 is quite flexible in terms of its applications to a wide range of baseline scenarios. Most notably it is capable of accounting for unplanned degradation in its baseline, separately from avoided deforestation estimates. It can also account for carbon stock enhancements in areas that qualify as forests. This is different from reforestation since eligible areas cannot be cleared of forest.
Baseline options	Baseline emissions must be projected in time and across space using different options for baseline emissions including simple historic emissions. GIS is required to determine and justify spatial projections. Specialized remote sensing techniques using optical and non-optical sensors are likely required.
Justification	VM0006 is the only VCS REDD+ methodology that currently allows projects to include emissions from unplanned degradation in their baseline. The project must qualify as "mosaic" deforestation to use it. In contrast, VM007 only allows for GHG credits from degradation from fuel-wood extraction, and not from logging.
Risks	Onerous ex-ante GHG emission projection requirements

Options for Afforestation/Reforestation (A/R)

It is possible to develop an ARR project separately from REDD, even possibly using a different GHG Program like Gold Standard. The scenarios could unfold in the following ways.

- **Use a CDM A/R methodology under VCS, likely AR-ACM003.** Given the uncertainties with VCS's new ARR methodology, it is probable that using a CDM A/R methodology before the new VCS methodology is approved would result in the project eventually having to switch methodologies and incur extra costs.

- **Use the Gold Standard using AR-ACM003 or ProClima to develop a reforestation project.** It is possible to use a different GHG program's methodology for A/R alongside a VCS methodology, but the cost implications of this would need to be assessed and it would raise the amount of complexity for the proponent in order to manage projects with various standards. A more detailed analysis of these reforestation scenarios is beyond the scope of this study.

4.3 PROJECT DESIGN AND CONFIGURATION

About Grouped Projects

A grouped project is a configuration that allows additional project activity instances (crediting areas) to join the same project design after project validation (project design approval), as conditions permit, provided that the new project instances meet pre-

established eligibility criteria. In this case, a broader geographic area is chosen for project development such that the governance structures, land-use patterns, stakeholder groups, and any other relevant criteria are similar enough across the area for incorporating multiple project instances. Project instances must fulfill eligibility criteria outlined at validation to use the same baseline conditions, project activities, and monitoring plan.

Any new project instances added after validation do not need to undergo individual validation or treatment as individual projects. In this way, a project lowers its project development costs through economies of scale, whereby project validation and related costs only occur once, ultimately decreasing costs across the project lifetime. For example, if a region contains multiple Indigenous *resguardos*, the baseline assessment and crediting baseline could be established at a jurisdictional level or a broader spatial boundary like an ecological boundary, such that one Indigenous *resguardo* is validated initially. Other *resguardos* fulfilling eligibility criteria could then be added to the same project design in the future at verification.

A summary of the most important grouped project requirements has been reproduced and included in Annex B. Project Design and Configuration. The VCS grouped project requirements are very similar to those under ProClima and CerCarbono.

Configuration Recommendation

The Motilón Barí and Gabarra - La Catalaura IRs are in a strong position to leverage the benefits of a grouped project approach. A grouped project design would confer the most flexibility to establish REDD crediting areas in a way that aligns with the evolving technical, managerial, and administrative capacities of local communities and government authorities. The options are summarized here, and a more detailed analysis is presented in Annex B. Project Design and Configuration.

- Under a grouped project approach, one of the two *resguardos* could be developed as a project first depending on whether conditions (financial, operational, etc.) favored one over another.
- The Motilón Barí *resguardo* could also subdivide its territory into multiple project instances, focusing on the areas of most interest or priority to them first. A sub-division would be based on determining in which areas within the *resguardo* it is more feasible to initially work. Then a geospatially allocated plan for project areas and activity implementation over time would be made, taking care to initiate and document project activities in each project area instance.
- The VCS Standard states that grouped project areas incorporate new project areas within 5 years of the new project area inclusion if new proponents are added to the design after validation. As long all of the potential proponents the project are officially identified at the project start, the project would be unlikely to face constraints by this rule (VCS Standard 3.5.16).

The grouped project design would likely reduce project development costs by benefiting through economies of scale. Savings would likely be expressed by sharing common fixed

costs, such as including the preparation of only one project description document (PDD) for all project areas (as opposed to each crediting area having its own PDD). Further, project areas would share a common GHG baseline assessment and monitoring plan, and would likely establish and prove resource rights in a similar way.

Having shared project strategies for reducing deforestation in conjunction with the National Park authorities would increase efficiency, particularly in terms of the costs incurred to establish such agreements, and streamline coordination mechanisms. Validation and verification costs would also be reduced: all current and future project instances would only need one validation audit, and verification audits to review current and new project instances would be less costly.

These cost saving opportunities would be expanded if additional areas were added in the future beyond the two initial *resguardos*. In light of the Barí people considering the ongoing process to expand legal titling of additional areas within the National Park, this could be highly valuable. EP Carbon therefore recommends a grouped project approach encompassing both the MB and GC Indigenous *resguardos*.

Combining both *resguardos* under one project design would ideally be accomplished by conducting a baseline assessment and structuring the project design at the level of the entire National Park, with GC and MB IRs being the first two project instances. Either *resguardo*, especially the larger MB IR, could also be subdivided into smaller crediting areas if conditions warranted it in order to progressively expand the project as conditions permit. However, this would require a more detailed understanding of the spatial arrangement of the agents and drivers of deforestation, as well as an exercise to determine whether there is an ideal sequencing of project area instances that would still guarantee financial viability.

The ultimate success of a grouped project approach will depend on the ability of the various traditional and state authorities in the Catatumbo Barí National Park to collaborate and coordinate effectively to implement and monitor activities that lead to emission reductions. The underlying critical assumption here is that the physical security of the communities and implementation partners can be guaranteed.

SECTION 5

BASELINE CONDITIONS

Key Takeaways:

- GC and MB IRs are predominately densely forested with settlements and subsistence agriculture being the most common other land use inside the *resguardos*.
- Deforestation in and around the *resguardos* has been increasing in recent years, with the loss of significant areas tied to agricultural expansion and encroachment

on the *resguardos*' borders, along with specific instances of poor fire management due to agricultural clearing.

- Coca cultivation is one of the most serious drivers of deforestation, which is supported by illegal armed groups that exert much control over the region and is difficult to control.
- Without interventions, it is likely deforestation would continue and would likely worsen due to social (e.g., conflict, weakening of social institutions, illicit economies) and environmental (e.g. climate change, erosion, etc.) conditions.

5.1 BASELINE DESCRIPTION

Deforestation is a mounting threat in the region that has already made inroads into PNN Catatumbo Barí and within the *resguardos* themselves. The municipalities with the two highest rates of deforestation in the region, Tibú and Teorama, overlap with the Barí *resguardos* and PNN Catatumbo Barí. IDEAM ranked Tibú as the municipality with the highest deforestation rate in Norte de Santander, with 7,103 ha deforested as of 2019, representing 75% of the deforestation of the department's 9,910 hectares. The municipality of Teorama has the second highest amount of deforestation in the department, with 1,864 hectares deforested. Deforestation is due to a combination of several agents and drivers of deforestation and forest degradation, resulting in emissions from activities such as illicit coca cultivation, mining-energy, agriculture and cattle expansion, and selective logging and fuelwood collection.

The lands inside the *resguardos* are largely forested, with some areas dedicated to agricultural crop cultivation, livestock grazing, settlements, and more recently coca cultivation. In the MB and GC IRs tropical humid forest predominates, with more than 95% forest cover. Land cover information reveals that there is significant secondary vegetation growth, which may indicate forest recovery processes from past deforestation.

Areas transformed by anthropogenic action (less than 5%) mostly consist of pasture, heterogeneous agricultural areas, and temporary annual crops in a very low proportion. The documents consulted describe that food crops (mainly tubers and fruits) as well as forest products constitute the main sources of food for the Barí people. These crops are cultivated for family and community subsistence and have not significantly impacted the natural forest ecosystems. However, a growing dependence on products obtained at markets outside of their territory is having negative impacts on their economy and health (Centro Nacional de Memoria Historica, 2018).

Extractive activities are carried out in the areas surrounding the *resguardos*, including hydrocarbon and mineral mining. These firms have titles issued by the relevant authorities and more are in the process of being requested (Crudo Transparente, 2018). Oil palm cultivation has also been observed to be increasing outside the *resguardos* as well.

5.1.2 IDENTIFICATION OF AGENTS AND DRIVERS OF BASELINE EMISSIONS

The majority of the key stakeholders identified in Section 2.3 Stakeholder Identification. There also the principal agents of deforestation in or near the *resguardos*. These agents are listed below along with what is currently known concerning their relationship to different drivers of deforestation and forest degradation.

Known agents of deforestation and forest degradation:
1) The Indigenous Barí people in the MB and GC *resguardos*
2) *Campesino* subsistence farmer groups, individuals, and families
3) Migrant populations and recent settlers, known as *colonos*
4) Illegal actors in the area

Unconfirmed agents of deforestation and forest degradation:
5). Extractive industries (oil and gas)

1) The Indigenous Barí people in the MB and GC *resguardos*

The Barí communities live within the Motilón Barí and Gabarra Catalaura *resguardos*. Some community members themselves are agents of deforestation and forest degradation of forest resources within the *resguardos*, as identified by Barí community members during the workshop with EP Carbon. Several drivers of deforestation were identified as being caused by immediate livelihood needs including shifting agriculture to address food security, selective logging for building materials, and firewood collection for household energy. Some of the drivers of deforestation and degradation, such as selective logging, were identified as also being caused by the need for income generation, which purportedly occurs by selling high-value timber to regional markets.

The issue of illicit crop cultivation by community members themselves was not directly addressed in the workshop. However, there are some indications that this may be occurring based on communication with other stakeholders. The mechanism and underlying causes for this driver are complex and not yet entirely understood, but are generally linked to a demand for income generation by communities and in some cases by coercion by illegal actors. This is, and will continue to be, among the most concerning drivers of deforestation and also one of the most complex to address.

TABLE 2: SUMMARY OF GHG EMISSIONS, DRIVERS, CAUSES GENERATED BY THE BARÍ COMMUNITIES

Emission Type	Driver	Underlying cause	Source
Deforestation	Subsistence agricultural production	• Food security	EP Workshop
	Illicit crop production (unconfirmed)	• Income generation • Coercion by armed groups	EP Carbon interviews
Forest Degradation	Fuelwood collection	• Demand for household fuel	EP Workshop

		• Inefficient, wood-based cooking areas	
	Selective logging	• Demand for local building materials • Income generation	EP Workshop

2) *Campesinos*, *Colonos*, and Migrants

Both *campesinos* and *colonos* stakeholder groups were identified during the EP Carbon workshop as significant agents of deforestation and forest degradation. These agents are associated with significant deforestation resulting from a combination of unsanctioned land occupancy and unallowable land uses within the PNN Catatumbo Barí and the *resguardo* boundaries. Both agents are reportedly involved in commercial and subsistence agricultural production, cattle production, illicit crop cultivation, as well as fuel wood collection and selective logging. In absence of effective natural resource governance, enforcement of established boundaries for specific land uses, and sustainable land use activities, these groups represent the most notable agents from outside the *resguardos* responsible for GHG emissions from land use change.

Whether making a distinction between *campesinos*, *colonos*, and migrants results in discernable differences in their patterns and magnitude of emissions is currently not well understood and merits further analysis. Identifying key distinctions between them may greatly influence how project activities are designed, and may present an opportunity to tailor approaches that can more effectively target any unique underlying motivations or decision-making processes that govern their behavior.

At this stage, EP Carbon was not able to secure information to clarify the exact processes by which these drivers of deforestation and forest degradation have encroached into the PNN Catatumbo Barí and the *resguardos*, or their extent and specific locations within them. However, the information and documentation reviewed suggest that these land use changes occur through a combination of land-grabbing, illegal sale of land rights by the Barí, and-- in the case of illicit crops – financial incentives or coercion by illegal groups.

TABLE 3: SUMMARY OF GHG EMISSIONS, DRIVERS, CAUSES GENERATED BY CAMPESINOS, COLONOS, AND MIGRANTS

Emission Type	Driver	Underlying cause	Source
Deforestation	Illicit crop production	• Income generation • Coercion by armed groups	EP Carbon Workshop
	Cattle production	• Income generation	
	Subsistence Agriculture	• Food security	
	Commercial Agriculture	• Income generation	
Forest Degradation	Fuel wood collection	• Demand for household fuel • Inefficient, wood-based cooking areas	
	Selective logging	• Demand for local building materials • Income generation	

4) Illegal actors

Illegal actors in the area are known to be associated with the production of illicit crops. These actors reportedly conduct both voluntary and involuntary arrangements with sanctioned and unsanctioned land users to cultivate coca, which results in increasing levels of deforestation in the region as well as in the PNN Catatumbo Barí and the MB and GC IRs specifically. As a result, engaging in any kind of activity to enforce legal land uses likely presents a high risk to the physical security of any stakeholders involved in such activities. This creates a potentially perilous situation for conservation and development projects that favors a continuation of illicit crop cultivation and further encroachment into protected areas. The role of various state actors to address these governance and political issues is essential.

TABLE 4: SUMMARY OF GHG EMISSIONS, DRIVERS, CAUSES GENERATED BY ILLEGAL GROUPS

Emission Type	Driver	Underlying cause	Source
Deforestation	Illicit crop production	• Income generation • Political influence	EP Workshop
	Cattle production	• Presumably income generation	
Forest Degradation	Selective logging	• Income generation	

5). Extractive Industries

Broadly speaking, hydrocarbon exploration by outside groups is another contributor to deforestation and other environmental and social impacts in the region. The specific groups responsible as well as their degree of impact are not currently well known. The Barí community members suggest it is not currently a major source of forest cover loss in the *resguardos* themselves, however these activities are said to contributes to polluted waterways, landslides, and impacts the overall health of forest resources and communities.

TABLE 5: SUMMARY OF GHG EMISSIONS, DRIVERS, CAUSES GENERATED BY UNKNOWN EXTRACTIVE GROUPS

Emission Type	Driver	Underlying cause	Source
Deforestation	Resource extraction	• Income generation • Economic demand	ART document

5.1.3 ANALYSIS OF AGENTS AND DRIVERS OF BASELINE EMISSIONS

The following section analyzes the current state of knowledge concerning the agents and drivers of baseline land uses based on inputs from the workshop EP Carbon conducted

with the communities and other documents. While the agents and drivers of deforestation and forest degradation are generally known (Table 6) and have been analyzed, there are a number of knowledge gaps (Table 7) remaining that should be resolved in the future to more precisely define the project scenario, agents and drivers, and improve project activity design to reduce GHG emissions effectively.

TABLE 6: SUMMARY OF AGENTS AND DRIVERS OF DEFORESTATION AND DEGRADATION

EMISSION TYPE	DRIVER	TYPES	AGENT(S)
Deforestation	**Mining - Energy**	Mechanized	Unknown, possibly outside groups/corporations
	Coca Cultivation	Illicit crop production	campesinos, colonos, illegal groups, Bari(?)
	Agricultural Expansion	Subsistence agriculture	Barí community members, campesinos, colonos
		Commercial agriculture	campesinos, colonos
		Cattle production	campesinos, colonos, illegal groups
Forest Degradation	**Timber Extraction**	Fuelwood collection	Barí community, campesinos, colonos
		Selective Logging	Barí community, campesinos, colonos

TABLE 7: UNCERTAINTIES CONCERNING AGENTS AND DRIVERS IN MB+GC IR

Driver	Types	Agent(s) Uncertainties	Other Uncertainties
Mining - Energy	Assumed to be industrial scale/ mechanized, but unclear	Unclear if accomplished by corporations or groups/individuals, permitted or unpermitted, and whether linked with illegal groups	Unclear if affecting carbon stocks within project or just surrounding it, and how immediate this threat may be
Coca Cultivation	Illicit crop production	Unclear on if Bari community members are themselves engaged in this; unclear if illegal groups cultivate areas themselves or if more reliant on voluntary versus incentivized or coerced production	Difficult to estimate extent if some is cultivated in the understory and how much is associated with degradation vs deforestation
Agricultural Expansion	Subsistence	Unclear which techniques are used by different groups (i.e., shifting vs. sedentary),	Extents and locations are not precisely known; lack of information on how fires are currently

Driver	Types	Agent(s) Uncertainties	Other Uncertainties
			controlled and impact of uncontrolled fires
	Commercial	Unclear which outside groups tend to be engaged in commercial agriculture of legal products,	Unclear how prevalent this is inside the *resguardo* itself and which markets/products are associated
	Cattle production	Conflicting accounts of which groups are responsible (Barí community members vs. campesinos, colonos vs. illegal groups) and their respective magnitudes	Unclear how prevalent this is inside the *resguardo* itself; Unclear if mostly for subsistence or income generation.
Timber/Wood extraction	Fuelwood collection	Relative proportions of extracted timber volumes/species, by agent, are unknown	Volumes of fuel wood consumption and fuel-shed are unquantified
	Selective Logging		Locations of extraction are unknown/unmapped; timber supply chain is unknown

Agriculture and Cattle Production

Different types of agricultural cultivation are believed to be occurring in the *resguardos* by the Barí community members as well as by *campesinos* and *colonos*. Shifting subsistence agriculture (commonly referred to as "slash and burn") is a traditional practice of the Barí within the *resguardos*, where fires are used for clearing the land. Community members identified this as a major source of deforestation when some fires have been inadequately managed and burn considerable amounts of forest area, generating significant emissions from these agricultural processes.

Agricultural expansion by *campesinos* and *colonos* in and around the *resguardos* are considered to be both subsistence and commercial in nature and are another source of agricultural-related deforestation. Additionally, these groups are associated with extensive cattle production surrounding the *resguardo,* which is considered a major threat to forest resources. Illegal groups were also identified as being involved in cattle expansion, though their exact role has not been identified. At this stage, the extent of different types of agricultural expansion by these groups, which products tend to

dominate, and the extent of the impacts from\ agricultural activities within the immediate project area is not fully understood.

Selective Logging and Fuelwood

The use of timber by Barí community members, *campesinos*, and *colonos* contribute to forest degradation as a result of selective logging practices to procure building materials and fuelwood for family and community use. Indirect causes of timber extraction were identified as stemming from a multitude of issues including meeting basic household needs, income generation, lack of knowledge or ability to organize and plan sustainable forest management practices, the weakening of cultural institutions that promote ancestral forest stewardship practices, and economic incentives that promote forest conversion. In the case of the Barí people, local governance processes are reportedly in place to approve selective logging for community demand, though there are also reported instances of unapproved logging as well. There is currently no credible estimate that could be identified regarding the potential locations, species, volumes, or frequencies of selectively logged timber, what kind of forest products they are associated with, and what markets they serve. The same uncertainty is present with information concerning fuelwood collection. These could be estimated in the medium-term through qualitative surveys, and, at a higher cost, combined with remote sensing approaches.

Coca Cultivation

Illicit coca cultivation is a significant driver of deforestation in the region and encroaches on the boundaries of the *resguardos*. As evidenced by the United Nations Office on Drugs and Crime (UNODC), Catatumbo continues to be the region in Colombia with the largest area planted with coca. Tibú has the second highest concentration of coca crops in the country after Tumaco (in Nariño). Within the PNN Catatumbo Barí, 1,692 hectares of planted coca were identified in 2020, which is 12 times more than in 2016, while 510 hectares of planted coca were identified in the MB IR and 46 hectares in the GC IR. Both cases represent a doubling in these areas since 2018 (United Nations Office on Drugs and Crime, 2021).

Resolving the issues associated with coca cultivation is particularly challenging, as it stems from armed groups and associated illicit economies. Managing this complicated and potentially dangerous land use is highly dependent on identifying precisely which agents are responsible for cultivating these crops, as well as the mechanisms that influence these decisions. For instance, it is important to identify precisely where and in what proportion Barí community members are involved in these activities versus *campesinos*, *colonos*, or armed groups themselves. Each stakeholder will likely necessitate a different strategy for controlling illicit crop production. Although if armed groups are directly involved with the cultivation, REDD+ interventions are particularly unlikely to be effective or even safe to execute. This is one of the most significant challenges the project faces, as the region has some of the highest rates of violence associated with drug trafficking, with significant amounts of territory already controlled by illegal armed groups. This creates conditions that may be outside the scope of a REDD project, and

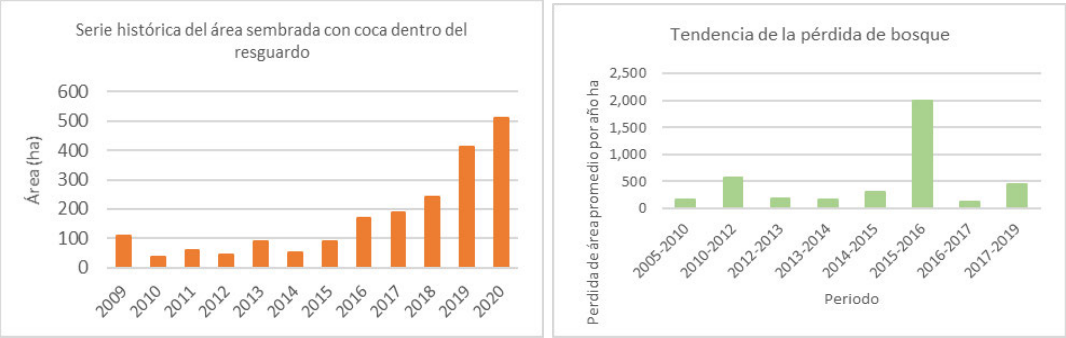
which could preclude effective REDD activities if they lead to retaliatory violence in response to conservation-driven land management activities. It is unclear if it is possible to implement an effective and safe REDD project without addressing this issue.

From the perspective of GHG emissions, coca is more often associated with deforestation, but it may also be planted with moderate amounts of forest cover, which could make it a driver of forest degradation as well. The degree which this is may be occurring is not yet known or quantified.

Motilón Barí *Resguardo*

The MB *resguardo* has experienced a constant incremental increase in area used for coca plantation, which has doubled in the last three years, increasing from 243 to 510 hectares (United Nations Office on Drugs and Crime, 2021). In 2016, Global Forest Watch reported the occurrence of a fire that caused the loss of approximately 360 hectares, which is supported by the evidence of 48 fire alerts recorded by the VIIRS sensor in that same year. This event was corroborated with community members during workshops, who identified this as an event related to poor fire management for land preparation. See graphs 1A and 1B below for a visualization.

GRAPH 1A AND 1B. AREAS PLANTED WITH COCA AND ANNUAL LOSS OF FOREST. RI MOTILÓN-BARÍ. SOURCES: (UNITED NATIONS OFFICE ON DRUGS AND CRIME, 2021) AND (IDEAM, 2020)



The fact that the largest deforested area during the analyzed period was potentially due to poorly managed agricultural practices allows the community to consider activities to prevent forest loss by improved agricultural management practices.

The Gabarra-Catalaura *Resguardo*

Deforestation is strongly correlated to coca cultivation within the Gabarra-Catalaura *resguardo*. The area of coca plantations in GC has greatly increased in the last 12 years, except for the period between 2016 and 2017. In the last three years it has practically doubled, increasing from 27 to 46 hectares per year (United Nations Office on Drugs and Crime, 2021). Deforestation rates show a similar trend. The data obtained from Global Forest Watch and IDEAM show an increase in deforestation, likely correlated with coca cultivation. Both sources of information record a sudden increase in annual deforestation for the year 2015-2016. Importantly, for this same year VIIRS sensor

records show the occurrence of a fire event in which approximately 180 hectares could have been burned, which may explain some of the increase in forest loss specifically for this year. This event was corroborated during the community during workshops held. See Graphs 2A and 2B below for a visualization of deforestation and coca cultivation.

GRAPH 2A AND GRAPH 2B: AREAS PLANTED WITH COCA AND ANNUAL LOSS OF FOREST. LA GABARRA CATALAURA. SOURCES: (UNITED NATIONS OFFICE ON DRUGS AND CRIME, 2021) AND (IDEAM, 2020)

Extractive Industries

Legal activities

The recent passing of Resolution 110 by the Colombian government (Ministry of Environment and Sustainable Development, 2022) suggests that such activities in and around the *resguardo* may increase in the future, as less permitting and formal approval is required for exploration in protected forest reserves (such as Indigenous *resguardos*) throughout Colombia. This implies that some amount of land use change emissions within the *resguardos* may be attributable to these activities sometime in the future, and measures to limit this risk through governance agreements with state entities may be needed.

Unsanctioned activities.

There is insufficient information to conclusively determine whether there is a threat from unsanctioned mining activities, especially gold mining, in the PNN Catatumbo Barí or the *resguardos*. However, it is a persistent problem across the region that results in extreme deforestation and contamination of waterways and food sources. Unsanctioned mining activities were not mentioned by the Barí during the EP Carbon workshop, but may become a concern in certain areas given its prominence as a driver of deforestation in the region in economically marginalized areas.

5.1.4 OTHER BASELINE CONDITIONS

Planning documents produced in conjunction between ART and the Barí communities suggest other baseline conditions related to community and biodiversity issues, and are listed here as other areas of concern, and which could be part of a holistic REDD+ project design that considers important co-benefits.

Food security, overhunting and biodiversity loss. The Barí still rely on hunting wildlife for a portion of their food security. However, the combined threat of monetary poverty and habitat loss is putting pressure on wildlife availability from over-hunting to meet food intake demands, and diminishing populations of desired species. These continued pressures could further strain an already tenuous component of local food security.

5.2 MOST LIKELY BASELINE SCENARIO

Based on the information analyzed and the statements made by community members in the GC and MB IRs, the most likely baseline scenario is that the activities causing deforestation (coca cultivation, slash and burn agriculture, etc.) will continue and worsen, along with the ongoing influence of armed groups that restrict movement, physical safety, food security, and personal liberties. Analysis of the historical agents and drivers of deforestation in the Barí territory shows that the rates of deforestation within the *resguardos*, as well as the entire PNN Catatumbo Barí, are low compared to the surrounding region. But according to data from UNODC and IDEAM deforestation rates seem to be increasing in recent years, particularly due to the cultivation of illicit crops. During the workshops with EP Carbon, Barí community members stated that *campesino* farmers' settlements, coupled with pressure from armed groups to increase the coca plantation area, are the main causes of increased deforestation in their territory.

Drivers of Deforestation:

- **Coca cultivation and illicit economies would likely continue:** Without viable alternative livelihood sources and control of illegal armed groups in the region, coca cultivation is likely to continue to be a significant source of deforestation as well as impact community members safety and autonomy.
- **Agricultural expansion continues:** Without mediation between the Barí people, *campesinos*, and *colonos*, the influence of illegal groups on cattle production, and protection of the Barí's territory from further encroachment, it is likely that both subsistence-level and income-generating agricultural activities, particularly cattle production, would continue to expand. *Colonos* populations in the area are increasing due to cross-national migration from Venezuela due to political instability and others are relocating from highland communities. This will likely continue and will put more pressure of local forest ecosystems and erode the Barí's land sovereignty.
- **Forest clearing for shifting agriculture would likely continue:** Traditional shifting agriculture practices that rely on clearing forest areas using fire (referred

to as "slash and burn") would likely continue without fire management and training and resources for sustainable agriculture techniques. Climate change increases the likelihood and severity of forest fires burning out of control. Thus, events that burn many hectares in one instance, like those that occurred in 2015 and 2016, would be more likely to occur.

- **Legal mining activities could increase, but subject to significant uncertainty:** Colombia recently passed Resolution 110 in 2022 (Ministry of Environment and Sustainable Development, 2022), which allows exploration for mineral mining, hydrocarbons, and other resources in protected forest reserves apart from National Parks (such as Indigenous and Afro-Colombian territories) without permits from the regulatory authority. This may increase the risk instance of legal, larger-scale, mechanized mining operations in and around the *resguardos*, although the precise likelihood and impact of exploratory activities is unclear, as is whether these would lead to actual extractive activities and losses in forest cover.
- **Unsanctioned mining activities may be a problem in the future:** There is insufficient information to conclusively determine whether there is a threat from unsanctioned mining activities is not. However, it is a persistent problem across the region that results in extreme deforestation and contamination of waterways and food sources.

Drivers of Degradation:

- **Selective logging would likely continue:** Selective logging for building materials, income generation, and for fuelwood is likely to continue by all stakeholder groups (the Barí community groups, *campesinos*, and *colonos*) unless forest-friendly income generating activities can effectively address these underlying causes.

Community well-being:

- **Food security would likely deteriorate:** Ongoing habitat loss and overhunting will likely continue to make food security a concern. Moreover, climate change increases the likelihood of more severe climate events that can lead to increased flooding, erosion, or water scarcity. This not only can threaten the natural ecosystems but can greatly disrupt small-scale agriculture, reduce soil fertility, yields, and increase the likelihood of pests and diseases. Additionally, communities are reliant on traditional hunting for protein sources and wildlife populations can plummet due to deforestation, environmental degradation, and climate change, which could further increase food insecurity. Without technical training and resources for wildlife and natural resource management and climate-resilient agriculture it is likely that the food security situation in GCMB would continue deteriorate.
- **Physical security and autonomy of the Barí would continue to be threatened:** The prevalence of illegal armed groups and illicit economies in this strategic location has and will likely continue to threaten the physical safety and economic security of the Barí people without significant interventions. This

weakens their cultural institutions and has cascading impacts on their ability to self-govern, pass down ancestral lifeways and traditions, and promote wellbeing in their communities. Without investment, it is likely younger members of the Barí communities will continue to seek non-traditional, potentially dangerous livelihoods (such as coca cultivation) for economic opportunities.

- **Ineffective governance and coordination contribute to ongoing illegal land use conflicts:** It is essential that any proposed interventions support alternative livelihood strategies that are economically and socially viable, and are in line with the territorial planning instruments. These planning documents include the Catatumbo Barí Management Plan, the Life Plan of the Barí people, as well as more recent documents, such as the Roadmap for the Catatumbo subregion created by ART, and the Plans for the Substitution of Illicit Crops (PNIS for its acronym in Spanish).

  There are an array of plans and programs formulated for the region, as shown in reports from the Attorney General's office and independent organizations such as the FIP (Fundacion Ideas Para La Paz Fip et al., 2020). But these documents also show the limited implementation capacity of state agencies in the face of the resurgence of violence in the Catatumbo region. Feedback from the Barí community corroborates that the armed conflict and the socio-environmental challenges present in the region have rendered the state's actions ineffective at reducing deforestation. These threats have also affected the governance of the Barí territory, causing divisions among the traditional authorities. It is likely that this situation will worsen in the absence of projects that reaffirm the legitimacy of the Barí people's traditional authorities and promote coordination between Indigenous authorities, environmental agencies, and the regional and national governments.

SECTION 6

PROJECT SCENARIO

Key Takeaways:

- A high crediting scenario cannot be justified until project activities are proposed that reduce GHG emissions deforestation and their underlying causes are fully considered, described, and planned, since currently more attention is given to forest degradation
- The majority of the detailed activity proposals formalized by ART are conceptual in nature and will require additional time and effort to formulate more detailed implementation plans if a REDD+ project moves forward
- REDD+ project success and timely project development will depend heavily on how quickly and effectively existing management plans and proposals, such as the

Catatumbo-Barí National Park Management Plan, the Barí Life Plan, and the PDET Roadmap can be harmonized, integrated and formulated with sufficient detail to promote timely and effective project activities

- Although restoration activities have been formally proposed, the current scale at which they have been conceptualized in the ART Fichas is unlikely to be sufficient for crediting as a GHG reforestation project. Our analysis suggests more areas potentially available for restoration.
- The project may have to prioritize monitoring and enforcement activities early in the project in order to justify and generate creditable GHG emissions reductions.
- Clean-cookstoves have been identified as potential activity that could generate revenue from GHG credits to offset their investment, however, a feasibility analysis of the crediting potential from clean-cookstoves is advisable, and was beyond the scope of this analysis
- There are significant external risks to the project due to political instability and violence in the region that could pose serious risk to project implementation.
- The project would likely meet additionality requirements, thus reducing validation risk

The overall analysis and full range of considerations for project activity development are contained in Annex C. Project Scenario.

6.1 PROPOSED ACTIVITIES

EP Carbon compiled and reviewed the results of a workshop with Barí community members we conducted. We also reviewed the outputs of the PDET Roadmap of Priority Initiatives led by ART, as well as the *Ichidji Ya Ababi: "Something Ours": Life Plan of the Barí Territory*. The most critical conclusions from this analysis are listed as Key Takeaways above, while more detailed analysis and additional conclusions of these tables are contained in Annex C. Project Scenario

The following table (Table 8) compiles and categorizes the various project activities that have been identified or proposed either through ART or in the EP Carbon workshop in order to visualize all the types of activities that have been discussed or identified. These activities fall into one of seven major categories: Natural Resource Governance, Restoration and Reforestation, Wildlife Management, Improved Land Uses, Monitoring and Enforcement, and Alternative Livelihoods.

Table 9 highlights the degree to which the proposed activities that are summarized in Table 8 are aligned with the agents and drivers of the baseline land uses identified in the previous section. It does this by comparing the proposed activity categories, in a qualitative way, against the range of potential activity categories that could be implemented to address a given driver of deforestation and forest degradation. Taken together, these analyses provide a preliminary overview of the strengths and potential gaps of the proposed activities and suggest considerations that may improve the overall

effectiveness of the project to reduce emissions from deforestation and forest degradation.

TABLE 8 - PROPOSED PROJECT ACTIVITIES IDENTIFIED FOR THE PROJECT AREA THROUGH ART OR EP CARBON

Activity Category	Proposed Main Activities	Sub -Activities	Relationship to GHG emissions	Projected Outcomes	Source	Status
Natural Resource Governance	Create/update environmental management plan	• Participatory Land use mapping and planning • Trainings and exchanges • Establish Land use zoning • Ecological restoration plan	Governance activity, Indirect GHG benefit but necessary for effectiveness	Climate benefits • (indirect)	(ART, n.d.-b)	ART Ficha conceptualized
	Conservation agreements	• (Undefined)	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Climate benefit	(EP Carbon, 2021)	Incipient
	Land use policy interventions	• Sanctions and land use bans of illegal activities	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Climate benefit	(EP Carbon, 2021)	Incipient
	Cultural strengthening	• Document/transfer traditional knowledge of forest use from elders to young people	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Community benefit • Indirect climate benefit	(ART, n.d.-b) (EP Carbon, 2021)	ART Ficha conceptualized
	Education	• environmental education about the importance of the sustainable forest uses	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Community benefit • Indirect climate benefit	(ART, n.d.-b)	ART Ficha conceptualized
	Conflict Resolution	• Formal mediation/conflict resolution between Barí and different groups	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Community benefit	(ART, n.d.-b)	ART Ficha conceptualized

Activity Category	Proposed Main Activities	Sub -Activities	Relationship to GHG emissions	Projected Outcomes	Source	Status
	Participatory planning processes	• See Restoration and Wildlife Management	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Biodiversity benefit	(ART, n.d.-a)	ART Ficha conceptualized
	Strengthen relationships and cooperation with institutions	(undefined)	Governance activity, Indirect GHG benefit but necessary for effectiveness	• Climate benefit	(ART, n.d.-b)	ART Ficha conceptualized
Restoration and reforestation	Establish native trees/forests or agroforestry trees on priority sites and illegally cleared areas	• Participatory workshops • Identify initial areas • Delineate areas based on level of disturbance and barrier • Formalize restoration/reforestation strategies by site (natural regeneration, exotic species) • Restoration trainings • Forest management trainings • Native tree seed collection • Establish tree nurseries in communities	Potential crediting from direct GHG removals (depending on scale) and/or means for generating avoided forest degradation	• Climate benefits; biodiversity benefits • Food security • Alternative income sources	(ART, n.d.-c)	ART Ficha conceptualized
	Woodlots for fuel for household use;			• Climate benefits • Biodiversity benefits • Improved Public health	(ART, n.d.-c) (EP Carbon, 2021)	ART Ficha conceptualized
	Woodlots for building materials and wood products ("balsas")			• Alternative income • Climate benefits • Biodiversity benefits	(ART, n.d.-c) (EP Carbon, 2021)	ART Ficha conceptualized

Activity Category	Proposed Main Activities	Sub -Activities	Relationship to GHG emissions	Projected Outcomes	Source	Status
Wildlife management	Design a wildlife management plan	• Participatory design of wildlife management plan	Direct GHG removals, or only biodiversity benefit	• Climate • Biodiversity benefits • Improved food Security	(ART, n.d.-a)	ART Ficha conceptualized
	Establish habitat corridors between protected areas	See Restoration and Reforestation	Potential crediting from direct GHG removals (depending on scale, additionality)	• Climate benefits • Biodiversity benefits		
	Restore specific plants that are food for culturally-important game species	See Restoration and Reforestation	GHG crediting unlikely	• Biodiversity benefits		
Improved Land Uses	Sustainable Forest Management	Community training and best practices implementation (timber, woodlots)	Direct GHG benefit, avoided deforestation/degradation	Climate benefits	(ART, n.d.-c)	ART Ficha conceptualized
		Establish and implement forest management zones	Direct GHG benefit, avoided deforestation/ degradation	Climate benefits	(ART, n.d.-c)	ART Ficha conceptualized
		Managed woodlots, 'See Restoration + Reforestation"	Means for avoiding emissions from degradation	Community benefits	(ART, n.d.-c)	ART Ficha conceptualized
	Improved Cattle Management	(Largely undefined; intensification for improved production, diminished footprint for restoration)	• Avoided deforestation; • Opportunity for GHG removals	Community benefits; Possible climate benefits	(EP Carbon, 2021)	Incipient
Monitoring and Enforcement	Reclaim and reforest illegal clearings due to agriculture,	• (Specific details are undefined)	Promotes direct GHG removals through restoration; Avoided	Climate, biodiversity benefit	(EP Carbon, 2021)	Incipient

Activity Category	Proposed Main Activities	Sub -Activities	Relationship to GHG emissions	Projected Outcomes	Source	Status
	cattle and illicit crop areas	• Also see Restoration and reforestation" and Natural Resource Governance	deforestation through deterrence			
	Participatory monitoring and enforcement	(undefined)	Direct avoided emissions	Climate, Biodiversity benefit	(ART, n.d.-b)	ART Ficha written
Alternative livelihoods	Establish sustainable enterprises	Training and development for community enterprises (community members, and women's association)	Indirect GHG benefit but necessary for effectiveness	Community benefit, Climate benefit	(ART, n.d.-b)	ART Ficha conceptualized
		Wood products development via wood mills in communities ("balsas")	Avoided deforestation/degradation through income generation		(ART, n.d.-c)	ART Ficha conceptualized
		Formalize, train, develop, commercialize traditional handicrafts effectively	Avoided deforestation/degradation through income generation		(ART, n.d.-b)	ART Ficha conceptualized
Household Needs	Clean-cook stoves	Identify, select, and implement cook-stove model	Direct avoided emissions from forest degradation	Public health Climate benefit	(ART, n.d.-c); (EP Carbon, 2021)	ART Ficha conceptualized
	Community-managed wood lots (fuel, materials)	(See Restoration)	Means for avoided forest degradation emissions	Climate and community benefits	(ART, n.d.-c)	ART Ficha conceptualized

TABLE 9 - ANALYSIS OF ALIGNMENT BETWEEN AGENTS + DRIVERS OF LULUC AGAINST EXISTING PROPOSED ACTIVITIES

Driver	Driver Type	Agent(s)	Emission Type	Currently targeted agent	Activity Category Options	Currently Proposed Activity (From Table 8)?	Explicitly aligned with agent/driver?	Plans or concepts exist?
Coca Cultivation	Illicit crop production	*campesinos, colonos,* illegal groups, Bari(?)	Deforestation	*campesinos, colonos,* illegal groups,	Enforcement	NO	NO	NO
					Repurposing/ Restoring land	YES	YES	YES
					Crop substitution;	NO	NO	NO
					Governance and policy changes;	LIMITED	YES	NO
					Alternative livelihoods	YES	NO	YES
Agricultural Expansion	Subsistence agriculture	Barí community members, *campesinos, colonos*	Deforestation	Barí community	Sustainable agricultural practices	NO	NO	NO
					Agroforestry	YES	NO	NO
					Zoning and enforcement	YES	SOMEWHAT	YES
					Alternative livelihoods	NO	NO	YES
	Illegal commercial agriculture	*campesinos, colonos*	Deforestation	*campesinos, colonos*	Enforcement	LIMITED	NO	NO
					Resettlement	NO	NO	NO
					Repurposing land	YES	NO	NO
					Restoration	YES	NO	NO
					Alternative livelihoods	NO	NO	NO
					Zoning	YES	NO	NO
	Cattle production	*campesinos, colonos, illegal groups*	Deforestation	*campesinos, colonos,*	Animal confiscation	NO	NO	NO
					Improved practices	NO	NO	NO
					Resettlement	NO	NO	NO

Driver	Driver Type	Agent(s)	Emission Type	Currently targeted agent	Activity Category Options	Currently Proposed Activity (From Table 8)?	Explicitly aligned with agent/driver?	Plans or concepts exist?
					Restoration	YES	YES	YES
					Alternative livelihoods	NO	NO	NO
	Cattle production	*Bari community*	Deforestation	*Bari community*	Improved practices	YES	NO	NO
Extractive industry (legal)	Mechanized/Industrial	Unknown outside groups/corporations	Deforestation	None	Governance and policy changes	NO	NO	NO
					Advocacy and lobbying	NO	NO	NO
Timber Extraction	Fuelwood collection	Barí community, *campesinos, colonos*	Forest Degradation	Barí community,	Improved clean cookstoves	YES	YES	YES
					Fuel alternatives	NO	NO	NO
	Selective Logging	Barí community, *campesinos, colonos*	Forest Degradation	Barí community	Improved forest management	YES	YES	YES
					Zoning and enforcement	YES	YES	YES
					Alternative livelihoods	YES	YES	YES

6.2 ALIGNMENT BETWEEN PROPOSED ACTIVITIES AND BASELINE LAND USES

As identified in the previous section, the *resguardos* have developed a portfolio of potential project activity concepts that could address many sources of deforestation and forest degradation from within the communities and promote reforestation. However, many of the proposed project activities, such as Restoration and Reforestation and Sustainable Forest Management, and are more oriented towards addressing drivers of forest degradation from the Barí, as opposed to focusing explicitly on the drivers of deforestation, especially those associated with illegal land users. Therefore, the proposed activities are not yet justified in projecting a level of high level effectiveness in generating quantifiable emission reductions related to both deforestation and forest degradation. The complete analysis of alignment between proposed activities and baseline land uses is contained in Annex C. Project Scenario.

There are several major gaps in the proposed activities that, unless addressed, will prevent the project from achieving the "High Crediting Scenario" and attain financial viability. The main gaps are related to baseline activities, such as community members practicing shifting agriculture and associated poor fire management, cattle production, and coca cultivation. These will require specific strategies to be identified in order to effectively mitigate them, and to be able to justify and generate the "High Crediting Scenario" described in the *GHG Quantification* and *Financial Feasibility and Marketing* section. Furthermore, specific monitoring and enforcement activities to contain further deforestation and to reclaim illegally cleared land have not yet been clearly articulated. These issues require substantial attention and clear implementation plans before the potential revenues from a High Crediting Scenario can be realized.

There is also insufficient information to determine whether activities from extractive industries and products being grown illegally for legal commercial supply chains are a risk to forest resources within the *resguardos*, which requires further analysis. Therefore, it is not yet known whether specific project activities should be developed to address these drivers of deforestation.

6.3 ADDITIONALITY CONSIDERATIONS

The project is unlikely to face any major challenges for establishing project additionality. The BioREDD projects in Colombia were all able to successfully demonstrate additionality following the requirements of the VCS, which require an analysis and selection of the baseline scenario followed by barrier and/or investment analysis and a common practice assessment as described in the VT0001: Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, v3.0 (Verra, 2012). It is likely that this REDD project would be able to use similar arguments to demonstrate additionality and that the demonstration of additionality would not be a significant hurdle during project development. The argumentation for additionality is outlined in *Annex C. Project Scenario.*

6.4 RISKS

- EP Carbon assessed the risk profile of the project using the categories from the VCS Non-Permanence Risk Report Tool v.4.0 (Verra, 2019), and found several areas of risk that require mitigation strategies before the project can be successfully designed, validated, and lead to effective emission reductions. The complete analysis of risk is contained in implementation. *Annex C*, while the summary of this analysis is contained in

- The Gabarra Catalaura and Motilón Barí communities will likely require significant time and resources in order to implement emission reduction activities in a timely manner across the project area to meet the proposed GHG reduction and revenue estimates.

- The capacity of the local authorities representing the two *resguardos* to collaborate and agree on a governance structure is currently uncertain. In the past, the two groups have reportedly disagreed on territorial governance. But to maximize overall benefit to the Barí territories they will need to establish a governance structure for REDD+, a benefit sharing mechanism, and a grievance mechanism; if not, this could hinder implementing effective REDD+ project activities.

- The regional instability associated with the armed groups is also a critical risk, and there currently is no clear strategy presented to EP Carbon for mitigating the influx of illegal land users or the disputes caused by illegal encroachment and deforestation.

- There is some financial risk, as measuring degradation is overall difficult to monitor and prevent, and not all agents and drivers are factored in to the project activities, so there is a risk that project activities will not stop degradation at a level that maintains the models' financial predictions, or address the appropriate agents and drivers.

TABLE 10: OVERVIEW OF POTENTIAL RISKS TO THE PROJECT

Risk Class		Risk Rating	Description
Internal	**Management Capacity**	Low	The management team will likely include individuals with extensive experience and skills implementing REDD projects
	Local Capacity	Moderate	Will require extensive training and capacity building of local communities in order to implement effective emission reducing project activities.
	Alignment between local authorities	High	No binding agreements exist between indigenous *resguardos*, and the project team and general assembly has discussed the issues. Both *resguardos* are independent entities with no current plans for a joint governance structure for REDD+ outcomes.

	Financial	Moderate	Degradation is difficult to quantify, and all agents and drivers are not currently addressed in the project activities, which could affect VCU generation.
External	**Resource Rights**	Low	The legal land tenure or carbon rights of the Barí are not in question.
	Governance and Political Instability	Critical	The civilian population is at increased risk by the continuous confrontation between armed groups over illicit economies and control of the territory. Additionally, there is an influx of refugees from Venezuela.
Natural	**Fire**	Low	Natural fire is uncommon in the region
	Earthquakes	Low	Earthquakes are present but there is no history or indication of major damaging earthquakes that would affect carbon stocks.
	Pest & Disease	Low	No evidence of significant pest or disease outbreaks in the region.

SECTION 7

GHG QUANTIFICATION

Key takeaways:

- Historical rates of deforestation increased from 2015-2019 when compared to rates observed in 2010-2014.
- Relative rates of deforestation within the GCMB IRs are significantly lower than in surrounding sites, especially the Pre-Extension Area and area included in the Resoluciónes Barí.
- Potential sites for ARR activities are somewhat limited within the GCMB IRs, although their concentration in one section may make them feasible. The larger areas of non-forest (likely from historical deforestation) in surrounding sites would allow for more expansive ARR activities.

OVERVIEW

The goal of this analysis is to quantify GHG emissions in the baseline and project scenario. A geospatial analysis (see *7.1 Geospatial Analysis*) was first needed to understand the rates and dynamics of historical deforestation in the project area in both the baseline and project scenarios. Outputs of the historical deforestation analysis were used to determine baseline activity data (areas of future deforestation) for the estimated REDD+ project area in the MB and GC IRs and surrounding sites that may be eligible for project expansion. We also conducted a brief geospatial analysis of the sites that may be initially eligible for Afforestation, Reforestation, and Revegetation (ARR) activities based on the final areas of forest/non-forest determined in this analysis to give a sense of the potential scale of possible activities. However, the GHG emissions potential of ARR activities has not been modeled or estimated.

The baseline deforestation activity data were combined with information within the Colombian *Nivel de Referencia de Emisiones Forestales* (NREF) as inputs in a GHG accounting model that estimated potential emissions reductions from avoided deforestation. Avoided emissions from forest degradation were estimated as a proportion of avoided deforestation emissions, derived from baseline degradation emissions from Colombia's BioREDD projects. See *7.2 GHG Accounting*, and *Annex E. Preliminary Carbon Accounting* for details on these processes.

Since Colombian law currently requires that all new REDD+ projects use the NREF to calculate their deforestation baseline, the project's baseline activity data was based on the NREF instead of a smaller reference area appropriate for the project area that is normally used in stand-alone REDD+ projects using the Verified Carbon Standard's REDD+ methodologies. EP Carbon conducted an exercise to distribute the national biome-level deforestation areas across the biomes and specifically within the project area, since the NREF does not get to this level of detail and is needed for quantifying baseline GHG emissions in smaller areas of the country.

7.1 GEOSPATIAL ANALYSIS

7.1.1 REDD

EP Carbon performed a geospatial analysis that included reviewing previous preliminary spatial work accomplished for these project sites as well as performing a new analysis better aligned with current requirements and law within Colombia. We assessed both MB and GC IRs together as a grouped project, and also included potential expansion areas over which the Indigenous groups are pursuing having jurisdiction, although carbon rights and land tenure in those regions remain undefined (see Section 2.4 Land Tenure). The final results are presented here in Table 11 below.

TABLE 11 FOREST COVER AND DEFORESTATION RATES WITHIN THE GCMB REGION FROM 2010-2019

Site	Forest Cover 2010 (ha)	Forest Cover 2015 (ha)	Estimated Deforestation in RP*1 (ha)	RP1 Annual Deforestation Rate (%)	Forest Cover 2020 (ha)	Estimated Deforestation in RP2 (ha)	RP2 Annual Deforestation Rate (%)
GCMB IRs	113,420	112,899	521	-0.09%	110,904	1,996	-0.36%
Pre-Extension Area	126,719	121,534	5,185	-0.84%	111,462	10,072	-1.73%
Resoluciónes Barí	17,514	16,460	1,054	-1.24%	15,010	1,450	-1.84%

* RP = "Reference Period"

EP Carbon used an approach similar to the recently approved Colombian NREF for distributing national historical baseline deforestation into the project area, where we allocated deforestation risk based on distance from historical deforestation. The recent VCS JNR guidelines stipulate that a "zero risk" stratum needs to be included. Due to this, our results revealed that there is a relatively low area at high risk for deforestation within the IRs (i.e., much of the area is at "zero risk"), and that deforestation within the IRs has been highly localized, likely due to frontier expansion. Conversely, the areas surrounding the reserves, including the potential expansion areas, had a high proportion of areas at higher risk of deforestation ("high" risk strata), and the pattern was mosaicked and more evenly spread across the area (Figure 8). These patterns and dynamics could reduce crediting potential within the reserves if they are shown (using the assumptions of these JNR rules) to be at low risk of deforestation. The implications of this analysis for crediting potential are detailed in Section 8.2 Crediting Potential and *Annex E. Preliminary Carbon Accounting*.

FIGURE 7: FOREST AREA IN THE PROJECT AREAS

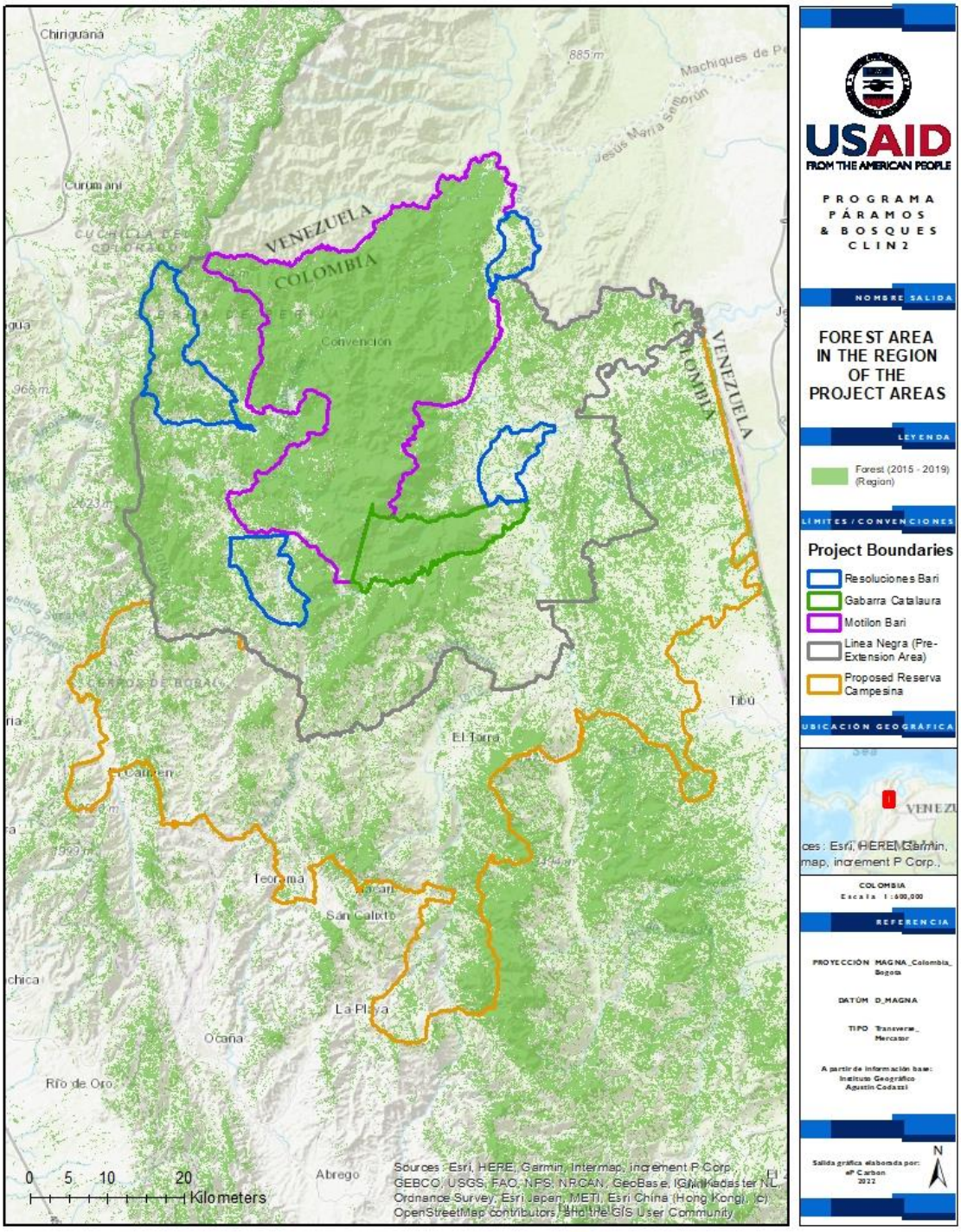
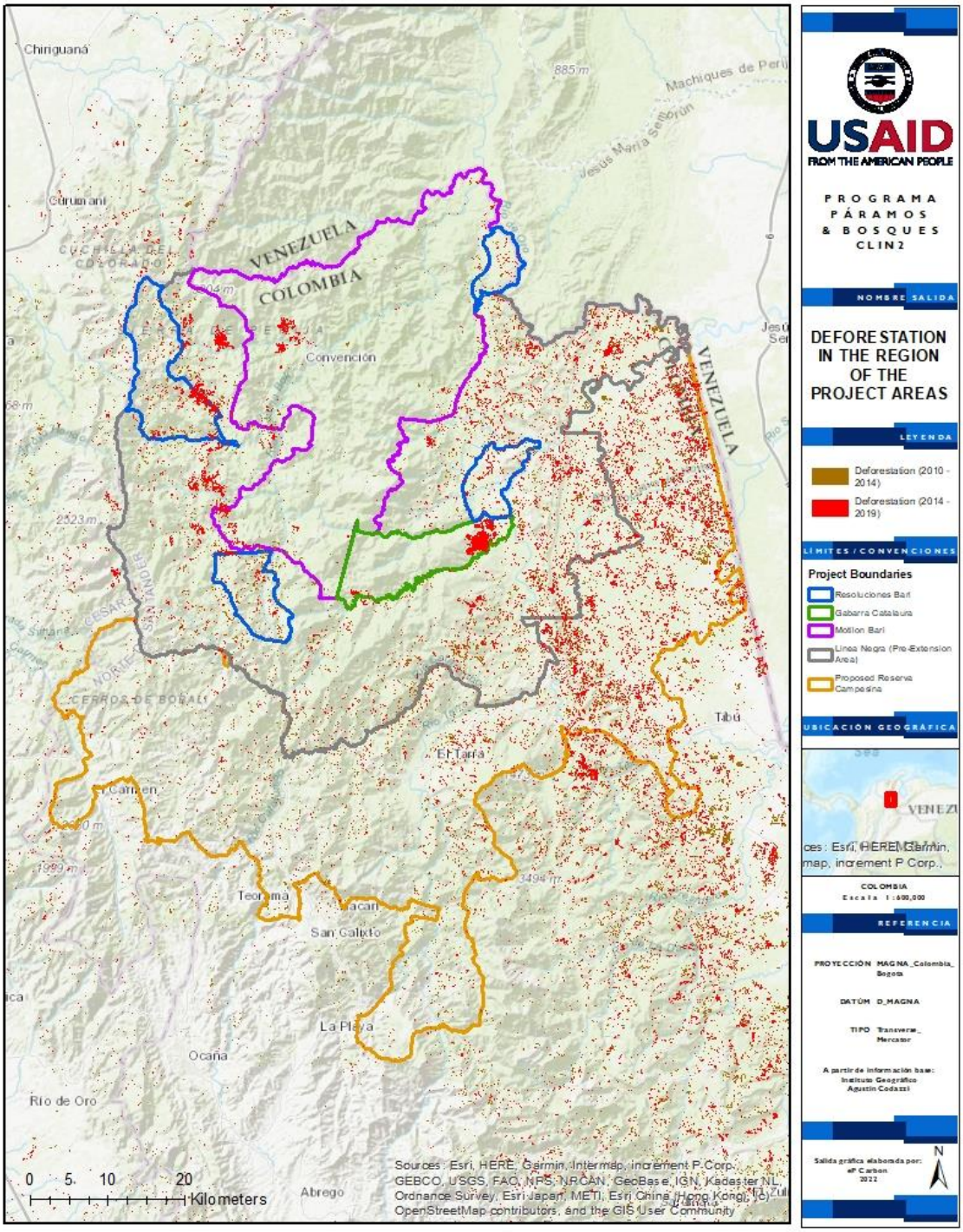


FIGURE 8: HISTORICAL DEFORESTATION IN THE PROJECT SITES



7.1.1 AFFORESTATION, REFORESTATION, AND REVEGETATION (ARR)

Identifying Eligible Areas

The potential areas for ARR activities were identified using the same Land Use and Land Cover (LULC) data, primarily the 'Forest/No-Forest' data from IDEAM supplemented by the global LULC dataset published by the University of Maryland (Hansen et al. 2013). These are areas that could theoretically generate credits from GHG removals from restoring vegetation on non-forest sites. As opposed to REDD project activities, which are conducted within areas classified as forest, ARR project activities are implemented within non-forest areas to establish higher levels vegetation than in would have occurred without this activity.

Areas within the project potentially eligible for ARR activities were estimated as the total area classified as non-forest as of 2019, conservatively excluding areas classified as "regeneration". These areas would be eligible for ARR project activities immediately, while areas that have been deforested recently within 10 years or less could be eligible depending on the GHG Program and Standard that are chosen. The VCS Standard requires that "Evidence shall be provided in the project description that any ARR…project areas were not cleared of native ecosystems to create GHG credits" (Verra, 2022). This means that the VCS does not allow the clearing native vegetation to create the conditions for generating climate finance revenue from a carbon project, which is unlikely to be a challenge for this project considering the unplanned nature of deforestation and its causes.

Potential Areas for ARR

The results of this LULC analysis as of the end of 2019, which is the most recent time point for which data is available, are reported in Table 12 and Figure 9 below. Relevant data was available for the three LULC transitions deforestation, reforestation, and areas remaining non-forest. As forest areas are not eligible for ARR activities, they are not included in this analysis. Regeneration areas are conservatively excluded from this analysis, as additional site analysis would be needed to determine eligibility for ARR project activities. Total non-forest areas (including areas deforested between 2010 and 2019) are reported in Table 12 in order to provide an estimate of total area eligible for ARR activities within GCMB and surrounding sites.

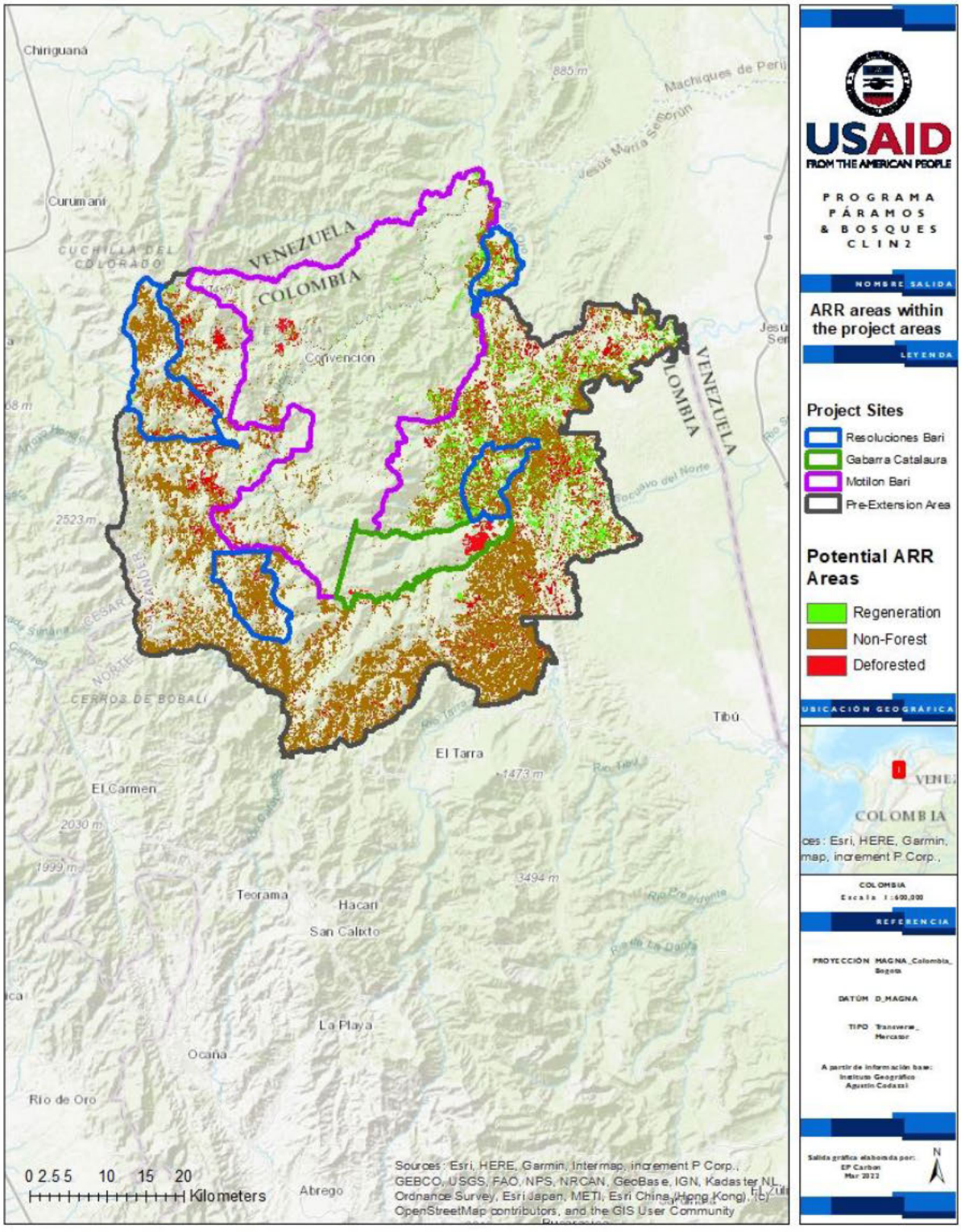
TABLE 12: AREAS OF LULC TRANSITIONS FROM 2015-2019 IN AREAS POTENTIALLY ELIGIBLE FOR ARR ACTIVITIES WITHIN GC AND MB IRS

Subzone	Non-Forest Area (ha)	Deforested Area from 2015-2019 (ha)	Total Non-Forsest Area (ha)
GCMB IRs	5,869	2,125	7,994
Pre-Extension	66,457	10,356	76,813
Resoluciónes Barí	12,350	1,543	13,893
Total	**84,676**	**14,024**	**98,700**

The total areas reported above are an estimate of areas potentially eligible for ARR activities. There are vast non-forest areas that are likely eligible for implementation of ARR and ANR activities, with nearly 100,000 ha of non-forest areas between all three sites. Within the MB and GC IRs, however, potential sites for these activities are more limited (less than 8,000 ha) but are still significant. These areas are estimated to be potentially eligible for ARR activities, and some of these areas are likely unsuitable for ARR activities (i.e., areas naturally non-forest). Much of the potential ARR areas are in the northwest section of the MB and GC IRs, presenting an opportunity to introduce activities in a concentrated area. The pre-extension area and *Resoluciones Barí* sites show greater potential area for ARR activities, which aligns with the observation above that there have been higher rates of deforestation observed in these areas. The non-forest areas are also much more concentrated, and the higher density may allow for more cost-effective implementation of ARR activities.

Further assessments and data would be needed to identify if these areas fulfill all eligibility criteria of the selected methodology, and whether areas would be appropriate for reforestation, which cannot be determined reliably with current data and solely with remote sensing data. We assume here that the project would use a methodology under the VCS Program, noting that the eligibility requirement for VCS is to provide evidence that native ecosystems were not cleared in order to generate carbon credits. Clearings that are less than 10 years from the project start date must provide evidence for this, while areas cleared more than 10 years prior do not need this proof. Presumably, the history of unsanctioned land clearings would provide sufficient evidence to make this task relatively straightforward and mitigate this risk.

FIGURE 9: POTENTIAL ARR AREAS WITHIN THE PROJECT SITES



Considerations for Implementing ARR Activities:

- **Areas that have remained as non-forest for several years are likely to be the most eligible for ARR activities,** although conditions would need to be assessed to determine which reforestation strategy is suitable for each type of site**.** For example, a passive natural regeneration strategy for reforestation could be suitable for a recent clearing for pasture, but this may not be suitable for a natural grassland, or a highly degraded site caused by intensive cattle management or mining. An assessment of site conditions would need to be conducted to design appropriate project activities for each site.

- **Not all areas identified as non-forest may be eligible for ARR.** Currently available data only provides a distinction between forest and non-forest areas, but this does not include the actual land use class that suggests how the land is being utilized. Therefore, not all the areas identified here may actually be eligible for ARR activities. Additional data sources that provide the current land use of the area are needed to make a full assessment of areas eligible for ARR activities.

- **Under a project scenario, additional future deforestation may be eligible for ARR, up to a point.** Complicating matters is the question of whether, and how, to count new reforestation areas created by future unavoided deforestation. In theory, any unavoided deforestation would present an opportunity for restoring carbon stocks. Therefore, the total ARR potential of the project would be the eligible clearings that are available at the project start date, plus the number of new clearings generated from unavoided deforestation during the project. If the ARR project is designed as a grouped project, new eligible areas during the project lifetime could be added as new project area instances. In practice, though, some limit might have to be placed on how far into the project lifetime new ARR areas could be practically added to the project, based on the amount of time it takes to generate enough forest growth to generate credits. Depending on local measurements, this cut-off date could be between 5-15 years prior to the end of the project, which is based on information on growth rates in tropical forests. After this point, it may not be economically viable to add more instances to the project for GHG crediting. A thorough ex-ante modeling exercise would be required to determine this with more accuracy.

7.2 GHG ACCOUNTING

Emissions from Deforestation

Preliminary crediting estimates for the potential project sites within and near PNN Catatumbo Barí are relatively low, especially for the GC and MB IRs. These low crediting estimates are primarily due to two factors. The first is that the Andes biome has a relatively low rate of deforestation compared to some of the other biomes, particularly the Caribbean and Amazon biomes, which have higher baseline

deforestation rates. This results in a lower amount of baseline activity data to allocate to project sites within the Andes biome. The second factor reducing the crediting estimate, especially in the GC and MB IRs, is that historical deforestation in this area is relatively low compared to the surrounding areas. Thus, these areas are considered lower risk and allocated a lower proportion of baseline activity data. On the other hand, the potential project sites surrounding the GC and MB IRs have more historical deforestation and are thus at higher risk and allocated a higher proportion of baseline activity data. However, there are land tenure concerns in these surrounding areas (see Section 2.3 Stakeholder Identification)

Emissions from Forest Degradation

While the Colombian NREF does not include emissions from forest degradation, EP Carbon estimated emissions reductions from avoided forest degradation. Monitoring forest degradation is more difficult than monitoring deforestation due to the challenges associated with observing changes in carbon stocks of forests that are not converted to a different land use or landcover class. For this reason, there is no available data on forest degradation across Colombia or within the potential project sites. While the Colombian NREF does not include emissions from degradation, projects will likely have an opportunity to add emissions from degradation to their project's baseline if doing so is appropriate based on the agents and drivers of deforestation and/or degradation. However, neither the Colombian government nor Verra have clarified how this would work in practice. Additional clarity is needed on how to resolve the addition of baseline degradation when a project is nesting into a jurisdictional baseline that only includes deforestation. For the purposes of this exercise, we used a degradation factor that can be multiplied with avoided deforestation emissions to estimate the amount of emissions associated with forest degradation. This was derived from the cohort of BioREDD REDD+ projects in Colombia and estimated as 121% (i.e., degradation emissions are 121% of deforestation emissions in impacted pools).

ASSUMPTIONS AND LIMITATIONS

The crediting estimates provided in this report, summarized in Table 14, are meant to provide a range for potential crediting, but they should not be understood as a final estimate of emissions reductions. Preliminary carbon accounting prior to project validation and verification is an iterative process that should improve over time as additional data and information are collected and integrated into the analyses. Additional details on the methods for these estimates are provided in *Annex E. Preliminary Carbon Accounting*.

Three crediting scenarios were assessed for this analysis: maximum mitigation potential (MMP), higher crediting scenario (HCS), and a conservative crediting scenario (CCS). The MMP scenario is not considered a realistic scenario, as it assumes the project is able to immediately and completely eliminate deforestation immediately at the project start. Instead, it is provided to show the maximum potential of the project and to help illustrate the impact that selected modelling parameters have on crediting estimates. For this reason, this scenario was not provided in the financial analysis discussed in Section

8. The HCS utilizes parameters that result in higher emissions reductions for the project by selecting parameter values that provide a realistic assessment of the best-case scenario for the project. On the other hand, more conservative parameters were selected for the CCS, which is meant to assess crediting of the project if it expands at a slower pace with less effective project activities. It is not meant to model a worst-case scenario, such as a reversal as a result of ineffective project activities or a natural disaster. Additional uncertainty beyond the scope of these scenarios remains due to unavailable data needed for nesting these projects into the Colombian NREF and it is recommended this analysis is updated as this data becomes available. Several key assumptions were made for this analysis of potential project crediting, discussed below.

Key Assumptions:

- Baseline deforestation data was estimated using the Colombian NREF and a proxy risk map assessing risk based on distance from recent historical deforestation. However, the NREF does not provide baseline deforestation for each biome and the Colombian government is expected to release an official risk map to be used for appropriate nesting into the NREF. More information on these limitations is discussed in *Annex D* and in the Limitations and Challenges section of *Annex E*.
    - In order to model the expansion of a grouped project, adoption parameters were added to each area of interest. Specifically, initial adoption and the annual increase in adoption are easily updated in the model. For this analysis, adoption can be considered the proportion of baseline emissions (within the entire area of interest) that would have been impacted by project activities and thus eligible for inclusion in the project in a specific project year.
    - For each crediting scenario, each subzone was provided a year in which project activities begin, initial adoption rate, and an annual rate of increase in adoption. Adoption continues to increase until the entire subzone is part of the grouped project.
    - Selected parameters for the three scenarios are provided in Table E 5 of *Annex E*, as well as Table 13 below.
- Emissions from forest degradation were estimated by applying an estimated proportion of degradation to deforestation emissions. This parameter was selected based on the baselines for the eight BioREDD projects within Colombia.
    - This approach was selected due to the lack of historical degradation data and the absence of degradation in the Colombian NREF.
    - Since the GCMB site is not near any BioREDD project, a weighted average of 121% was selected for this parameter (i.e., baseline degradation emissions are around 121% of baseline deforestation emissions). This parameter was applied to baseline and project scenario deforestation emissions in the aboveground and belowground pools.

Emissions from the soil organic carbon pool due to degradation was conservatively excluded.

  - The addition of emissions from degradation introduces another significant source of uncertainty, as the proportion of degradation to deforestation emissions ranges from 13.0-216.9% across the eight BioREDD projects. While the inclusion of emissions reductions due to avoided degradation can significantly increase the crediting estimate, it also increases the uncertainty of the estimate.

- An effective index (EI) parameter is applied to each area of interest for each year that represents the reduction (%) in historical deforestation within the grouped project area within a subzone.
  - Each project was provided an initial EI for the first year of project activities, as well as an annual increase of EI. This is under the assumption that the project will be effective in reducing deforestation below historical rates and that the effectiveness will increase over time.
  - Instead of applying the EI to baseline activity data, it was applied to historical deforestation data (Table 11) in order to estimate deforestation emissions in the project scenario. The historical deforestation data was selected as it provides the best data on patterns and quantity of deforestation in the area and can be helpful in identifying areas in which historical deforestation exceeds the estimated baseline deforestation. The same adoption rate was also applied as in the baseline scenario, as described above.
  - Emissions from degradation in the project scenario were estimated using the same proportion of deforestation emissions (121%) applied to selected pools in the baseline scenario.
  - The following parameters were selected for EI (Table 13):

TABLE 13 EFFECTIVENESS INDEX PARAMETERS FOR EACH CREDITING SCENARIO

Scenario	Initial EI (%)	Annual Increase in EI (%)	Maximum EI (%)
Maximum Mitigation Potential	100%	0%	100%
Higher Crediting Scenario	70%	3%	90%
Conservative Crediting Scenario	50%	3%	90%

- Leakage and the buffer contribution were estimated using standard values for early-stage projects but can be improved upon following additional data collection and stakeholder consultation. Leakage deduction and buffer contribution were both set at 15% of annual emissions reductions.

RESULTS

Crediting estimates for 10-year periods are provided for each site in Table 14 below. This summary table provides estimates for the MMP, CCS, and HCS as described above and in more detail in *Annex E*. These estimates include emissions reductions from both avoided deforestation and degradation and should be understood as a preliminary estimate. The complete model has been shared with the client so that the accounting can be an iterative process that improves over time as more data and information is available. The financial feasibility of project activities is discussed in more detail in Section 8 below.

TABLE 14: TOTAL ESTIMATED VCUS FROM AVOIDED DEFORESTATION AND DEGRADATION IN GCMB PROJECT SITES AND NEIGHBORING AREAS

Site	Scenario	VCUs 2022-2031 (tCO_2)	VCUs 2032-2041 (tCO_2)	VCUs 2042-2051 (tCO_2)	VCUs across project lifetime (tCO_2)
GCMB IR's	MMP	1,539,267	2,222,327	2,548,109	6,309,703
	Conservative	553,456	1,452,937	2,003,457	4,009,851
	High	1,006,314	1,788,511	2,140,977	4,935,802
Resoluciónes Barí	MMP	1,023,252	1,843,876	2,208,913	5,076,041
	High	392,531	1,226,462	1,772,884	3,391,878
	Conservative	674,685	1,526,506	1,899,712	4,100,904
Pre-Extension Area	MMP	4,311,943	10,314,545	12,910,200	27,536,688
	High	853,372	5,671,914	9,670,906	16,196,193
	Conservative	2,507,802	8,209,379	10,799,228	21,516,409

SECTION 8

FINANCIAL FEASIBILITY AND MARKETING

8.1 SUMMARY

We evaluate two crediting scenarios, the High Crediting Scenario (HCS) and Conservative Crediting Scenario (CCS), as well as three price scenarios (Low, Medium and High). Previous versions of this analysis included crediting from reducing deforestation only (not degradation) and suggested the project would only be viable in the HCS/High and HCS/Medium scenarios, and only if investment in productive activities is postponed for several years. This is not ideal, since such investment is critical for addressing the drivers of deforestation and generating a high crediting scenario.

By adding avoided forest degradation emissions, we find that including avoided degradation in the crediting scenario for the MB and GC IRs has a substantial positive

impact on the financial viability of the project. In particular, there are three scenarios which are now viable even when including investment of [redacted] in productive activities during Years 1-5 ([redacted] per year). While we did not include the additional costs that would typically be associated with measuring and monitoring degradation versus deforestation alone, the additional costs would likely have a minimal impact in terms of viability.

When we include avoided emissions from deforestation and degradation and assume that productive activities will be financed only once the project has reached its breakeven point, the viability of each scenario is as follows:

Viable

1. The HCS/High-price scenario is cash flow positive in Year 4, with an IRR of 118%, NPV of [redacted] and a capital requirement of [redacted].

2. The HCS/Medium-price scenario is cash flow positive in Year 4, with an IRR of 70%, [redacted] NPV, and a capital requirement of [redacted].

3. The CCS/High-price scenario is cash flow positive in Year 6, with an IRR of 44%, NPV of [redacted], and a capital requirement of [redacted].

Marginally viable

4. The HCS/Low-price scenario is cash flow positive in Year 6, with an IRR of 30%, NPV of [redacted], and a capital requirement of [redacted]. This is likely only viable with grants or other donor support.

Unviable

5. The CCS/Medium scenario is cash flow positive in Year 8, with an IRR of 29%, NPV of [redacted], and a capital requirement of [redacted].

6. The CCS/Low scenario is cash flow positive in Year 14, with an IRR of 15%, NPV of [redacted], and a capital requirement of [redacted]. It is unlikely the project would obtain sufficient grants or donor funding to cover the capital requirement under these scenarios.

While the above results are encouraging, it is important to ensure that productive activities can be financed as early in the project as possible, since this is likely to be a determining factor of the high-crediting scenario. We assess this by including [redacted] in investment as an additional cost incurred in Years 1-5 ([redacted]/year). This amount is not necessarily indicative of the actual investment required to kick start the productive activities that the community has prioritized but is rather intended as a placeholder value to indicate the scale of investment which could be supported by the project's revenue. Including the [redacted] investment into productive activities results in the following impacts in the viable scenarios:

1. The HCS/High scenario is still cash flow positive in Year 4, with an IRR of 65%, NPV of [redacted] and capital requirement of [redacted].

2. The HCS/Medium Price scenario is cash flow positive in Year 6, with an IRR of 39%, NPV of [redacted], and capital requirement of [redacted].

3. The CCS/High Price scenario is cash flow positive in Year 8, with an IRR of 29%, NPV of [redacted], and capital requirement of [redacted].

See Table 15 below summarizes the main outputs of the model across these scenarios. The general conclusions concerning the financial viability of implementing a GHG reduction project within the GCMB territories are as follows:

- The project is unlikely to be financially viable at credit prices offered in the Colombian compliance market. Obtaining prices in excess of [redacted] a ton would likely require using the Verified Carbon Standard (VCS) in order to sell credits in the international voluntary market. While the current model uses the costs associated with using the VCS program, which are higher than ProClima or CerCarbono, these decreased development costs are not nearly as significant a determinant of project viability as the carbon price.

- HCS at [redacted]/ton and HCS at [redacted]/ton are the only scenarios that generate a positive net cash flow in the first 5 years of the project (i.e., [redacted] and [redacted], respectively). They are therefore the only scenarios that would allow investment in productive activities by year 5 to help drive the high-crediting scenario of the project while maintaining a cash buffer for the project.

- HCS can only be achieved if the project secures sufficient funding to implement verifiably effective activities that reduce deforestation starting from the onset of the project. Achieving the highest price, project activity effectiveness, and project adoption will be critical and will greatly impact the revenues generated by the project for the first 5 years, 10 years, and for the lifetime of the project.

- While the crediting potential of ARR is not included in these estimates, it is probable that ARR could be a significant creditable activity that is likely to result in a financially viable carbon project. A more accurate conclusion would require a full GHG accounting exercise and inclusion into the financial model.

TABLE 15 FINANCIAL SUMMARY OF MB-GC REDD PROJECT CREDITING SCENARIO

	Credit Price	[redacted]
High Crediting Scenario (HCS)	**Capital required:**	
	NPV:	
	IRR:	
	Cash flow breakeven year:	
	Project lifetime cash flow:	
	First 10-year cash flow:	
	First 5-year cash flow:	
Low Crediting Scenario (LCS)	**Capital required:**	
	NPV:	
	IRR:	
	Cash flow breakeven year:	
	Project lifetime cash flow:	
	10-year cash flow:	
	5-year cash flow:	

8.2 CREDITING POTENTIAL

Two crediting scenarios were included in this financial assessment, the HCS and CCS. Both of these scenarios were introduced in Section 7.2 GHG Accounting and are described in more detail in *Annex E. Preliminary Carbon Accounting*.

The HCS crediting scenario results in approximately 25% more crediting than the CCS scenario over the lifetime of the project. However, the crediting profiles over time are slightly different, as the HCS assumes that the project generates credits more rapidly due to faster adoption and more effective project activities. Thus, the HCS will provide both higher returns and quicker returns on investment. Both these crediting scenarios are understood to be plausible under the right circumstances described in the Project Scenario and GHG Quantification section, but are subject to change as additional data is released by the Colombian government.

8.3 CREDIT SALES REVENUE

The project accounts exclusively for one source of revenue generated from the sale of Verified Carbon Units (VCUs). We tested changes in annual revenues based on two crediting scenarios (described in 8.2 Crediting Potential) and three price scenarios. The price scenarios are as follows:

1. [redacted] **per ton**. This corresponds to the current price on the Colombian Compliance Market.
2. [redacted] **per ton**. This is the price for REDD+ credits sold on international voluntary markets in 2022, as per the CBL database.
3. [redacted] **per ton**. This is the median between the Colombian and voluntary market prices.

Table 16 summarizes the revenues of the GC and MB REDD project across the various scenarios. Note that revenues are gross of any costs (i.e., before including costs).

TABLE 16: REVENUE SUMMARY FOR ASSESSED CREDITING SCENARIOS AT VARIOUS PRICE POINTS

	Credit Price	[redacted]
HCS	Total revenue over project lifetime	
	First 10 years	
	First 5 years	
CCS	Total revenue over project lifetime	
	First 10 years	
	First 5 years	

The financial model is highly sensitive to changes in prices. Revenues more than double (and in some cases triple) between the highest and lowest credit price scenarios, all else being kept equal. Revenues are also sensitive to differences between the two crediting scenarios, albeit to a lesser extent. Overall, revenues are approximately 20% higher in the higher versus the lower crediting scenarios. However, revenues in the HCS scenario are approximately double those of the CCS scenario during the first 5 years of the project when cash flow is most critical.

This implies that in addition to achieving a high price, the project team must work to ensure high rates of project adoption and activity effectiveness in order to maximize revenues during the critical early years of the project.

8.4 PROJECT COSTS

The financial model accounts for the main expenses that are required to establish and maintain the project. These expenses are described in Table H 2 in Annex G. Financial Model.

The largest cost categories are community operating expenses (General and Administrative Expenses, Equipment, and Human Resources), followed by Marketing. In total, we expect that the project will allocate [redacted] to General and Administrative Expenses, [redacted] to Equipment, and [redacted] to Human Resources over the project's lifetime. The model assumes that the project will hire 4 head office staff and 3 field staff, including technical coordinators, technicians, and basic service providers, who would be hired by and from the community. Therefore, the Human Resources cost also represents a direct positive contribution to community members. On the Marketing side, we expect that the project will need to allocate a total of [redacted] over 30 years. This estimation is on the high side to account for the need to market credits to the highest bidders in order to achieve a financially viable scenario.

We estimate the technical costs associated with project development, including preparation of the first monitoring report, to be approximately [redacted]. This is at the high end of the range and could feasibly be done more economically. However, it is important to keep in mind that a quality technical services partner will be able to maximize crediting potential, which has significant implications for revenue over the entire lifespan of the project and will help to minimize risks in project validation and verification. An experienced technical services provider can reduce the time required to achieve validation and first verification, which can be critical for cash flow in the early years of the project.

8.5 PROJECTED TIMELINE FOR PROJECT DEVELOPMENT

The timeline for project development in a high-risk environment like PNN Catatumbo Barí with historically under-served communities could last 18-24 months or longer. There are a few key considerations that could drastically affect timelines. *Annex I. Project Timeline* provides a general Gantt chart to help visualize key project development components and important milestones.

- **Aligning key stakeholders**: The fact that the Indigenous *resguardos* are within a national park increases the coordination time needed to establish key governance structures and agreements both within the *resguardos*, between the *resguardos* and the national park, and between these actors and any other state actors involved.

- **Planning and conducting FPIC consultations**: It is imperative that the strategy and implementation of Free, Prior, and Informed Consent (FPIC) be prioritized and conducted with care. This requires detailed preparation and protocols for documenting these advances from day one. FPIC consultations can generate unexpected challenges and requests that can take a considerable amount of time to resolve. No major project development activities can begin in earnest until a general agreement for participating in the REDD project has been established, which could happen quickly or take many months.

- **Finalize and design effective project activities**: Project activity design, management, and implementation is the most fundamental aspect of reducing emissions. This will likely require the most amount of effort to define and implement, and as pointed out in the Project Scenario section, significant effort still remains on this issue. This will require workshops and meetings with community groups and state and civil society actors to define a well-justified portfolio of activities that can drive effective reductions in deforestation. We recommend performing Theory of Change exercises with key stakeholder groups to arrive at the final list of project activities. Although the first goal of project development is project validation against the chosen standard, trainings and capacity building exercises that enable rapid implementation post-validation are essential in order to achieve credit issuances as soon as possible. Therefore, it is not advisable to delay project activity implementation and the proponents

(the communities in this case) must be effective at addressing the majority of agents and drivers of GHG emissions early on.

- **Use the VCS GHG Program**: Assuming the project uses a VCS methodology, this could significantly speed up GHG baseline development because Verra would theoretically be responsible for providing a spatial allocation of the sub-national baseline to the project development team. As long as Verra accomplishes this within 4-6 months, and no other serious and unexpected circumstances arise in the region, the project could achieve validation in the proposed timeframe as long as the concerns listed in this study can be addressed.

8.6 ALTERNATIVE LIVELIHOOD VALUE CHAINS

In November 2021, Paramos y Bosques staff working in conjunction with ART regional officers conducted a series of workshops with Barí representatives from the GC and MB *resguardos*. The workshops included participatory exercises that sought to identify certain types of social and environmental threats faced by the communities and design local initiatives to address them. The initiatives could be financed entirely or in part by carbon revenues, and would ideally come to generate enough revenue to be financially self-sustainable after recuperating investment costs. Not all the initiatives should necessarily be profitable in financial terms; some may offer tangible indirect benefits which reduce or eliminate household spending on certain goods and services, thereby increasing families' disposable income indirectly. Others may offer less tangible but equally significant benefits in terms of health, education, or cultural preservation.

In the GC IR, participants proposed a total of seven (7) community-led initiatives including: 1) cookstoves (total cost of COP [redacted]), 2) rainwater collection (total cost of COP [redacted]), 3) bushmeat (total cost unknown), 4) ecological restoration (total cost of between COP [redacted] and [redacted]), 5) firewood (total cost unknown), 6) small-scale agriculture and ranching (total cost unknown), and 7) cacao farming (total cost unknown). In addition to the above, the women's association "Barí Bioyi Inski" developed a plan to produce and sell traditional handicrafts requiring investment of COP [redacted].

In the MB IR, a total of six (6) initiatives were prioritized by the community (which were the same as in GC with the exception cacao farming. These were: 1) cookstoves (total cost of COP [redacted]), 2) rainwater collection (total cost of COP [redacted]), 3) bushmeat (total cost unknown), 4) ecological restoration (total cost of between COP [redacted] and [redacted]), 5) firewood (total cost unknown), and 6) small-scale agriculture and ranching (total cost unknown). Additionally, the Barí Women's Association (ASOMBARI) developed a plan to produce and sell traditional handicrafts requiring investment of COP [redacted]

The above initiatives are intended to be implemented by the communities, with the exception of cacao farming in the case of GC, which would require a partner with technical expertise and capital. The workshop reports indicate the number of families

that would benefit in each *resguardo*, but do not provide details on how many jobs would be created or what the revenue streams would be from these activities, if any.

A primary concern in the context of a REDD project is that such initiatives have a clear causal link to improved conservation outcomes. In GC, approximately 1,029 ha were deforested during 2010-2019, of which illicit crops were responsible for approximately 189 ha. In MB, the percentage of deforestation attributable to coca cultivation is even higher, accounting for some 653 ha of a total 1,882 ha deforested during 2010-2019. EP Carbon is not aware of any efforts to assess the number of families or beneficiaries of illicit cultivation in the two *resguardos*, which is a critical input in determining whether or not alternative value chains can effectively compete with this activity.

Another issue of concern is that a significant percentage of deforestation within the MB and GC *resguardos* over the last five years occurred as a result of unintentional fires, which are typically the result of poor land management, a lack of fire prevention protocols, and more extreme weather exacerbated by climate change. It is essential that the project address and mitigate the increasing risk of uncontrolled fires in order to ensure that the project's hard-earned benefits are not reversed through a single, catastrophic event.

8.7 CHARACTERIZATION OF POTENTIAL INVESTORS

There are four main categories of funders that may finance a REDD project: (i) equity investors, (ii) lenders, (iii), ex-ante credit buyers, and (iv) donors. Each of these funders will seek to invest in projects that present at least the following characteristics:

- High quality credits, i.e., strong community and biodiversity co-benefits;
- A clear path to crediting; and
- Strong implementation partners.

Funders differ along the following factors:

- **Risk appetite**: the level of risk that a funder is willing to take. The risk appetite of a funder determines the stage at which they would be funding a project;
- **Timing to funding:** the time it takes a funder to distribute funds to the project. Different types of funders work along different processes and timelines;
- **Ticket size**: amount of money that a funder can fund;
- **Ownership stake**: whether a funder owns a stake in the project; and
- **Control**: the level of control that a funder has on the project, and the resulting requirements that they may enforce to the project stakeholders (i.e., communities, project proponents, etc.).

Table H 3 provides an overview of different types of funders, their attributes, and suitability for financing the GCMB REDD project.

SECTION 9

CONCLUSIONS

After completing this Pre-Feasibility Study, EP Carbon has determined that the GCMB IRs grouped project could be eligible for REDD crediting and could be financially feasible if certain significant risks and gaps identified in this study are addressed before the project is developed. In order to be financially viable, project activities must be highly effective at preventing future deforestation and forest degradation and be able to be scaled quickly across the area. Project activities have the potential to meaningfully protect wildlife habitat and contribute to the Barí people's land sovereignty, autonomy, and well-being. Due to this, the project could add social and biodiversity co-benefit layers and/or carbon stock enhancements and carbon removals (such as through ARR activities), which would be attractive to potential investors and credit buyers and increase financial viability.

Our spatial analysis results showed that there is a relatively low rate of deforestation in the biome-level baseline, which is the primary reason that crediting estimates are somewhat low. However, there is a sufficiently high volume of hectares being deforested, which has been increasing in recent years, particularly due to poor fire management from agricultural clearing and coca cultivation, to drive carbon project development. Additionally, including avoided emissions from forest degradation significantly increases crediting. But these results include significant sources of uncertainty, particularly related to baseline rates and how effective the project can be at meaningfully decreasing deforestation and forest degradation on the ground.

As previously detailed, the Colombian government recently released the updated NREF, endorsed by the UNFCCC, which determines jurisdictionally-nested baselines. We replicated the baseline allocation as closely as possible, which resulted in fairly low rates of baseline deforestation within the reserves, consequently yielding lower crediting. The areas surrounding the reserves– which the Barí groups seek to incorporate into their traditional territory– are experiencing much higher rates of deforestation than within the reserves. If they were to be integrated into the grouped project in the future, crediting potential could greatly increase. Importantly, though, land tenure is tenuous in the expansion areas, with *campesino* settlers and migrants also asserting land-use rights and different pressures on forested areas. Potential expansion of effective project activities would need to be thoroughly assessed prior to project expansion, but this was beyond the scope of this analysis. Forest degradation crediting was estimated based on previous BioREDD projects, as emissions from degradation are not included in the NREF, but this crediting estimate is based on limited data with a high level of uncertainty.

While an individual project in the MB area would likely be viable on its own under at least two of the financial scenarios, utilizing a grouped project approach would bring multiple benefits. However, the viability achieving a governance agreement between the *resguardos* is unclear. Under a grouped project design, the GC community would

participate and contribute to a coordinated territorial governance plan for the region, which could also include National Parks areas which are not titled to either community. This cost-sharing would allow for a greater margin of error in terms of project activity efficacy, scalability, and credit marketability. The threat of deforestation from coca cultivation, which is often out of the direct control of community members, could be more effectively mitigated if both *resguardos* are involved. A grouped project design would allow both communities to take advantage of economies of scale to lower project development costs, and would permit for the potential inclusion of other project areas in the future, e.g., the *Resolucións Barí* and Pre-Expansion areas.

The project is likely to only be financially viable if it was developed using a GHG program such as the Verified Carbon Standard, since its credits would likely command the higher prices required for viability than those offered in the Colombian compliance market. We recommend using the VM0006 methodology, because avoided emissions due to forest degradation in addition to deforestation could also be included. The current Colombian NREF does not include emissions from forest degradation, and it is currently unclear when and how degradation will be included in the future.

There are also serious risks to effective project implementation related to security concerns in the conflict-prone region, transnational migration, and other socio-political complexities. Armed groups still exert control over the region and illicit economies, particularly coca cultivation, are prevalent. After our analysis, we were unable to identify whether the proposed alternative livelihoods would be more financially viable than coca cultivation. This activity, which is tied to the armed groups, is highly profitable for families and is a significant and increasing driver of deforestation within the reserves based on our consultation with the communities. Further, forest clearing by burning for subsistence agriculture is a common practice and poor fire management has led to significant amounts of deforestation. This means providing effective training and resources for fire management and sustainable agricultural alternatives is crucial for project success.

Additionally, the two Barí groups have different authorities and governance processes and do not currently maintain consistent communication and collaboration. Potential conflicts between the two groups regarding planning and governance of the grouped project could pose a significant risk to effective project development and implementation. Furthermore, the reserves are wholly located within PNN Catatumbo Barí, meaning park staff will also need to be consulted on and approve project-related activities and interventions. The complexity of maintaining communication and alignment between multiple stakeholders and groups with potentially conflicting interests could slow project development and also increase project-related costs. If the identified risks are mitigated and the information gaps are sufficiently filled, the GC and MB IRs could make a successful REDD and/or reforestation project that would have considerable benefits to the Barí people and their environment.

9.1 PROJECT DEVELOPMENT RECOMMENDATIONS

In light of the above concerns, EP Carbon recommends the following steps to address sources of uncertainty and mitigate risks to the project:

TABLE 17 - PROJECT DEVELOPMENT RECOMMENDATIONS

ID	Project Design Category	Action	Description
1	Stakeholder identification	Conduct a comprehensive stakeholder analysis	Implement a stakeholder analysis methodology, such as the SBIA, involving different groups (community, government and civil society) to more precisely identify and evaluate the relevant stakeholders involved in current land uses and related impacts, in order to design effective and efficient REDD+ strategies with priority stakeholder groups.
2	Project Proponent	Define a preliminary project governance structure	A more comprehensive analysis of roles and responsibilities of specific stakeholder groups will be needed to determine who would assume the role as the official project proponent versus who would serve as an implementing partner(s).
3	Legal	Clarify carbon rights	National Park authorities and the Indigenous Barí people have legal collective land tenure within the titled areas of the park. Further consultation with state agencies is needed to firmly clarify carbon rights for the project in this scenario.
4	Agents and Drivers of GHG emissions	Differentiate the impacts/significance between current land users and land uses	Conduct an analysis to clarify the relative impact/extent of illegal or unsanctioned land uses between Barí community members, *campesinos*, *colonos*, and armed groups to more efficiently design and prioritize REDD project activities
5		Analyze land use processes	There is currently insufficient information to fully understand the mechanisms/processes used by agents and drivers of deforestation and forest degradation within the PNN Catatumbo Barí and the *resguardos*, their extent and specific locations within them (See Table 7). This is critical for effective project activity design, and could be addressed with a social survey or appraisal approach.
6	Project Activity Design	Conduct a Theory of Change exercise	Building off of a stakeholder analysis, continue with a formal Theory of Change exercise to validate and refine the current set of proposed project activities to reduce GHG emissions, and ensure both deforestation and forest degradation drivers are addressed.
7		Update project activity portfolio	Building off Theory of Change and Stakeholder Analysis, generate an updated project activity portfolio
8		Harmonize REDD+ activity proposals with existing management plans	Generate or update governing land management plan for the *resguardos*, including updated project activity portfolio for REDD+, detailed project implementation plan with the communities.

ID	Project Design Category	Action	Description
9		Physical security assessment	Thoroughly assess the security situation surrounding the project area and determine if project activities would be able to be accomplished safely without putting project staff and community members at risk
10		Clarify strategy for monitoring and enforcement of illegal land uses/reclaiming land from	Develop specific plans and recommendations for monitoring and enforcing illegal and unsanctioned land uses: see Stakeholder Analysis and Theory of Change recommendations
11		Feasibility study of Reforestation/Restoration	The analysis performed by EP Carbon suggests there are upwards of 8,000 ha that are potentially available for restoration, but this requires further analysis to define eligible areas, define strategies, quantify crediting potential, and feasibility.
12	Project Management	Define preliminary local project management roles	Assess project governance and implementation capacity within communities, propose management structure and capacity building targets.
13	Grouped project design	Joint governance agreement between resguardos	Promote collaboration regarding a joint REDD governance agreement to allow a grouped REDD project between the MB and GC *resguardos* to take place.
14		Evaluate likelihood of additional project area instances	Update the current status and likelihood of *Resoluciones Barí* and Pre-Expansion Areas to become part of a grouped project design
15	GHG Quantification	Baseline GHG updates	Update the carbon accounting model when the current NREF baseline allocation guidelines are released.
16		Update Project Scenario GHG estimates	Thoroughly consult the communities on more precise assumptions for project effectiveness, adoption rates, and other parameters.
17	GHG Quantification /Monitoring	Forest degradation monitoring proposal	Conceptualize and define a preliminary proposal for forest degradation measurement and monitoring, building on approach taken by the BioREDD REDD+ projects in Colombia (optical+RADAR satellite images with biomass calibration plots)

ANNEX A. STANDARDS AND METHODOLOGIES REVIEW

This analysis finalizes the recommendations concerning the optimal GHG Program and REDD Methodology selection for candidate REDD areas in the PDET Zone of Colombia. It builds on the conclusions presented in the PDET REDD Gap Assessment Report v2.0, titled "*Evaluación De Brechas De Datos E Información Para REDD En Zonas PDET Necesarios Para La Fase De Evaluación*" (Deforest et al., 2021).

SUMMARY

This analysis aimed to determine the most suitable GHG program and methodologies for the candidate REDD project sites, and reviewed the Verified Carbon Standard, ProClima, and CerCarbono GHG programs and methodologies respectively, the final recommendations are based on an analysis of qualitative rating criteria, which is described in detail in Annex B. Project Design and Configuration. The analysis makes the following recommendations:

GHG Program Selection

- **The VCS GHG Program is still the better candidate for REDD project development, despite some notable drawbacks.** The financial modeling scenarios that are presented in this document suggest that the project is not attractive financially at the prices offered by the Colombian compliance market, even when avoided degradation emissions are included. This makes the VCS GHG Program and the higher prices its projects tend to command the more favorable option. Refer to the Financial Feasibility and Marketing section.

- **While VCS is the best option based on credit pricing and financial feasibility, it has several notable drawbacks relative to the other GHG programs that were assessed**. These drawbacks are as follows:

    - High fees. The VCS fee structure that is approximately 2X higher (3X higher if paired with the CCB Standards) than its Colombian competitors such as ProClima

    - English-only: VCS Program documentation is only in English, and project documentation must be in English. This is a disadvantage for many international REDD project stakeholders.

    - Potential delays due to VCS updates. Project development delays are likely for upcoming VCS projects that may last from 2022 into 2023, and which are the result of Verra's ongoing updates to stand-alone project

methodologies that will affect projects that need to apply a jurisdictional baseline.

5. **Developing a reforestation project with VCS is possible but pending improvements to the VCS Program could make it temporarily challenging to develop such a project that is both time and cost effective.** A new VCS-owned ARR methodology is under development, and once approved, sometime in 2022 or 2023, new projects would be obligated to use it. But if a project were to be developed with a CDM A/R methodology, currently the only option under VCS, the project would likely have to switch to the new methodology at some point in the future. Verra has not provided enough information at this time for EP Carbon to be able to conclusively predict the lowest-cost, and most time-efficient pathway on this matter.

6. **If a Colombian GHG program would have been a viable option, this analysis would recommend the ProClima GHG Program under a more favorable financial feasibility scenario**.

   Advantages

   a. **Higher uptake.** ProClima has demonstrated a higher degree of uptake in Colombia than its competitor CerCarbono,
   b. **Easier design than CerCarbono.** The overall design of its standard and REDD methodology is easier to use and understand than CerCarbono
   c. **Flexible REDD methodology**. Its REDD methodology is extremely flexible which may reduce project development costs by having fewer PD requirements to fulfill.
   d. **Operates in Spanish.** GHG program documentation exists in both Spanish and English and projects can submit their documentation in either language.

   Disadvantages

   a. **Level of effort is still high, maybe not quite as high as VCS**. The level of effort required to develop a project with ProClima may not necessarily be substantially lower than using VCS**.** The flexibility offered by ProClima's REDD methodology - which, allows proponents to suggest and justify their own methodological approaches at the time of project development puts the onus on the project developer to resolve complex GHG accounting considerations that the VCS methodologies may already have a solution for.

   b. **Uncertain value in the international voluntary market.** Although the revenue for ProClima projects sold in the Colombian compliance is more secure, it may be lower than revenue generated from sales made in the global voluntary market. Recent reports on the Colombian compliance market suggest that sale prices tend to be 10-20% lower

(about [redacted] USD/ton) than the value of the Colombian carbon tax, in order to be an economical alternative to it (Terra Global Capital, 2021). Current estimates of credit prices commanded in the global voluntary market for REDD projects suggest sale price ranges during 2021 that ranged from [redacted] to [redacted] /ton (Forest Trends' Ecosystem Marketplace, 2021) though sources like IHS suggest average prices for REDD grew substantially towards the end of 2021 to [redacted] /ton (IHS Markit, 2022).

OVERVIEW

The Colombian carbon tax created a compliance market for verified emissions reductions in Colombia. This analysis provides a first indication of whether, and under what conditions, the VCS may be preferable to using a Colombian GHG program like either ProClima or CerCarbono, or the reverse. The conclusions were formulated using a qualitative rating system coupled with a qualitative analysis informed by professional experience, and primary and secondary sources.

METHOD

This analysis uses a non-weighted, qualitative rating scale across multiple selection criteria to compare the relative strengths and weaknesses between several GHG programs, including the Verified Carbon Standard (VCS), ProClima, and CerCarbono. The selection criteria include several decision-making factors that were originally identified in the report "*Evaluación De Brechas De Datos E Información Para REDD En Zonas PDET Necesarios Para La Fase De Evaluación*" (Deforest et al., 2021), (Deliverable 4), as well as new factors that were added in this analysis that more directly address the project feasibility concerns for the candidate REDD areas in the PDET Zone of Colombia.

Table A 1 identifies and defines the evaluation criteria and highlights the criteria that were newly added in this analysis. These criteria were developed based on EP Carbon's professional opinion of the elements that are commonly considered by EP Carbon when advising prospective carbon project proponents on how to choose the GHG Program and methodology that is best suited for their project. Since the first analysis in Deliverable 4 was an initial rapid analysis of the available standards and methodologies, this new analysis builds on this earlier approach to refine and clarify its previous recommendations.

The rating process groups together a standard with its respective methodologies. In other words, the rating is based on a holistic appraisal of the standards and their methodologies together as a package. This is because on the one hand, the technical aspect of project development occurs by interacting with a given GHG methodology. However, the Standard establishes the boundaries within which the GHG methodology is interpreted. On the other hand, the Standard is the brand that potential investors know and understand, but the quality of the brand is in part built on the quality of the GHG methodologies it uses. For the purposes of this pre-feasibility exercise, this analysis will assess both the Standard and its GHG methodologies as a unit and will

identify the most salient points of each component that are relevant to this discussion. Analyzing and comparing standards, or methodologies in a comprehensive way is beyond the scope of this exercise.

TABLE A 1: DEFINITIONS OF THE CRITERIA FOR EVALUATING THE GHG PROGRAM OPTIONS

ID	Criteria	Description	Present in D4?
1	**Allows desired carbon project type**	Has applicable methodologies for avoided deforestation projects	Yes
2	**Marketability**	The level of recognition of, and acceptance by, potential investors/buyers	Yes
3	**Revenue potential**	The ability to command a favorable credit sale price	Yes
4	**Alignment w/National GHG rules**	The level of compatibility with established national laws/regulations/policies concerning GHG emissions accounting	Yes
5	**Ease of Technical Implementation**	The ease or difficulty of applying and interpreting the standard and its methodologies	No
6	**Ease of demonstrating additionality**	The ease or difficulty in proving project additionality	Somewhat
7	**Allows Grouped Projects**	Contains provisions for allowing grouped project designs	No
8	**Documentation in proponent's language**	Key documentation such as program documents, and GHG methodologies exist in the proponent's language	No
9	**Social/Environmental Safeguards**	Degree of REDD Social and Environmental Safeguards included in the standard and its methodologies	Somewhat
10	**Fees**	Cost of registering and issuing GHG credits	No

RESULTS AND ANALYSIS

Table A 2 shows how the VCS, ProClima, CerCarbono GHG programs qualitatively compare across the set of evaluation criteria. The ratings are unweighted, meaning they are all given equal value. Under this scheme there is no clear winner, as each has its strengths and weaknesses. Ultimately, a financial analysis will determine whether the "Marketability", and "Potential Revenue" criteria should be weighted more heavily if the project is not financially feasible at the credit sale prices of the Colombian compliance market, but fares better on the international voluntary market. The unweighted values below suggest that if the project were to be financially feasible at prices similar to those of the Colombian market, then the selection of the greenhouse gas program can, for example, be based more on other factors such as "Ease of Technical Implementation", or operational language of the program (Spanish vs. English).

TABLE A 2: QUALITATIVE RATINGS FOR VCS, PROCLIMA, AND CERCARBONO GHG PROGRAMS

ID	Criteria	VCS	ProClima	CerCarbono
1	Allows desired carbon project type and combinations	4	5	5
2	Marketability	5	3	3
3	Revenue potential	5	3	3
4	Alignment w/National GHG rules	5	3	4
5	Ease of overall Technical Implementation	3	4	2
6	Ease of demonstrating additionality	3	4	5
7	Guidance for Grouped Projects	4	3	4
8	Documentation in proponent's language	2	5	3
9	Social/Environmental Safeguards	3	4	4
10	Fees	3	4	N.A. (4)
		37	38	37

KEY
Very Good
Good
Moderate
Somewhat poor
Poor

Verified Carbon Standard

1. Allows desired carbon project type – (Good)

Avoided deforestation

VCS offers several methodologies for GHG accounting of avoided deforestation (VM0006, VM0007, VM0009, VM0015 and VM0037) projects. Some of these methodologies apply to slightly different baseline scenarios than others, but all provide detailed methodological guidance and reporting requirements for avoiding deforestation on non-organic soils. According to the Verra registry, there are over 80 VCS-registered projects that are actively issuing credits across the world, using these five methodologies. In Colombia, there are 12 registered projects, signaling a critical initial mass of projects that have generated expertise and proof-of concept of the VCS model in the country. However, the sheer number of requirements demanded by the VCS and its methodologies, as well as the sometimes-stringent applicability conditions, can make their application in complex real-world scenarios challenging. This is discussed more in criteria "*5 – Ease of Technical Implementation*".

Afforestation, Reforestation, Re-Vegetation (ARR)

VCS allows ARR projects which can be highly marketable, however but these projects could soon be temporarily more challenging to develop because VCS's approach to ARR project development will be changing soon and will create uncertainties for new projects. This is caused by a VCS recent announcement that they will soon have their own methodology for ARR and will eventually disallow CDM A/R methodologies. Currently, VCS allows project developers to use CDM A/R methodologies, and presumably new projects must use the new ARR methodology provided by VCS. The preliminary version of the VCS ARR methodology that was made available for public comment suggests that ARR projects will become easier to implement in some ways, particularly with respect to additionality, but will introduce new and unresolved sources of uncertainty for project developers. This is discussed in more detail in in section "*5-Ease of Technical Implementation".* Generally speaking, however, the VCS Program is more than capable of providing the necessary guidance for developing a quality, marketable ARR project, despite temporary setbacks as the program improves how ARR projects are designed.

2. Marketability – (Very Good)

Since the inception of the VCS in 2007, the voluntary carbon market has largely consolidated around VCS as the leading voluntary GHG program, and its methodologies for avoided deforestation have set the benchmark for others to follow. VCS has therefore become the most utilized, widely-known, and trusted GHG standard for international voluntary REDD projects. As such, the majority of avoided deforestation projects have been developed using VCS[1], and using VCS has become the default option for projects seeking international investment. When completed, Verra's updates to

[1] Chagas et al., "A Close Look at the Quality of REDD Carbon Credits."

jurisdictional REDD will allow its methodologies to be used seamlessly for the Colombian market.

3. Revenue Potential – (Very Good)

VCS's long track-record, robust MRV requirements, and market-share has generated a market preference for VCS projects, which translates into VCS projects commanding a price premium in the international market, particularly when paired with the Climate, Community, and Biodiversity (CCB) Standards. VCS projects can participate in the growing Colombian compliance market created by its carbon tax, however initial market research conducted by Terra Global Capital suggests that the current price will not exceed ■ USD/ton in order for carbon offsets to be an economical alternative to paying the carbon tax (Terra Global Capital, 2021). This suggests that depending on their cost structure, some VCS-registered REDD projects developed in Colombia may not afford to be fully reliant on the Colombian carbon market in order to adequately cover its costs and meet its return targets. However, in absence of a global compliance carbon market, a project must have a solid investment and marketing plan to take advantage of revenue from voluntary sales. Moreover, in the Colombian context, new projects must use the FREL and its established emission factors which will likely lead to more conservative credit generation vs. developing project-specific baselines. Therefore, a project must carefully estimate its costs and revenue assumptions and determine whether it is more, or less, advantageous to sell exclusively to the Colombian market under the VCS.

4. Alignment with National GHG Rules – (Moderate, then Very Good)

Using VCS at this moment in time comes with some considerable, but temporary drawbacks, which give it "Moderate" rating in the short term, and a "Very Good" rating in the medium to long-term.

Stand-alone VCS REDD projects could theoretically use certain VCS methodologies, like VM00015 for instance, to incorporate national GHG accounting rules established for Colombia, particularly its FREL and emission factors, in order to align themselves with national GHG accounting efforts – a requirement set by Colombia for projects seeking to make transactions in Colombia. In practice, VCS is in the process of overhauling its approach to jurisdictional VCS projects. As of this report, Verra has officially stated that "*VCS stand-alone projects are NOT permitted to use jurisdictional FRELs, or pieces of them to estimate their project baselines until the updates to VCS methodologies have been made* (VERRA, 2021). This statement has been made because Verra is updating its approach to Jurisdictional and Nested REDD which will lead to VCS REDD methodologies being updated in early 2022.

The new Verra updates will introduce new technical processes where any stand-alone project seeking to nest within an existing FREL will be provided with a baseline to use by Verra (ibid). The rationale for this approach is to ensure stand-alone projects in the same country are applying the national/sub-national baseline in the same way. This is

both a positive development, and a challenge. This is positive because it will mean that in the very near future, stand-alone projects seeking to nest to the Colombian FREL, are guaranteed to do so in the same way if they are a registered VCS project. This is in contrast to ProClima and CerCarbono who simply require that proponents replicate the FREL approach when generating baseline for their project, which could introduce inconsistencies between projects for a number of reasons. It also means less technical uncertainty for proponents and developers about how to use a FREL as a baseline, since VCS will assume this role.

Unfortunately, it will be a challenge to proponents that wish to develop projects during 2022-2024 because it will likely take Verra staff longer to provide the necessary update to current REDD methodologies, and to implement its intended baseline-setting procedure, fees, service-provider, etc. Therefore, in the near-term, these changes will likely be a source of delays for developing projects in Colombia, however, if they are successful, it will greatly streamline the ease with which VCS stand-alone projects will function in the Colombian context, and further boost the confidence in the VCS Program.

5. Ease of Technical Implementation – (Poor)

The VCS and its REDD+ methodologies are well known for not being especially easy to interpret, implement, or adapt to every REDD+ scenario. Moreover, there is an expressed desire by project stakeholders to evaluate the potential of both avoided deforestation and ARR for this project. Unfortunately, Verra/VCS's approach to ARR projects is currently in flux and has introduced a high level of uncertainty for projects seeking to develop ARR projects during 2022-2024. These conditions are currently too unpredictable to interpret, and we cannot determine whether there is a cost-effective strategy for developing both an avoided deforestation project as well as an ARR project on the same project site under the VCS. For these reasons, the overall rating for VCS's ease of technical implementation is "Poor".

<u>Avoided Deforestation</u>
Developing avoided deforestation projects under VCS is challenging, but there is more than a decade of project implementation experience at the global level that has built global capacity of developers and caused the evolution of the VCS program over time. This has led, to some extent, to improvements and innovations that offset some of the challenges facing project development for avoided deforestation projects. Nonetheless, choosing between methodologies can be daunting and costly to evaluate.

- **Choosing between VCS REDD+ Methodologies can be a difficult and highly specialized task.** VCS methodologies have considerable detailed guidance within them that make project description and development a complex task. And there are meaningful differences between VCS methodologies that affect project implementation, many of which can be less obvious to detect until they are actually put to use. Also, the fact that there are five main REDD methodologies (VM0006, VM0007, VM0009, VM0015, VM0037) can make

choosing the ideal one for a project difficult. For example, VM0006 was selected for the BioREDD projects in Colombia; however, in working with this methodology over several years, it has become clear that it is overly complicated and places onerous requirements on ex ante emissions estimates that ultimately do not impact crediting. VM0009 has specific spatial thresholds for the proximity of deforestation relative to the project area boundaries that impose extra labor to determine whether a project could use it. VM0007s structure spreads its requirements across numerous modules in order to accommodate a wide range of carbon project types, including both planned and unplanned deforestation, Afforestation/Reforestation/Revegetation, and Wetland Restoration and Conservation. However, this modular approach can in and of itself make VM0007 a more costly option to implement since requirements are spread across different module documents, making interpretation more challenging. Finally, great care must be taken to properly identify and interpret each of the numerous requirements, to avoid delays at validation/verification from omitted or improperly interpreted requirements, which are spread between the Standard, various VCS templates, stand-alone tools, and within the methodologies themselves. This makes using the VCS program difficult even for specialized firms or individuals.

- **Despite improved global capacity to develop VCS projects, the VCS is still evolving significantly which can create unforeseen project development costs as new requirements are announced to fix gaps in the program.** The experience accumulated by Verra, project developers, and some proponents from over a decade of operational experience has led to collective learning to improve the design and guidance provided for the VCS Program and has led developers to understand the advantages and disadvantages of various methodologies. The VCS Standard has undergone numerous revisions to consolidate its program information, and clarify its guidance documents, which have corrected previous points of confusion for developers. However, there are still numerous contentious issues (JNR baselines, new ARR methods, new emerging research and MRV protocols) that periodically force projects to undertake significant unforeseen costs after project validation as the VCS tries to fix gaps in its standards and methodologies.

- **Avoided deforestation projects with jurisdictional baselines may be easier to develop in the future, but degradation still poses a challenge for developers**. The pivot to jurisdictional REDD has led Verra to overhaul and improve how current methodologies will incorporate jurisdictional baselines, thereby eliminating a great deal of uncertainty and technical development time to use methodologies for stand-alone projects. Although this is clearly a benefit for avoided deforestation, there is less of a benefit for avoided degradation because most National Forest Reference and Emission Levels do not contain degradation baselines. Therefore, project developers are still left to propose their own methodological approaches. Under this situation, those proponents who wish to account for avoided degradation emissions must choose a VCS REDD

Methodology that allows them to do so, and to propose a method that fits the methodology. Currently only VM0006, and VM0009 allow for unplanned degradation, and VM0007 only allows for degradation from firewood extraction. None of these may be an ideal fit for the project.

Afforestation/Reforestation and Revegetation (ARR)

VCS allows ARR projects, but they could be challenging to develop because VCS's approach to ARR project development will be changing soon, creating several uncertainties for new projects. Below are some important considerations, including recent public updates that suggest ARR projects will become easier in some ways, but with new and unresolved sources of uncertainty for project developers. Under these uncertainties it may be best to develop avoided deforestation separate from an ARR project and wait until the new VCS ARR methodology is released (sometime in 2022) to decide whether or not to develop an ARR project.

ARR Analysis

The following points highlight the current challenges with implementing an ARR project under VCS. These issues are largely temporary in nature but may create uncertainty until a final public version is released. Our assessments are purely based on comments made by Verra representatives and a read-through of the version listed for public-comment. The final version and its requirements could be different depending on revisions that are made.

- **VCS allows ARR projects but has no approved ARR methodologies of its own**. VCS allows CDM A/R methodologies under the VCS Program, but CDM A/R methodologies must follow VCS rules (Verra, 2011). This results in a few notable changes that make using CDM A/R more flexible under VCS
    - **A/R activities do not have to create a "forest".** A VCS ARR project does NOT have to result in "forest", which allows for "revegetation" projects that re-build carbon stocks but that do not necessarily lead to "forests" being created as a result (i.e., bamboo plantations)
    - **No eligibility date.** There is no historical eligibility date governing ARR site eligibility (i.e., 31 December 1989)
    - **Must only prove GHG projects did not clear native ecosystems to generate GHG credits**. ARR projects must only prove ARR site eligibility by proving that native ecosystems were not cleared for the purposes of generating ARR GHG credits later. If it is proved these clearings occurred at least 10 years prior to the start date, no proof is required. If earlier than 10 years, the project must provide proof. See VCS 3.2.4 (Verra, 2022). Projects can be creative in how they address this, through interviews, media reports, or other justifiable evidence.
- **VCS-approved ARR methodology under development in 2022, new projects must use it once approved**. Verra announced in December 2021 that an ARR methodology is currently being developed and is under public comment. The methodology will eventually replace the need to use CDM A/R

methodologies under VCS. Once it is approved, new VCS ARR projects will no longer be able to use CDM Methodologies, and legacy projects using CDM will likely have to switch at some point in the future (Verra et al., 2021). Approval will happen sometime in late 2022 or early 2023. This introduces significant uncertainty into bundling REDD with ARR into a single project design, which is possible the under the VM0007, as described later.

- **The preliminary version of the ARR methodology suggests its approach for "additionality" may become quantitative – easier for some, harder for other projects.** The new approach may no longer require the project-based approach to additionality that requires the application of the CDM additionality tool. Instead, projects will be required to set up a network of "virtual" plots (desk-based exercise) in areas similar to the proposed A/R sites that monitor how vegetation grows without the benefit of an ARR project. Plots will be established and monitored through remote sensing. (TerraCarbon & Silvestrum, 2021).

  Some potential challenges of this new approach are:
  - Monitoring illicit crops. In the case of clearings caused by illicit crops, Additionality may prove challenging to prove and monitor because known areas of illicit crop cultivation outside the project areas may have to be identified and monitored over the life of the project.
  - Costly/challenging remote sensing: Cloud-cover in the Andean slopes could make acquiring cloud-free images difficult and make this approach to additionality more challenging and costly over the life of the project.

- **The implications for including ARR in the VM0007 v1.6 REDD+ Methodology after the new ARR methodology release is ambiguous and may present challenges and increased future costs.** Currently VM0007 allows projects to combine avoided deforestation and ARR (among others) in one project site under one Project Description. No mention has been made about whether, when, and how VM0007 v1.6 would be updated to incorporate the existence of the new VCS ARR Methodology and the changes it introduces, including but not limited to additionality and leakage calculations.
  - **Unclear timeline and approach to updating VM0007**. VM0007 uses the VMD0041 module (BL-ARR), which refers the user to the CDM AR-ACM0003 methodology titled "Afforestation and reforestation of lands except wetlands and associated tools" to calculate baseline and project GHG removals. VM0007 could defer to the new ARR methodology for establishing a project baseline, but this is unlikely to happen for at least several years. Even so, it is unlikely that the actual procedures for ex-ante estimates would change as suggested by the beta version of the forthcoming VCS ARR Methodology.

  - **Unclear how additionality would be applied to ARR if VM0007 were updated.** VM0007 v1.6 uses the VCS Additionality Tool to

establish additionality, however, the new ARR methodology uses a performance-based method based on quantitative indicators of vegetation growth. No mention has been made yet how this could be reconciled in the future. This could introduce undesirable project development costs in mid-stream if the project is obligated to switch methodologies and re-validate to the new methodology.

- **The project could be developed now under VM0007 v1.6 using CDM A/R methodology but could be forced to update regardless.** If VM0007 is updated to include the new VCS ARR Methodology, the project may eventually be forced to use it anyway at some point in the future. These future costs may be inevitable, but there is no way of knowing at this point in time.

Conclusion

Overall, EP Carbon views project development under VCS to be more difficult than other GHG Programs such ProClima and CerCarbono. The VCS is more prescriptive and has more written requirements for REDD projects. This makes it easier to know what the benchmark for project quality is for validation/verification but can make it challenging to interpret and apply under complex real-world conditions. It is this feature that contributes to the strength of the VCS brand. In contrast, ProClima and CerCarbono follow the general GHG accounting template set by VCS, but with fewer requirements and guidance. The current uncertainties with ARR and the challenges in interpreting different VCS REDD methodologies make implementation difficult, resulting in a "Poor" rating for "*Ease of Technical Implementation*".

6. Ease of demonstrating additionality – (Moderate)

The VCS allows for various methods for proving additionality, although all of the VCS REDD methodologies use the project method, based on the original additionality tool developed under the Clean Development Mechanism. This approach is based on analyzing additionality at the project-level and can present different levels of difficulty depending on the carbon project type, and the range of possible baseline land-use scenarios. The difficulty in applying this method depends first on formulating a range of credible alternative land use scenarios, and then using either an investment analysis and/or a barrier analysis to determine additionality, followed by a common-practice analysis as a reality-check as to whether the proposed project activity is already widely implemented. In this way the proponent is analyzing whether i). the same proposed carbon project activities are already being implemented without VCU income and are common practice and, ii). whether the other land uses are more financially viable or not, and iii). the underlying reasons or barriers justifying why VCU income is needed. This analysis can be time-consuming and requires a moderate to significant amount of research concerning alternative land use scenarios, related costs for the investment analysis, and identifying and justifying different types of barriers allowed by the tool. However, for REDD projects in developing countries with rural populations, there are typically enough systemic investment, institutional, and prevailing practice barriers to

make a straightforward case as to why activities for REDD are not already common practice, and that other land uses will prevail in the baseline scenario. Moreover, the expertise developed over years through VCS project implementation by numerous project developers has honed the approach for proving additionality using the CDM-based tool, and therefore it is unlikely to be a major obstacle in the case of the candidate project sites in Colombia.

7. Guidance for Grouped Projects – (Good)

Allowing grouped projects is an important cost-saving feature to consider, which will likely be an asset during project development. The VCS allows for grouped projects, which allows multiple project instances of a particular project activity to be included under a common project design as long as the baseline conditions and additionality considerations are the same for each new project instance. Although the VCS allows grouped projects, the guidance pertaining to them is mostly contained in the VCS Standard. All VCS methodologies allow for grouped projects, although not all of them make mention of grouped projects within them, which may cause some confusion. For example, the VCS methodologies that apply to REDD are VM0006, VM0007, VM0009, VM0015, VM0037, but the popular VM0007 and VM00015 do not explicitly mention grouped projects, which can lead to uncertainty whether they allow grouped projects or not (Deforest et al., 2021). Despite this variability in guidance within methodologies, the VCS unambiguously allows for grouped projects in any methodology and provides considerable guidance as to how to apply a methodology for this purpose (VCS requirement 3.5.8 – 3.5.19).

There is generally no restriction on adding new project area instances (PAIs) for a grouped project during the life of the project, however one requirement can create challenges. VCS requirement 3.5.16 requires all new PAIs to be added within five years of the project start date if a new proponent is added to the project. Therefore, proponents must either add as many proponents as is foreseeable at the time the project is designed an validated, or take care to stay within the five year window relative to the project start date, otherwise, PAIs with new proponents are not allowed.

See Annex B for a more complete analysis of grouped project opportunities for this project.

8. Documentation in proponent's language – (Somewhat Poor)

All the VCS Program documentation is in English, which is the official language of the VCS, which can cause notable costs and challenges during project development because proponents, implementing partners, and communities may have little to no operating capacity in English. Therefore, key documents and requirements must be relayed to such stakeholders, in Spanish for instance, thus adding to project development costs. The Project Description, Monitoring Reports, and audit reports, as well as all legal documents such as the Registration Representation, and Issuance Representation must be in English. This elevates project development costs and development time by forcing

proponents that operate in other languages to either factor in time and money for translation services, or to work with project developers with English-speaking staff, many of which may command higher fees for this work than similar firms from other countries. Overall, using the VCS can increase project costs and project development time solely as the result of language. However, since English is among the most dominant languages for technical work, it is likely that most project developers and implementing partners that are assisting local stakeholders in project development have some degree of capacity with English to facilitate applying the Standard and its methodologies. Further, underserved stakeholders are major project proponents or important land-users, and it is unlikely they will be involved in deep technical work associated with GHG accounting. This work is left to be facilitated to a technically competent non-profit, government institution, or project developer, where English language skills are often less of a problem.

9. Social and Environmental Safeguards – (Moderate)

Taken alone, the VCS standard has limited safeguards built into its reporting requirements, but which are much improved from earlier versions. Section 3.16 of the VCS focuses exclusively on Safeguards, and require basic tenets of Free, Prior, and Informed, Consent including the demonstration of "No Net Harm", local stakeholder identification, consultations, disclosure of risk, respect of stakeholder resource rights, grievance mechanisms, and a public comment period. Broadly speaking, the VCS safeguard requirements contained in the current version of the VCS closely match the nationally mandated safeguards in Colombia, which are adapted from the safeguards approved at COP 16 in Cancún. The notable exceptions[2] being a more specific requirement to build local capacity to a level "*where local stakeholders' technical, legal, and administrative governance capacity is strengthened to a degree where they can make informed decisions*"; a specific requirement to recognize, respect, and promote traditional knowledge systems; and having equitable benefit sharing for stakeholders (ProClima, 2021)
The rest of the Colombian safeguard requirements appear to be addressed in some form or another within various parts of the VCS Standard, not just the "Safeguards section".

Despite the VCS's basic Safeguards requirements, historically VCS projects have elected to pair the CCB project design standard, which generally surpasses the requirements made by VCS and also surpass the safeguards listed in Colombian legislation. This pairing has historically conferred the highest confidence that climate change mitigation projects are delivering strong benefits for climate, community, and biodiversity – and meet or exceed national social and environmental safeguards. This in turn has typically resulted in a price premium, as well as being a requirement for some investors. However, it should be noted that using the CCB generates additional ongoing costs by way of a levy on verified emissions reductions, not to mention additional

[2] These exceptions were derived from ProClima's list of national safeguards for Colombia contained in their REDD Methodological Document.

validation/verification costs for this standard. In sum, the VCS alone contains the vast majority of safeguards mandated by Colombian legislation, with a few exceptions. Using the CCB project design standard would fill these gaps and would most likely lead to a price premium on the international voluntary market.

10. Fees – (Moderate)

Verra charges several fees that together can create a significant, but manageable fee for REDD projects that have reasonable returns, although the preference for VCS labeled verified emission reductions in the international market typically allows compelling, well-designed projects to adequately recuperate these costs. VCS fees can only be estimated accurately using a financial cashflow analysis for the project because of the progressive nature of the VCS levy. The calculated fees for this project are presented in Annex G, but may represent a cost somewhere between 3-8% of projected revenues over the project lifetime depending on issuance volumes and whether CCB is added.

VCS charges three main fees as follows, with other fees for special circumstances: an Account Opening Fee, a Registration Fee, and a VCU Issuance Levy. The fees have been reproduced here for convenience in Table 2 from the VCS Program Fee Schedule (Verra, 2020).

Account Opening Fee - [redacted] USD

Registration Fee - The registration fee is a levy of [redacted] USD that is pegged to either ex-ante VCUs or the verification period quantity depending on the underlying registration conditions for the project at time of registration, and which is capped at [redacted] USD.

VCU Issuance Levy – The VCS uses a progressive levy structure that taxes issuances from a calendar year. The levy is higher for lower amounts of VCU issuances and decreases as issuance volumes increase. VCS provides the following example in footnote number four in the Program Fee Schedule.

> *The calendar year is defined as 1 January – 31 December. The sliding scale for the VCU levy shall be applied as cumulative issuances within the calendar year cross each volume threshold. The cumulative issuance volume for each project shall restart on 1 January of each year. For example, where 4.7 million VCUs were issued from a project within one calendar year, the total VCU issuance levy for the VCUs issued during that calendar year would be: [redacted] x 10,000) + ([redacted] x 0.99m) + ([redacted] x 1m) + ([redacted] x 2m) + ([redacted] x 0.7m) = [redacted]. Note that there is no limit on the number of issuance events which may occur within the calendar year, meaning that the 4.7 million cumulative issuances may have been reached over any number of issuance events.*

A highly simplified exercise was developed to understand the potential costs of using VCS (with CCB), by modeling the costs (in USD) for issuing [redacted] VCUs in one calendar year at the same time as the project is registered. Assuming a sale price of

[redacted]USD/ton suggests the relative costs of using VCS and CCB are approximately 4.7% and 2.5%, (7.2% combined) of revenue ([redacted] USD).

TABLE A 3: ESTIMATED VCS AND CCB FEES FOR [redacted] CREDITS

VCS	Acct. Opening + Registration Fee	[redacted]
	Issuance Levy	
	Subtotal	
CCB	Val + Ver Fees	
	Labeling Fees	
	Subtotal	
Grand Total		

TABLE A 4: VCS FEES

Account Opening fee	[redacted]
Registration fee	
without verification report, or registration with verification report and verification period is at least one year:	[redacted] x (Ex-ante VERS), capped at [redacted]
Registration with verification report + verification period < 1 yr.	[redacted] x (Verification period quantity), capped at [redacted]
	Fee is credited toward future VCU Issuance Levies
VCU Issuance Levy	[redacted]
VCU issuance levy, conversion of GHG credits from approved GHG programs	
Retroactive label fee	USD [redacted] flat fee for each label event

PROCLIMA

1. Allows desired carbon project type – (Very Good)

The ProClima GHG Program has one REDD methodology that applies to forested areas and could be applied to the candidate project area. It also has one methodology for Afforestation/Reforestation, and one for avoided paramo (high Andean grasslands) conversion. In addition, the applicability conditions of the ProClima REDD Methodology are similar to those of comparable VCS REDD methodologies and mainly require that land qualify as "forest" for 10 years prior to the project start date. ProClima appears to be more permissive of letting GHG accounting occur on organic soils, but puts the onus on the proponent to suggest a defensible methodology for doing so. The available REDD methodology (v2.2) was recently released in February 2020, and

according to the ProClima registry there are approximately 16 registered and active REDD projects (ProClima, 2022). This demonstrates a reasonable level of confidence in ProClima's ability to supply REDD credits to the Colombian market.

2. Marketability – (Moderate)

The carbon tax in Colombia has created a strong market signal for land-based GHG mitigation offsets to be available as alternatives to paying the imposed carbon tax, and the ProClima GHG program is rising to meet this challenge. A recent report by Terra Global Capital suggests that the demand in the Colombian market is projected to outstrip demand for approximately 15 years (2021-2035) (Terra Global Capital, 2021). ProClima is a domestic response to this market signal, and given the change in legislation that requires carbon tax offset credits to be sourced from Colombia. Its growing portfolio of projects in its first two years of existence all suggest that ProClima is being seen by many as a viable program for producing and successfully selling credits in the Colombian market. However, its prices will very likely be lower than the value of the carbon tax. Terra Global Capital estimates that credit prices are 10-20% less than the tax, averaging approximately [redacted] USD/ ton CO2e (Terra Global Capital, 2021). It should be noted that the cost of implementing effective REDD project activities will be similar regardless of the GHG program, therefore facing a price ceiling of ~[redacted]/ton when selling to the Colombian market may be a concern to some projects. Even so, the evidence suggests that ProClima REDD projects are viewed favorably, as a recent analysis of the ProClima registry suggests that 65% of currently issued verified credits have been retired in Colombia exclusively (ProClima, 2022).

The marketability of ProClima credits at the international level is less certain and price comparisons versus VCS credit prices are currently difficult to find. Therefore, until the performance of ProClima credits for international buyers is better documented, we are unable to comment on the international buyers' willingness to pay for it, indicating there is unknown risk in this endeavor. For now, VCS will likely remain the more trusted brand that caters to the international market until new data suggests otherwise. One caveat of interest is that ProClima allows for other GHG methodologies to be used under its program, so for instance, a project could use a VCS REDD methodology under ProClima. There is not enough data yet to indicate whether developers are considering this option when the more flexible ProClima REDD methodology is available.

Due to the mixed opinion on the marketability of ProClima credits for the domestic vs. international markets, the judgment on ProClima is only "Moderate". For the time being, VCS still likely has the edge over ProClima for international buyers, though the trends suggest that ProClima is becoming a force in the Colombian market. Whether the candidate sites in Colombia choose to develop under ProClima will depend on the project's cost structure once a realistic set of project activities has been developed in conjunction with the communities, and their costs have been accurately estimated to allow a financial model to compare expected cashflows under VCS vs ProClima.

3. Revenue Potential – (Moderate)

Several aspects of ProClima's revenue potential are tied to its marketability, which was discussed in the previous section. Project proponents generating credits under the ProClima Standard have had reasonable success at selling their credits in the Colombian market, albeit at prices that are likely just below the value of the carbon tax of approximately [redacted] USD/tCO2e. Therefore, the revenue potential for ProClima may be promising for projects with a cost structure that can support this price. Less clear is ProClima's revenue potential for sales outside of Colombia. Data on this topic does not yet exist since all sales listed in the ProClima registry indicate all credit transactions have been sold in Colombia. The conclusion here is that as long as a project's cost structure can be operated with revenue from ~[redacted] USD/tCO2e, ProClima could be a viable alternative. Further, it may be in the project's interest to support the local Colombian market and the organizations participating in it rather than using a foreign GHG program, but this decision is up to the project proponents.

4. Alignment with National GHG Rules – (Moderate)

A benefit of ProClima and other Colombia-based GHG programs is that they are designed to align completely with national GHG rules, regulations, and decisions. This confers some confidence to the user that by following the written instructions in the ProClima Standard and its REDD methodology, that less research is needed to understand how to align a project to the Colombian national context. This is a substantial theoretical advantage over the more general requirements imposed by VCS that require projects to comply with national laws, which can save a meaningful amount of project development time and lead to more immediate progress. In practice, the ProClima REDD methodology does provide references to key technical documents, such as Colombia's FREL, and provides other guidance to clarify the general approach that should be followed for GHG accounting. However, the amount of specific methodological guidance for applying the national FREL is limited to referencing the national emission factors, as well as a few high-level statements that defer to the current documentation available on the UNFCCC website for Colombia. This puts the onus on the project developer to consult technical documents produced by the government of Colombia to understand and to develop the project's baseline, as opposed to having more helpful, time-saving guidance built into ProClima's REDD methodology. In conclusion, ProClima does reference key rules, regulations, and decisions specific to the Colombian context. However, when it comes to GHG accounting it stops short of issuing any meaningful technical guidance that could help a user to save time when applying Colombia's rules to GHG accounting. This decreases the potential usefulness of the ProClima standard relative to VCS. Once VCS completes its update to let stand-alone projects use jurisdictional baselines, VCS will have an edge because it will be removing the uncertainty and time expense associated with applying a JNR baseline to a project, and presumably improve project quality.

5. Ease of Technical Implementation – (Good)

As compared to VCS and its methodologies, ProClima's REDD methodology follows the main outline of the VCS methodologies, but provides very little, if any, detailed guidance. This may make it more flexible, but potentially less rigorous. Instead, ProClima defers the responsibility of detailing the methodological approach almost entirely to the user. This limits the number of requirements that are being audited at validation and verification to high-level GHG equations and general outputs needed for important intermediate and final calculations. It also provides proponents a wide range of methodological freedom with which to address their projects. With this in mind, ProClima projects will likely exhibit a greater degree of variability in quality, which will put greater pressure on auditors as the final arbiters of project integrity. However, this feature also likely results in lower project development costs due to the fewer number of requirements that must be contained in the project description. Lastly, although the measurement, monitoring, and reporting requirements may be less with ProClima than with VCS, it is unlikely to result in less costly activities to reduce deforestation. In sum, the flexibility of ProClima is a plus in many ways that include lower development costs. On the other hand, this flexibility may undermine international buyers' confidence in ProClima projects and in the end may make some projects similarly difficult to develop because of the lack of technical guidance provided by the standard.

6. Ease of demonstrating additionality – (Good)

The ProClima REDD methodology offers a streamlined version of the CDM-tool for additionality. It provides a similar approach to that of VCS's version of the tool, except that it eliminates any requirement to do an investment analysis or a common practice analysis. Instead, it asks proponents to describe whether the impact of registering at a GHG project would lessen any of the identified barriers, proving additionality with an affirmative analysis. This is a less intensive process for proving additionality than that of VCS and would reduce development costs.

7. Guidance for Grouped Projects – (Moderate)

The ProClima Standard allows for grouped projects, although this guidance is only contained in the Standard. The guidance is broadly similar to the guidance in the VCS, but with less detail, making it more difficult for proponents to interpret how to correctly apply the grouped project concept. This could introduce delays at project validation/verification.

8. Documentation in the Proponent's Language – (**Very Good)**

ProClima project documentation, including the website, exists in Spanish and English, and lends itself well to parties with multiple language capabilities to use it. Both Spanish and English speakers are therefore able to interface with the ProClima documentation, thus eliminating the need for translating documents into either language. The ProClima Standard allows project documentation to be in Spanish vs. English.

9. Social/Environmental Safeguards - (Good)

The ProClima REDD Methodology contains all 15 safeguards mandated under Colombian law, which are slightly more rigorous than the minimum safeguards contained in the VCS. In general, the VCS and ProClima safeguards are broadly similar to one another, but the VCS lacks a few categories as identified earlier in this document. Because of these differences, and because the ProClima inherently aligns to the Safeguards approved by Colombia, it can be considered slightly more rigorous than applying the VCS Safeguard requirements. It is unclear whether ProClima projects will ever use the more rigorous CCB Standards, though the absence of ProClima/CCB projects as evidenced in the CCB registry suggests that the marketability of ProClima in Colombia is sufficiently high to avoid doing so.

10. Fees (Good)

ProClima's has lower fees than VCS, which is a benefit for projects seeking to market their project solely within Colombia. Since ProClima is operated out of Colombia and is relatively new, it likely has lower operating costs than VCS as well. A similar exercise was constructed to illustrate ProClima's costs relative to VCS, noting that exact costs would require a more detailed financial model tailored to the project development costs associated with developing projects against the ProClima Standard. As with the VCS Fee example, this example models the costs associated with registering a new project, and issuing and retiring [redacted] credits in the same year. Fees were reproduced from ProClima's publicly available fee schedule (ProClima Internacional, 2021) The result of the exercise suggests that ProClima's overall fees are more than half as much as those charged by Verra for similar costs for VCS, with ProClima charging ~[redacted] compared with Verra's [redacted]. The difference is even more stark if CCB is added, making total costs for VCS+CCB [redacted] vs ProClima's [redacted], or more than 3X the cost. The true effective fee rate on a project cashflow is likely to be 1-4% of revenue, providing ProClima with a distinct advantage.

TABLE A 5: PRO CLIMA FEE SCHEDULE

Fees	COP	USD
New account fee + annual maintenance	[redacted]	
Project Certification and Registration		

TABLE A 6: FEES FOR ISSUANCE OF VERIFIED CREDITS

Credit Volume	Certification + Registration (COP)	Issuance (COP)	Retire (COP)	Certification + Registration (USD)	Issuance (USD)	Retire (USD)
[redacted]						

CERCARBONO

1. Allows desired carbon project type – (Good)

The CerCarbono protocol allows REDD projects and provides flexibility to use various methodologies. CerCarbono provides its own methodology, "Metodología REDD v1.1" for avoided deforestation projects that includes guidance for applying the methods used in the national reference levels at the project level. As with ProClima, CerCarbono allows the use of third-party methodologies provided they comply with some eligibility criteria. In theory, VCS methodologies could be used under CerCarbono as well. In practice, there are seven registered projects under CerCarbono's third-party registry (EcoRegistry), and which are using two REDD methodologies: either CerCarbono's Metodología REDD v1.1 (4 projects, 2 project developers), or the Norma Técnica Colombiana 6208 (3 projects, 3 project developers). This demonstrates that at least several developers have demonstrated that it was possible to use a non-CerCarbono REDD methodology under the CerCarbono Protocol. In summary, although less utilized than its domestic competitor, ProClima, CerCarbono has had some, albeit more limited, traction in the Colombian market.

2. Marketability – (Moderate)

As compared to ProClima's level of uptake in the Colombian market, CerCarbono is more limited with about half as many registered REDD projects under its protocol (7 versus 16). CerCarbono's REDD methodology was finalized in September 2020, while ProClima's was finalized in April 2020 – a difference of only five months. And yet, the market has shown a preference for ProClima's GHG program. This may be related to the ease of technical implementation (discussed below). As a result, ProClima appears to have an edge in marketability based on the number of projects that have utilized it. Unfortunately, CerCarbono's EcoRegistry does not provide the ability to analyze issued vs retired credits, therefore it is not clear how desirable these credits have actually been. The demonstrated preference of projects using ProClima instead of CerCarbono, combined with the lack of insight into retired vs issued credits, suggests no sales have occurred at the international level, but unlike ProClima's registry, no data is available on EcoRegistry on this matter. This introduces a level of risk for a project that utilizes CerCarbono but wishes to trade credits on the international market.

3. Revenue Potential – (Moderate)

Since no insight into the destination of issued credits can be found on the CerCarbono registry or outside sources, the most charitable assumption is that projects have been sold at prices equivalent to the carbon tax in Colombia, approximately ~[redacted] USD/tCO2e (Terra Global Capital, 2021). However, no data or information has been found confirming that this is accurate. The lack of information on the EcoRegistry system to discern retired vs issued credits is a missed opportunity to be transparent about an important indicator of CerCarbono's revenue potential, resulting in a less favorable rating. However, the fact that some projects have registered provides some

reason to give the benefit of the doubt that they are in fact being sold on the Colombian market.

4. Alignment with National GHG Rules – (Good)

CerCarbono demonstrates a higher attention to detail concerning how its methodology should be used to more fully align with Colombian law than does ProClima. The CerCarbono REDD methodology contains a full annex devoted to help users apply the specifications of the national FREL, which is one of the most important components for project development. Similar to ProClima, it contains a table of the required Safeguards mandated by Colombia. In addition, an entire Annex is devoted to identifying the sources for specific information used for various technical processes, which includes various government sources and websites. Therefore, in this respect, CerCarbono provides more helpful information to better allow its users to more fully align with government GHG accounting rules.

5. Ease of Technical Implementation – (Somewhat Poor)

The CC REDD methodology v1.1 provides a great deal more written guidance than does ProClima, and is more comparable to VCS in this respect, although its lack of formatting makes it difficult to interpret. The methodology has 142 pages versus ProClima's 60-page methodology. This is a crude indication of the level of guidance that CerCarbono provides its users. Unfortunately, the guidance contained in the methodology appears as unformatted large blocks of text. This alone drastically raises the costs of technical implementation since it is considerably more challenging to identify and interpret the requirements of the methodology. Similar to ProClima, it too replicates the VCS's general approach to REDD project accounting by recommending users identify a reference area, a project area, and a leakage area. However, the quality of the guidance regarding how to construct and utilize these areas in project accounting is less clear than in ProClima, which would likely lead to confusion and longer development times for projects. For these reasons the CerCarbono has been issued a "Somewhat Poor" rating with respect to ease of technical implementation, since despite its more verbose approach to guidance, it is not all useful and not presented in a format that permits an easy user experience. The relatively low number of projects registered under CerCarbono may be an indicator of the added difficulty of using it when applying it in practice.

6. Ease of demonstrating additionality - (Very Good)

The CC REDD methodology utilizes an even more simplified approach to proving additionality than ProClima. Users must only comply with two straightforward steps in order to demonstrate project results would not have happened without REDD financing. The first step involves a cause-effect matching exercise to identify each REDD activity and describe what its anticipated effects may be. This is followed by a step to demonstrate that there is no other financing leading to the same cause-effect relationships, or, to demonstrate that the level of expected results is proportional to

the level of expected funding through credit sales. Presumably this would require some research on similar activities, but this is at least as much effort as the barrier analysis required by ProClima, perhaps less. As a result, CC's method for proving additionality may be slightly easier than that of ProClima.

7. Guidance for Grouped Projects – (Good)

Similar to ProClima, and VCS, CerCarbono also allows for grouped projects, though here too the guidance for grouped projects is only provided for in the Protocol document and not the methodology. The quality of the guidance is generally slightly more robust to that of ProClima, but less detailed than that of VCS. Overall, the guidance should be sufficient to construct a grouped project.

8. Documentation in the proponent's language – (Moderate)

CerCarbono, like ProClima, has documentation available in both Spanish and English, although key documentation is not always offered in both languages. Importantly, the REDD methodology is currently offered only in Spanish, although there are indicators on the website that an English version is forthcoming. The CerCarbono protocol is available in both languages. The fact that CerCarbono has made an effort to provide documentation in both languages is helpful, but the level of implementation needs to be more consistent for the benefits of multi-lingual documentation to be a benefit for users. The CerCarbono protocol states that it allows any project documentation to be generated in either English or Spanish, though it emphasizes that English documentation may be preferable for international sales. In conclusion, although CerCarbono has made inroads into having bi-lingual documentation, it has done so inconsistently, thus not allowing users to fully benefit from this feature. However, it is possible that in the near future more documents will be translated into both languages.

9. Social/Environmental Safeguards – (Good)

Similar to ProClima, the CerCarbono REDD methodology v1.1 contains all 15 safeguards mandated under Colombian law, which are slightly more rigorous than the minimum safeguards contained in the VCS. The same analysis made for ProClima applies here.

10. Fees – (N.A. / Good)

Unlike both VCS and ProClima, CerCarbono does not publish its fees on its website, and instead requests that pricing inquiries be made on a case-by-case basis via email. EP Carbon submitted a request for general pricing information, which went unanswered. Unfortunately, there is no data available pertaining to fees that could make it into this report. One can assume that prices must be comparable to those of ProClima if CerCarbono is trying to stay competitive. Assuming this is the case, its fees are likely comparable to those of ProClima – which could be up to half as expensive as the VCS.

TABLE A 7: PROCLIMA REGISTRATION + ISSUANCE FEES ON [redacted] CREDITS (APPLIED TO CERCARBONO)

ProClima Fees	New Account Fee	[redacted]
	Registration	
	Registration Levy	
	Issuance Levy	
	Retirement Levey	
Total		

LIMITATIONS AND CHALLENGES

1. Market information for ProClima and CerCarbono is relatively limited as compared to VCS, therefore inferences and assumptions must be made from available sources that study voluntary markets, which have much less transparency.

2. The rating scale, and the ratings applied are to a large degree, subjective, and are based on the professional judgement of EP Carbon staff. Different developers have different tolerances for different GHG program and REDD methodology features and approaches. Therefore, these results only represent the views of EP Carbon based on its own experience.

3. EP Carbon currently does not have experience developing projects under the ProClima or CerCarbono Standard. The professional opinions expressed here were formulated based on readings of the GHG program documentation that are publicly available on each program's website. Given the voluminous nature of the requirements and the rules contained within these documents it is possible that an important consideration was accidentally omitted from this analysis that might have a significant impact on the conclusions and recommendations that have been reached

CONCLUSIONS

The VCS Standard seems to offer the best potential for financial feasibility and is therefore the best option, despite not performing as well on other indicators relative to the other Colombian GHG Programs. The financial analysis provided elsewhere in this document suggests that this project's financial viability is highly sensitive to the sale price of GHG credits, but that prices below [redacted] USD/Ton, which are similar to those of the Colombian compliance market, make the project financially un-attractive. If the project's financial viability were compatible with the Colombian market prices, ProClima would have been the preferred choice.

Marketability

1. VCS is still the dominant GHG accounting standard world-wide.
2. The quality, clarity, transparency, and attention to detail of all of the VCS products is noticeably better than its Colombian counterparts. Together

this confers higher confidence in its product, which likely translates into better marketability.

3. Despite the VCS strengths, new REDD projects in Colombia are using the cheaper alternatives, especially ProClima, which now has more registered projects in Colombia than the VCS.

Revenue Potential

1. VCS has demonstrated revenue potential in international markets with 12 registered projects in Colombia that pre-date its carbon tax and carbon market.
2. However, projects seeking to use VCS project level methodologies for the Colombian market cannot do so yet. Recently VCS has clarified that projects are NOT allowed to apply jurisdictional baselines to project-level methodologies until its update to all five project methodologies, as well as its updated processes, are complete, likely in early to mid-2022. This will result in a new module for jurisdictional baselines along with updates in each methodology to accommodate it. VCS will provide proponents with a jurisdictional baseline in an effort to standardize how projects apply jurisdictional baselines at the project level. This will likely introduce delays for first time users of this updated approach and is a noticeable drawback to those projects seeking to develop VCS projects immediately. However, project activities could still be implemented while these VCS-related technical issues are being figured out.
3. VCS will likely have an all-around edge in total revenue potential, assuming VCS successfully implements these updates. Once it does, projects will be able to sell Verified Carbon Units (VCUs) in both the Colombian and international markets, though proponents will have to adjust to new processes and updated methodologies.
4. Any project selling to the Colombian market under any GHG Program will likely be selling at ~[redacted]/Ton or less to remain attractive as compared to the Colombian carbon tax. This price is likely to remain unchanged, with the exception of an annual adjustment for inflation. As such, projects should consider a diversified sales approach that involves both domestic and international sales, in which case VCS has the stronger revenue potential.
5. Selling at under [redacted]/ton will only be feasible for projects with an accommodating cost structure.

Alignment with National GHG Rules

1. The Colombian standards better align with Colombian law and requirements since they identify these rules specifically and are structured around them.
2. However, ProClima/CerCarbono miss an opportunity to make the user experience easier with respect to alignment with Colombian rules, giving them a less clear advantage over VCS.

3. Once the VCS updates to allow jurisdictional baselines into project-based methodologies are complete, ProClima/CerCarbono advantages may decrease.

Ease of Technical Implementation

1. VCS has more prescribed methodologies and more requirements to comply with, while both ProClima and CerCarbono offer more flexible options that may lower project development costs.
2. Once the VCS updates for jurisdictional REDD are made to VCS methodologies, no VCS methodology will have an advantage over another in terms of applying a jurisdictional baseline is concerned. The decision will rest on the methodology's applicability conditions, allowed baseline activities, and overall ease of use.
3. The added flexibility of ProClima and CerCarbono is not necessarily an advantage, as it puts more of an onus on its users to provide answers to difficult methodological questions that VCS has more built-in guidance to address.
4. The existing expertise developed around VCS erodes some of the advantages of its more flexible Colombian counterparts.

   The format of ProClima makes it easier to understand than CerCarbono, and for this reason it is preferable to it.

Ease of demonstrating additionality

1. VCS has the most intensive additionality test compared ProClima/CerCarbono, but with the context in which these projects are likely to be implemented, demonstrating additionality is unlikely to be a challenge in a general sense.
2. Both VCS and ProClima use a version of the CDM additionality tool, though ProClima has simplified it.
3. CerCarbono has an advantage in its ease of demonstrating additionality, but the overall ease of use for overall project development between the Colombian standards goes to ProClima.

Guidance for Grouped Projects

1. All three standards and methodologies permit grouped projects, though VCS has the most robust guidance for ensuring grouped project implementation is done correctly.
2. All VCS methodologies can accept grouped projects.

Documentation in proponent's language

1. VCS poses challenges for Spanish-speaking countries since its official language is English, and all project documentation must be in English. This poses additional

costs to projects in order to use VCS with non-English speaking project partners, and makes the technical process less accessible to them.

2. Both ProClima and CerCarbono have project documents in both English/Spanish, though ProClima has done this consistently to all key documents, and CerCarbono has not.

Social and Environmental Safeguards

1. All three GHG Programs have similar Safeguards in place, however, the Colombian standards are slightly more rigorous than those of VCS and map directly to mandated safeguards by Colombia.
2. VCS-CCB paired together go beyond the Safeguards mandated by Colombia, but result in fees that may be 3X higher than using one of the Colombian Standards. The higher returns from international markets may make up for this difference.

Fees

1. VCS fees are approximately 2X those of its Colombian counterparts.
2. VCS fees are estimated to be between 4-8% of revenue, while Colombian standards may be between 1-4% of revenue.
3. VCS projects selling to Colombian markets may need a diversified sales strategy to sell to international buyers at higher prices to make up its higher fees. But the higher returns may more than compensate for these fees.
4. Lower fees do not imply that REDD activity development and implementation will be cheaper to develop, and will likely be similar in cost across the three methodologies.

METHODOLOGY RECOMMENDATION

Choosing the best VCS REDD+ methodology can be a complex process, particularly at the feasibility stage of carbon project development because the scope of the project is still not clearly defined and the project idea can still take many different directions.

Below is a simplified table created to visually depict how the available VCS REDD+ methodologies compare to one another. In practice, comparing these methodologies is complex because of a wide range of methodological differences between them that are too numerous to explain here. The 2013 publication "Project Developer's Guidebook to VCS REDD Methodologies" is still a useful document for more detailed comparisons between them and we recommend it as a supplementary resource (Conservation International, 2013).

TABLE A 8

Type	Criteria I	Criteria II	Criteria III	VM006 v2.2	VM007 v1.6	VM009 v3.0	VM0015 v1.1
Avoided emissions	Avoided deforestation	Planned					
		Unplanned					
	Avoided Degradation	Planned					
		Unplanned	Logging, etc.				
			Firewood for fuel/ charcoal				
Carbon stock enhancements	Assisted Natural Regeneration						
	Afforestation /Reforestation						

Conclusions

There are at least three different scenarios that are possible with the project, and each one results in a different methodology recommendation. We have identified these scenarios as follows.

1. **There are multiple scenarios for project development, and each one results in a different recommended VCS Methodology.** There is no one VCS methodology that fits all the feasible scenarios that could occur in this project. There are at least three different scenarios that are possible with the project, and each one results in a different methodology recommendation. We have identified these scenarios as follows.

2. **Selecting between VCS REDD methodologies should not be based on their compatibility with jurisdictional baselines.** Once Verra completes its scheduled updates sometime in 2022, it will provide a great deal of clarity for incorporating jurisdictional baselines into VCS project methodologies because Verra will be providing the GHG baseline to projects in these scenarios. The updated methodologies will likely utilize a new module for jurisdictional baselines. Therefore, selecting between VM0006, VM0007, VM0009, or VM00015 will be driven more by their ease of use, their applicability conditions, and allowable baseline scenarios, than whether they accommodate jurisdictional baselines easily or not.

Scenario 1: Avoided Unplanned deforestation only
This scenario involves only claiming avoided unplanned deforestation

TABLE A 9 VM0015 V1.1

Recommended Methodology	VM0015 v1.1
Description	VM0015 is exclusively oriented towards accounting for emissions from avoided deforestation, but it offers a wide range of flexibility for including various types of baseline scenarios as long as they ultimately lead to deforestation. Degradation emissions are conservatively excluded.
Baseline options	Baseline emissions must be projected in time and across space using different options for baseline emissions including simple historic emissions (the simplest). GIS is required to determine and justify spatial projections.
Justification	VM0015 offers the most streamlined approach for accounting for avoided emissions in either frontier or mosaic scenarios. There are few extra modules to use (only the Additionality and GHG significance test).
Risks	The upcoming update to include JNR baselines has not yet been finalized. Verra has indicated that all projects that wish to use project level methodologies under a jurisdictional baseline scenario are NOT allowed to do so until Verra has completed its updates, sometime in 2022. Other aspects of the methodology may be updated, but EP Carbon has no way of knowing this. As a result, there will likely be delays in project development for any new REDD+ in the world until Verra finalizes these updates, communicates them appropriately, and implements the changes.

Scenario 11: Avoided Unplanned deforestation and degradation

This scenario involves claiming avoided unplanned deforestation and degradation in one methodology.

TABLE A 10 VM0006 V2.2

Recommended Methodology	VM0006 v2.2
Description	VM006 is quite flexible in terms of its applications to a wide range of baseline scenarios. Most notably it is capable of accounting for unplanned degradation in its baseline. It can also account for carbon stock enhancements in areas that qualify as forests. This is different from reforestation since areas cannot be cleared of forest.
Baseline options	Baseline emissions must be projected in time and across space using different options for baseline emissions including simple historic emissions (the simplest). GIS is required to determine and justify spatial projections.
Justification	VM006 is the only VCS REDD+ methodology that currently allows projects to include emissions from unplanned degradation in their baseline. The project must qualify as "mosaic" deforestation to use it. In contrast, VM007 only allows for GHG credits from degradation from fuel-wood extraction, and not from logging.
Risks	The risks are similar to that of VM0015, please refer

Scenario III: Avoided Deforestation + Reforestation

This scenario involves claiming avoided unplanned deforestation as one project category, while developing a reforestation project in the eligible clearings caused by unplanned deforestation.

TABLE A 11

Potential Methodologies	VM007 v2.2
Description	• VM007 allows for a wide range of project categories including planned an unplanned deforestation, ARR, avoided wetland conversion and restoration of wetlands • These project categories can theoretically be combined under one project description (PD), thereby potentially saving validation/verification costs for complex projects with more than one project categories • Uses numerous modules to perform different tasks based on the project category
Baseline options	Baseline emissions must be projected in time and across space using different options for baseline emissions including simple historic emissions (the simplest). GIS is required to determine and justify spatial projections.
Justification	VM0007 is a flexible methodology and is the only one that could theoretically combine both avoided unplanned deforestation and reforestation into one project description.
Risks	**Due to unknown levels of project development risks in terms of costs and delays, it may be too risky to use this methodology for combining project categories until more information is provided by Verra concerning both JNR updates, and potential new updates for ARR.** There is uncertainty caused by JNR updates, see the "Risks" section under VM0015. Additional uncertainty is created because VM007 uses a CDM A/R methodology that

	may not be allowable after the new VCS ARR methodology is approved and the VCS Program rules are updated to specify the implications for projects using CDM A/R methodologies. There is no information available to allow EP Carbon to determine how this will play out. Therefore, we cannot fully endorse this methodology for a combined REDD + ARR project design based on the available information because of the unknown project development costs that could occur. ARR projects in general under VCS are in a state of uncertainty until the new ARR methodology is approved.

Other options for ARR

It is possible to develop an ARR project separately from REDD, even possibly using a different GHG Program like Gold Standard. The scenarios could unfold in the following ways.

- **Use a CDM A/R methodology under VCS, likely AR-ACM003.** Given the uncertainties with VCS's new ARR methodology, it is probable that using a CDM A/R methodology before the new VCS methodology is approved would result in the project eventually having to switch methodologies and incur extra costs.

- **Use the Gold Standard or ProClima to develop a reforestation project.** It is possible to use a different GHG program's methodology for A/R alongside a VCS methodology, but the cost implications of this would need to be assessed and it would raise the amount of complexity for the proponent in order to manage projects with various standards. A more detailed analysis of these reforestation scenarios is beyond the scope of this study.

ANNEX B. PROJECT DESIGN AND CONFIGURATION

GOAL

This document summarizes the recommendations concerning the REDD project design configuration for two (2) of the remaining seven (7) potential REDD project sites that are under consideration for development as voluntary REDD projects under the Innovative Conservation Models for Paramos and Forest Task Order. The two projects covered here are as follows:

1. Motilón Barí *Resguardo Indigena*
2. Gabarra La Catalaura *Resguardo Indigena*

The recommendations specify and justify whether a project is ideally suited for either a grouped project design, or as an individual project. This decision for a grouped project design maximizes flexibility in the size of the overall project crediting area for emission reductions, while minimizing project development costs over the project lifetime.

SUMMARY

EP Carbon recommends that the Motilón Barí Indigenous *Resguardo* and the Gabarra La Catalaura Indigenous *Resguardo* be considered under a grouped project design that utilizes the Catatumbo National Park as the overarching spatial boundary of the grouped project area, with the two reserves functioning as the first two project instances. Further subdividing the MB *Resguardo* into multiple crediting areas prior to project implementation could ease the risk of project development depending on the risk of deforestation, secured funding, and the management capacity and expertise of community authorities within different parts of the *resguardo*.

OVERVIEW

This document summarizes previous recommendations made by EP Carbon concerning optimal project configuration for each potential REDD project area within Intermediate Report v3.1 (previously submitted as Deliverable 7 of the Innovative Conservation Models for Paramos and Forest Task Order). There, the fourteen initial candidate sites under consideration as potential REDD projects for the voluntary market were evaluated for the purpose of recommending an optimal project design configuration. Although the project configuration analysis contained in the Intermediate Report focused on all 14 candidate project sites, seven of these sites had already secured financial and technical support from other organizations, and thus withdrew from consideration by the Innovative Conservation Models for Paramos and Forests program. This analysis focuses on the project configuration analysis pertaining to the MB and GC Indigenous *Resguardos* as one of the seven remaining candidate sites for REDD project development.

Choosing Individual vs Grouped Project Configurations

Many GHG standards, such as the Verified Carbon Standard, offer the ability for projects to choose from two types of project configurations: individual or grouped. The question of a grouped project design merits consideration when faced with resource constraints for project development and a desire to cut project development costs as much as possible. Any project area that is eligible as a REDD project can be designed as an individual project, provided it has secured the resources to do so. However, a grouped project configuration potentially confers some benefits similar to that of sub-national REDD approaches, as they can allow for streamlined collaboration across a network of regional stakeholders, potentially increasing a project's ability to mitigate GHG emissions in the context of avoided deforestation. This holds true so long as multiple stakeholder groups are open to such collaboration and agree on an equitable benefit sharing mechanism. Moreover, the grouped project design is also a pathway for applying a national/sub-national jurisdictional baseline to multiple project areas, which applies to the Colombian context.

Individual projects

Individual projects are project areas whose spatial limits are defined and fixed at project validation, do not change during the project lifetime, and have a crediting baseline and monitoring plan which applies only to that project area. For example, if an indigenous reserve in Colombia decided to recognize its deforestation reduction efforts as a GHG mitigation project and apply it under the Verified Carbon Standard, the eligible forest area that generates credits would be identified at project validation, and it would have an associated GHG baseline/monitoring plan that applied only within the spatial limits of this same defined project area, and remained fixed for the entire crediting period. There would not be an opportunity to expand the project to surrounding areas.

Grouped Projects

A grouped project is a configuration that allows additional project activity instances (crediting areas) to join the same project design after project validation (project design approval), as conditions permit, provided that the new project instances meet pre-established eligibility criteria. In this case, a broader geographic area is chosen for project development, such that the governance structures, land-use patterns, stakeholder groups, and any other relevant criteria are similar enough for multiple project instances that fulfill eligibility criteria outlined at validation to use the same baseline conditions, project activities, and monitoring plan. Any new project instances added after validation do not need to undergo individual validation or treatment as individual projects. In this way, a project lowers its project development costs through economies of scale, whereby project validation and related costs only occur once, ultimately decreasing costs across the project lifetime. For example, if a region contains multiple indigenous reserves, the baseline assessment and crediting baseline could be established at a jurisdictional level, or a broader spatial boundary like an ecological boundary, such that one indigenous reserve

is validated initially, while other reserves fulfilling eligibility criteria are added to the same project design in the future at verification.

Grouped projects must comply with the Grouped Project requirements under VCS as described in 3.5.8-3.5.19 of the VCS Standard. These requirements are very similar to those under ProClima and CerCarbono. The requirements have been included in Table B 2 exactly as listed in the VCS v4.1. A summary of the most important grouped project requirements is listed below:

TABLE B 1 SUMMARIZED GROUPED PROJECT REQUIREMENTS (FROM VCS 4.1)

Baseline Scenario and Additionality

- A grouped project must be developed within a defined geographic area and have an associated polygon that functions in a Geographic Information System (GIS). A single baseline scenario and additionality assessment must be applicable to a grouped project area in accordance with the selected methodology.
- The first project instances are used to demonstrate the baseline and additionality of the project and must be shown and described at validation. Future project activity instances may be described at validation as long as they can be identified geographically and have enough supporting documentation to be fully evaluated at validation.
- If a grouped project area is presented as part of the project with no project activity instances, this can only be done with proof that they are subject to the same baseline scenario and additionality arguments as those demonstrated by the first project instances.
- A project may include multiple different strategies for mitigating greenhouse gases in one project design (REDD, A/R, Clean cookstoves, etc.), but the project description must clearly show which activities occur in which grouped project areas. Different methodologies can be used to quantify different aspects of the project design in one Project Description.

Eligibility Criteria

- Grouped projects must define a set of eligibility criteria per project activity (REDD, A/R, etc.) that new project instances must comply with to enter into the project. The criteria must ensure that project instances meet the applicability conditions, use the same measures as previous instances to achieve project goals, have the same baseline and additionality characteristics.

Adding New Project Activity Instances

- Any new instance must occur within the grouped project boundary
- New instances added after validation must be described and justified fully in the monitoring report at a verification event, including eligibility criteria, project ownership, project activity descriptions and implementation descriptions.

- If adding a new instance requires adding a new proponent to the project not established at validation, an AFOLU project has five years the addition of the new project activity's start date to finish adding new project instances. Otherwise instances can be added at any time during the project lifetime.

Risks and Leakage

- Non-permanence risk is addressed at the level of the grouped project geographic area, but if certain risks are applicable to sub-sections of this grouped project area, the area can be divided, and each division is analyzed separately for non-permanence risk and presented accordingly in a monitoring and verification report and applies to the respective instances in that sub-division.
- Leakage assessments must follow the requirements of the standard and project are encouraged to take mitigations measures to minimize leakage (activity-shifting, market, ecological)

Project Description Requirements

- A grouped project is described in one Project Description and must clearly identify the geographic area where all project instances will be added.
- Baseline and additionality assessments must be presented in accordance with each methodology used
- Eligibility criteria must be clearly established and mentioned
- The GHG information system that tracks the project must be described

TABLE B 2 - VCS GROUPED PROJECT REQUIREMENTS (FROM VCS 4.1)

Baseline Scenario and Additionality

3.5.8 Grouped projects shall have one or more clearly defined geographic areas within which project activity instances may be developed. Such geographic areas shall be defined using geodetic polygons as set out in Section 3.10 below.

3.5.9 Determination of baseline scenario and demonstration of additionality are based upon the initial project activity instances. The initial project activity instances are those that are included in the project description at validation and shall include all project activity instances currently

implemented on the issue date of the project description. The initial project activity instances may also include any planned instances of the project activity that have been planned and developed to a sufficient level of detail to enable their assessment at validation. Geographic areas with no initial project activity instances shall not be included in the project unless it can be demonstrated that such areas are subject to the same (or at least as conservative) baseline scenario and rationale for the demonstration of additionality as a geographic area that does include initial project activity instances.

3.5.10 As with non-grouped projects, grouped projects may incorporate multiple project activities (see Section 3.5.1 – 3.5.3 for more information on multiple project activities). Where a grouped project includes multiple project activities, the project description shall designate which project activities may occur in each geographic area.

3.5.11 The baseline scenario for a project activity shall be determined for each designated geographic area, in accordance with the methodology applied to the project. Where a single baseline scenario cannot be determined for a project activity over the entirety of a geographic area, the geographic area shall be redefined or divided such that a single baseline scenario can be determined for the revised geographic area or areas.

3.5.12 The additionality of the initial project activity instances shall be demonstrated for each designated geographic area, in accordance with the methodology applied to the project. Where the additionality of the initial project activity instances within a particular geographic area cannot be demonstrated for the entirety of that geographic area, the geographic area shall be redefined or divided such that the additionality of the instances occurring in the revised geographic area or areas can be demonstrated.

3.5.13 Where factors relevant to the determination of the baseline scenario or demonstration of additionality require assessment across a given area, the area shall be, at a minimum, the grouped project geographic area. Examples of such factors include, inter alia, common practice; laws, statutes, regulatory frameworks or policies relevant to demonstration of regulatory surplus; determination of regional grid emission factors; and historical deforestation and degradation rates.

Capacity Limits

3.5.14 Where a capacity limit applies to a project activity included in the project, no project activity

instance shall exceed such limit. Further, no single cluster of project activity instances shall exceed the capacity limit, determined as follows:

1) Each project activity instance that exceeds one percent of the capacity limit shall be identified.

2) Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not within one kilometer of any other instance shall not be assigned to clusters.

3) None of the clusters shall exceed the capacity limit and no further project activity instances shall be added to the project that would cause any of the clusters to exceed the capacity limit.

Eligibility Criteria

3.5.15 Grouped projects shall include one or more sets of eligibility criteria for the inclusion of new project activity instances. At least one set of eligibility criteria for the inclusion of new project activity instances shall be provided for each combination of project activity and geographic area specified in the project description. A set of eligibility criteria shall ensure that new project activity instances:

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

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

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

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

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

Note – Where grouped projects include multiple baseline scenarios or demonstrations of additionality, such projects will require at least one set of eligibility criteria for each combination of baseline scenario and demonstration of additionality specified in the project description.

Inclusion of New Project Activity Instances

3.5.16 Grouped projects provide for the inclusion of new project activity instances subsequent to the initial validation of the project. New project activity instances shall:

1) Occur within one of the designated geographic areas specified in the project description.

2) Comply with at least one complete set of eligibility criteria for the inclusion of new project

activity instances. Partial compliance with multiple sets of eligibility criteria is insufficient.
3) Be included in the monitoring report with sufficient technical, financial, geographic and other relevant information to demonstrate compliance with the applicable set of eligibility
criteria and enable sampling by the validation/verification body.
4) Be validated at the time of verification against the applicable set of eligibility criteria.
5) Have evidence of project ownership, in respect of each project activity instance, held by the
project proponent from the respective start date of each project activity instance (i.e., the date upon which the project activity instance began reducing or removing GHG emissions).
6) Have a start date that is the same as or later than the grouped project start date.
7) Be eligible for crediting from the start date of the instance through to the end of the project
crediting period (only). Note that where a new project activity instance starts in a previous
verification period, no credit may be sought for GHG emission reductions or removals generated during a previous verification period (as set out in Section 3.4.4) and new instances are eligible for crediting from the start of the next verification period.

Where inclusion of a new project activity instance necessitates the addition of a new project proponent to the project, such instances shall be included in the grouped project within two years of the project activity instance start date or, where the project activity is an AFOLU activity, within five years of the project activity instance start date. The procedure for adding new project proponents is set out in the VCS Program document *Registration and Issuance Process*.

AFOLU Projects

3.5.17 AFOLU non-permanence risk analyses, where required, shall be assessed for each geographic
area specified in the project description (for requirements related to geographic areas of grouped projects see the VCS Standard). Where risks are relevant to only a portion of each
geographic area, the geographic area shall be further divided such that a single total risk rating
can be determined for each geographic area. Where a project is divided into more than one
geographic area for the purpose of risk analysis, the project's monitoring and verification reports shall list the total risk rating for each area and the corresponding net change in the
project's carbon stocks in the same area, and the risk rating for each area applies only to the
GHG emissions reductions generated by project activity instances within the area.

3.5.18 Activity-shifting, market leakage and ecological leakage assessments, where required, shall be
undertaken as set out in Section 3.14.5 – 3.14.15, and the methodology applied, on the initial group of instances of each project activity and reassessed where new instances of the project activity are included in the project.

Project Description for Grouped Projects

3.5.19 A grouped project shall be described in a single project description, which shall contain the following (in addition to the content required for non-grouped projects):

1) A delineation of the geographic area(s) within which all project activity instances shall occur. Such area(s) shall be defined by geodetic polygons as set out in Section 3.10 below.

2) One or more determinations of the baseline for the project activity in accordance with the requirements of the methodology applied to the project.

3) One or more demonstrations of additionality for the project activity in accordance with the requirements of the methodology applied to the project.

4) One or more sets of eligibility criteria for the inclusion of new project activity instances at subsequent verification events.

5) A description of the central GHG information system and controls associated with the project and its monitoring.

METHOD

The Intermediate Report v3.1 arrived at its project configuration recommendations by evaluating whether the candidate project sites generally fulfilled the grouped project criteria mentioned in Table B 1. Our initial recommendations and observations remain unchanged; however, more detail is provided here based on additional information gathered since the Intermediate Report was written. This additional information was matched against a formalized matrix of Spatial and Non-Spatial factors identified in Table B 1.

Spatial and Non-Spatial Factors requiring consideration for a grouped project design are formatted as a positive-list, the fulfillment of which suggests a grouped project configuration is appropriate. A project must satisfy at least one of the Spatial Factors, and all of the Non-Spatial Factors in order to achieve a strong candidacy for a grouped project. Otherwise, an individual project configuration is likely more appropriate. Other situations and factors not listed here are possible, which could ultimately dictate a project's configuration decision. These criteria are only meant to capture the most likely scenarios that contribute to a grouped project configuration.

TABLE B 3. GROUPED PROJECT SELECTION CRITERIA

	Criteria	Discussion
Spatial Factors	1. Multiple potential GHG crediting areas close together, AND/OR	Having multiple crediting sites close to one another suggests the potential for developing a shared baseline assessment under a grouped project configuration. The final decision will depend on: 1) Degree of similarity in ecosystems/geophysical factors; 2). How similar the baseline conditions are

		between them that are driving land use change; 3) The degree of similarity in resource governance structures and land management values.
	2. One large potential GHG crediting area (one proponent), AND/OR	A large crediting area could be divided up into separate crediting areas (project instances) depending on the proponent's management capacity and how the risk of future deforestation is distributed across the area. Either one, or a combination of these two factors, creates a situation in which dividing up the potential crediting area into smaller project instances allows the project to expand in proportion to the proponent's growing level of expertise and success at reducing deforestation with a smaller number of initial project instances.
	3. Potential future changes to a crediting area's spatial boundaries	A grouped project configuration could allow for expansions in the crediting area at a lower cost when there is a chance the project area's spatial boundary could change substantially over time, and such changes encompass areas of new land that are comparable in ecosystem, governance, and levels of risk of land use change
Non-Spatial Factors	4. Similar ecosystem/geophysical factors across crediting area(s), AND	Constructing and justifying shared baseline conditions and future trends across project area sites should occur across similar ecosystems and geophysical characteristics. These are the underlying factors that shape the types of land uses and land cover types that are possible on the land. Further, sharing ecological/geophysical characteristics such as soils, hydrology, slope, ecosystems, permits a unified approach to baseline GHG accounting and monitoring. Excessive differences in these factors may suggest an individual project design is preferable.
	5. Similar agents and drivers of land use change across a large potential crediting area, multiple proponents, AND	Having similar agents and drivers of land use change across a significant spatial area facilitates a grouped project approach when such an area is large enough, and multiple possible project proponents are present. This suggests the potential for a shared GHG baseline assessment, as well as developing a common and coordinated approach for activities to mitigate GHG emissions.
	6. Common governance structure	Exploring a grouped project structure here is warranted since the same legal framework and overarching governance system would theoretically

	between potential crediting areas	apply to multiple project areas at once. This applies both to the jurisdictions that contain the project areas, as well as to governance at the level of individual properties. If governance structures are the same within a jurisdiction but substantially different at the property level, a developer would have to assess how compatible the various properties' governance structure and values concerning land management are with one another's goals, and whether a grouped project design would facilitate or hinder project development depending on the compatibility between stakeholders and their governance systems.

RESULTS AND ANALYSIS

I. RI Motilón-Barí + RI La Gabarra-Catalaura

Configuration recommendation: Grouped Project

Although it is possible to develop each project area individually, EP Carbon recommends a grouped project for MB and GC. There are three spatial factors and three non-spatial factors that contribute to this decision, the details of which are analyzed in Table B 3 and summarized below.

Spatial Factors

This spatial and jurisdictional arrangement between the Motilón Barí and Gabarra – La Catalaura *Resguardos* and the Catatumbo National Park favor a grouped project arrangement to more effectively reduce deforestation through common strategies and shared responsibilities, provided the stakeholders can reach terms to successfully collaborate with one another. The spatial limits of both reserves are encompassed by the Catatumbo National Park, are in close proximity to one another, and are both registered indigenous reserves. These conditions have the potential for creating efficiencies that could improve the project development process. This includes the total time and cost of establish a framework for project governance, delineating clear roles and responsibilities, and developing benefit sharing agreements between the respective communities and the Catatumbo National Park authorities, which could take less overall effort to establish collectively than as the *resguardos* as separate projects.

Non-Spatial Factors

There are important non-spatial factors that contribute to the grouped project design recommendation as well. Since the communities involved are from the same ethnic group (the Barí peoples), although each *resguardo* has a separate General Assembly, the potential commonalities between how these structures function, as well as the shared heritage between them, would make for a stronger and more effective project design were they to collaborate together. Furthermore, the *resguardos* share a broadly similar ecotype which facilitates carbon accounting methodologies, although the wide altitudinal range

within the park merits an analysis of whether further stratification of carbon stocks based proportional changes in forest type is necessary. Lastly, both areas share similar agents and drivers of deforestation and according to recent community workshops, are keen to confront them in a collective fashion. Therefore, project development costs could be reduced by following a holistic strategy to decrease deforestation that could apply to both reserves.

The grouped project design offers some flexibility during the project development process in the event that unforeseen challenges hamper one reserve's project development pathway more than another. In such a case, the grouped project design would allow at least one of the reserves to move forward as the first project instance, while allowing the second, and any future instances to join the project at a later verification event, once any challenges are overcome. In addition, it is possible to subdivide the large MB reserve into different crediting areas depending on the nature of the deforestation risks/agents/drivers and as the available capacity and expertise to manage the project evolves. This would allow subsections of the MB reserve to move forward with crediting if conditions warrant it. Moreover, there are several proposals to expand the legal territory of the Barí peoples which could expand the spatial boundaries by more than 200k hectares and to areas with higher risks of deforestation. If the changes in the legal titling of Barí territory were to occur, a grouped project design would allow the project to add these areas at a lower cost to the project, without having to incur additional and more costly validation audits.

TABLE B 4 GROUPED PROJECT ASSESSMENT – GC + MB INDIGENOUS RESERVES

	Criteria	Result	Discussion
Spatial Factors	1. Multiple potential GHG crediting areas close together, AND/OR	✓	Both reserves are located relatively close to one another within the boundaries of the Catatumbo National Park, with the larger MB reserve two encompassing 108k ha with over 20 Barí communities, and the smaller GC reserve of 13k Ha, with two Barí communities. Deforestation risks could be addressed in a unified manner as a grouped project, and allows flexibility to add other instances.
	2. One large potential GHG crediting area (one proponent), AND/OR	✓	The Catatumbo National Park encompasses both indigenous reserves for the Barí people, which together occupy the majority of the national park. Although resource rights, and management responsibilities as related to carbon project development between the national park and the respective communities must be clarified, in theory, the laws and regulations of the park apply to the reserves similarly and could allow for more efficient and effective project activity execution.
	3. Potential future changes to a crediting area's spatial boundaries	✓	There are at least two major initiatives to expand the legal boundaries for the Motilón Barí peoples, indigenous reserve by more than 200,000 ha, which currently conflicts with a proposal to create an adjacent reserve

			for non-indigenous farmer communities. A grouped project design would allow the project to integrate a change in the legal boundary at a lower cost to the project by avoiding a re-validation audit to address the spatial boundary change, should it occur in the future.
Non-Spatial factors	4. Similar ecosystem/geophysical factors across crediting area(s), AND	✓	The Catatumbo National Park is situated on the Eastern Andean Slopes near the border between Colombia and Venezuela and encompasses an altitudinal range of between 70-2000m above sea level. This broadly covers Tropical Humid Forest of the Catatumbo Tropical Humid Zonobiome (warm-superhumid and warm-humid climate), more broadly, moist tropical montane forest. though more subtle forest type definitions are possible based on elevation and geomorphological characteristics to be clarified in the future
	5. Similar agents and drivers of land use change across a large potential crediting area, multiple proponents, AND	✓	Both reserves share similar agents and drivers of deforestation, and consider them as a collective threat to the Barí peoples' way of life. These include: illicit crop cultivation, large-scale cattle ranching, timber extraction, and mining. Non-indigenous community members including farmers and migrants, as well as armed groups, are believed to be the driving force behind these non-forest land-uses. Meanwhile, the Barí community is responsible for smaller scale land use change including timber extraction, fuel wood extraction, and creating new settlements.
	6. Common governance structure between potential crediting areas	✓	Both reserves are located within the Catatumbo National Park, and both project areas within the reserve are registered Indigenous Reserves for the Barí peoples. Therefore both reserves are bound by a similar regulatory structure (the national park), and as sister reserves for the Barí people, they each confer ultimate decision-making authority onto their own *Asamblea General* (General Assembly) where all members of the community ages 12 and older from each *resguardo* can vote on key decisions, while official representation to outside interests is delegated to the Ñatubaiyibarí – the Association of Traditional Authorities of the Barí people (*Asociación de Autoridades Tradicionales del Pueblo Barí*). These institutions represent the collective interests of the two reserves

LIMITATIONS AND CHALLENGES

Several limitations and challenges exist pertaining to the grouped project configuration at this stage in the project's evaluation. They are listed as follows

- **There is a lack of clarity concerning the future of the proposed areas of expansion and whether they might be legally recognized.** Given the length of time that has already transpired concerning the Bari expansion areas within the Colombian judicial system, there is significant uncertainty as to whether any area of proposed expansion area could be legally titled within the project lifetime and whether the manner in which titling occurs would allow for participation in an existing REDD project. Provided the legal titling of the area continued to recognize the existing authorities of the Barí peoples, a grouped project design encompassing the entire Catatumbo Park could afford the Barí people some flexibility to eventually add all areas of the park under the same project design.

- **Uncertain collaboration potential between the Motilón Barí *Resguardo*, the Gabarra-La Catalaura *Resguardo*, and the Catatumbo National Park authorities.** Effective collaboration between these stakeholders would improve REDD+ outcomes at the level of the national park, however, the actual willingness to collaborate in a joint REDD+ project is less certain.

- **As long all of the potential proponents the project are officially identified at the project start, the project would be unlikely to face constraints by the VCS rule that grouped project areas incorporate new project areas within 5 years if new proponents are added to the design after validation**. Current VCS rules state that all the potential constituent governing units of the REDD project are properly recognized at validation, project area instances could be added at any time provided they are done so in financially viable manner (VCS Standard 3.5.16). Therefore, as long as all current and future stakeholders were identified as project proponents at the beginning of the project, any number of project instances could be added to the grouped project design during the lifetime of the VCS project.

- **Policy differences between municipalities may affect the project's governance structure and project activity design and are currently unknown.** The land use policy differences between the municipalities that are contained within the Catatumbo National Park and the *Resguardos* need to be systematically identified and analyzed to determine whether and how they might affect the project's governance structure, operations, and benefit sharing mechanisms. We emphasize that the grouped project design is simply a means for cutting project development costs and cultivating efficiencies and effectiveness of project activities across different crediting areas. It is only a recommendation, as any project can choose to become an individual project should the requisite financial and technical resources be available to do so.

CONCLUSIONS

The MB and GC Indigenous Reserves are in a strong position to leverage the benefits of a grouped project design. This design confers maximum flexibility to establish REDD crediting areas in a way that aligns with the evolving technical, managerial, and administrative capacities of local communities and government authorities. In addition, the grouped project design would reduce project development costs by benefiting through economies of scale. Savings would likely occur through sharing common fixed costs, such as including the preparation of only one project description document (PDD) for all project areas vs. having each crediting area have its own PDD. In addition, project areas would share a common GHG baseline assessment and monitoring plan, and would likely establish and prove resource rights in a similar way. Having shared project strategies for reducing deforestation in conjunction with the National Park, authorities would introduce additional efficiencies, particularly in terms of the costs incurred to establish such agreements, but could also drive higher effectiveness at reducing deforestation through streamlined coordination mechanisms. Validation and verification costs would also see a reduction by having only one validation audit for all current and future project instances, while using less costly verification audits to review current project instances, as well as any new instances that might be developed. These savings would expand if additional areas were added in the future beyond the two initial reserves, which is a potential scenario for the Barí people considering the ongoing process to expand legal titling of additional areas within the national park. EP Carbon therefore recommends a grouped project approach encompassing both the MB and GC Indigenous Reserves, ideally by conducting a baseline assessment and structuring the project design at the level of the entire national park, with the reserves acting as the first two project instances, though either reserve, particularly the larger MB reserve, could subdivide into smaller crediting areas if conditions warranted it.

ANNEX C. PROJECT SCENARIO

GOAL

The goal of this analysis was to compile, organize, and analyze the agents and drivers of deforestation to inform project activity design.

CONTEXT AND METHOD

There have been various occasions in the recent past to formulate project activities that address issues of concern within the *resguardos*, and in the PNN Catatumbo Barí. This section discusses several proposed activities, compares their alignment with the identified agents and drivers of deforestation, and offers some considerations for future project design. For the purposes of this study EP Carbon compiled and reviewed the results of a workshop with Barí community members we conducted, and also reviewed the outputs of the PDET Roadmap of Priority Initiatives led by ART, as well as the *Ichidji Ya Ababi: "Something Ours": Life Plan of the Barí Territory*. Taken together these sources form a valuable set of ideas and principles from which to formalize a REDD+ project design strategy.

PDET ROADMAP of PRIORITY INITIATIVES (ART)

The implementation of the Peace Agreement signed by the national government in 2015 involves addressing the causes of the conflict. One mechanism for achieving this is by transforming the territories most affected by it, starting by restoring the rights of the victims. This policy involves coordinating stakeholders at different jurisdictional levels including state authorities, the private sector, and the international community, in order to respond to the needs of the communities that have been historically affected by violence.

In compliance with the above, ART convened communities from 16 territories severely affected by the armed conflict in order to build Development Programs with a Territorial Approach (PDET). These are participatory planning and management tools that integrate the communities' own vision for their development (Agencia de Renovación del Territorio, 2020) and the documents developed for the Barí communities have been compiled and analyzed here.

During this process, the construction of a roadmap, which is defined by ART as a tool that identifies the different initiatives generated in the participatory planning process, is essential. The Joint action plans that guide the implementation of the PDETs also need to be further coordinated. This will ensure all proposed initiatives and responsible parties are identified and can obtain programming and funding within 15 years (Agencia de Renovación del Territorio, 2020). The roadmap will be a valuable tool to further identify and prioritize activities that can be facilitated at different phases of the REDD projects.

ICHIDJI YA ABABI: "SOMETHING OURS": LIFE PLAN OF THE BARÍ TERRITORY

A REDD+ project design is highly compatible with the vision laid out by the community and can be readily incorporated into to ensure the activities and outcomes are adding to their collective goals and values. The Life Plan of the Barí territory proposes seven areas of self-development: territory, organization, economy, housing, education, health, and culture, aimed at defining priorities to guarantee the well-being of the Barí people. According to the Life Plan, various situations put the survival, culture and quality of life of the Barí people at risk: 1) The armed conflict, 2) the rise of illicit crops and associated colonization, 3) exploration and exploitation of minerals and hydrocarbons, 4) the Proposed Catatumbo Campesino Reserve Zone project, since it is considered by the Barí people that the prospective reserve overlaps ancestral Barí territory), 5) the lack of commitment for the implementation of projects by mayors and the Government of Norte de Santander, and 6) the actions of political and religious groups that have divided the traditional authorities. For the Barí people, the recognition of the Black Line boundary is fundamental, which encompasses the area considered as ancestral territory (Centro Nacional de Memoria Historica, 2018)

The REDD+ activities that have been compiled here should be reviewed by the Bari against their life plan and other management plans in order to identify and prioritize activities that could be implemented as a part of a REDD+ project.

ANALYSIS OF PROPOSED ACTIVITIES

Natural Resource Governance

Natural resource governance activities are the foundation for effective project activity design and implementation that will meet the community development and conservation goals of the Barí communities within the *resguardos.* To this end, numerous activities have been proposed, especially through ART, the most important of which is to create and update management plans that rely heavily on participatory processes with local communities to do so. This management plan would serve as the main strategic and operational document for identifying and implementing priority activities that will bring the communities and park authorities toward priority conservation and development goals, including REDD.

A number of other activities have been proposed to strengthen natural resource governance. The goals of the proposed activities are generally aligned and compatible with REDD+ concepts and consist of sustainable community development, land use, and livelihood options; reducing and mitigating the effects of illegal land uses; and conserving and restoring habitat and wildlife. More specific proposed activities include zoning the reserve for different land uses and conservation statuses, establishing conservation agreements with unsanctioned land users, recuperation and knowledge transmission of ancestral land use practices, conflict resolution, and strengthening co-governance and articulation with relevant state institutions. These activities will not directly reduce GHG emissions themselves, but will be important for establishing and building important

relationships and agreements between stakeholder groups that will determine the success of other proposed activities that are designed to generate direct reductions in GHG emissions.

Considerations

- The inclusion of a REDD+ project in the *resguardos* will likely require that pre-existing plans for *resguardo* management such as the Catatumbo-Barí National Park Management Plan, the Barí Life Plan, should be consolidated, harmonized, or otherwise updated to accurately reflect updated activities, agreements, and measures that that are based on the conscious management and monitoring of carbon stocks, GHG emissions, and community development indicators.
- A review of options for legal or policy changes at local, departmental, or national levels that may contribute to GHG reductions may present additional options for reaching key goals, and are currently absent from the information EP Carbon was able to obtain
- Several potentially important governance activities have currently only been mentioned in general terms and not elaborated further. This includes the idea of establishing conservation agreements with certain land users, and increased cooperation and relationships with institutions.
- Utilizing participatory planning processes in governance activities has figured prominently in the ART documentation, but the process and timeframe for doing so will have to be carefully assessed and planned against the needs and timelines of a REDD+ project development timeline.

Restoration and Reforestation

The ART Ficha for Forest Resource Uses, outlines a robust proposal for promoting restoration and reforestation strategies that address multiple goals. These goals include targeting illegally cleared or degraded areas to restore habitat and wildlife corridors, recuperating tree diversity to promote wildlife populations, promoting agroforestry systems for climate-friendly livelihoods, and establishing managed wood lots for fuel and building materials. Some of these activities could have the scale needed to design a creditable GHG removal project to generate additional revenue particularly habitat restoration but require more detailed analysis and planning to determine this more certainty.

Considerations

- Restoration activity success depends heavily on completing governance activities such as land use zoning and enforcement to maximize its potential and prioritize each activity type over time
- A more detailed assessment is needed to precisely whether the restoration activities can produce credits for GHG removals. This would include identifying

    - Developing digital maps of all the areas targeted for restoration areas, and identifying the type of restoration activity they could be associated with
    - Demonstrating the eligibility of these areas to be restored under a REDD+ activity. Includes an analysis of why and when native ecosystems were cleared, and by which types of land users, describing/measuring existing conditions, size, location, and eligibility of each area
- Wherever possible, using passive natural regeneration as a restoration strategy will likely be the most cost effective, climate-resilient option for future crediting
- Restoration strategies for different sites must be effectively differentiated, designed, and communities must be trained to implement them. Some areas may require more costly restoration strategies depending on the level of land degradation from previous land uses and distance from forests and seed sources.
- An enforcement plan for addressing unsanctioned or illegal land uses that currently occupy areas targeted for restoration needs to be developed. Although the ART Ficha expresses the desire to restore illegally cleared areas with vegetation, it does not describe a plan and process for addressing specific illegal land users and land uses.
- There is no formalized plan in place for minimizing the threat from existing agents and drivers of non-forest land uses - including unmanaged or illegal cattle, agricultural expansion, or from illicit crops - to areas undergoing restoration activities. Previously cleared areas have a higher risk of being re-cleared again given they are less costly to clear than mature forest. The current ART proposal does not clearly identify or address this.
- Reforestation strategies that are intended for community benefit, such as managed woodlots, may be difficult to develop as a creditable carbon project due to the small scales that have been proposed (less than 100 ha). These will also require a significant amount of local capacity building to maximize and assure their productivity and value

Wildlife Management

A major concern for the communities is the decreasing wild game populations in the area, causing hunters to venture farther away from their homes and spend more time finding game, which is an ancestral basis for food security. This is the result of the combined pressures of habitat loss and fragmentation, unmanaged hunting by various stakeholder groups including colonos, and ongoing food security demands. To address this, there is a concept note formalized by ART to create a wildlife management plan to ensure the populations of wild game species, particularly tapir (*Tapirrus terrestris,* or "danta"), peccary *(Pecari tajacu* and *Tayassu pecari,* or "zainos"), and black-fronted wood quail (*Odontophorus atrifrons,* or "perdiz carinegra") can be protected, managed, and harvested at sustainable levels.

The concept note also proposes establishing habitat corridors between protected areas and to enrich specific plant species, such as certain seed-bearing plants, on which these species feed. These activities could improve the communities' food security by sustaining an important protein source as well as protecting biodiversity and providing habitat to both the target species as well as other potentially threatened species in the area. The restoration activities could potentially be part of a REDD+ crediting program for GHG removals if the scale of the restoration efforts are large enough, and the pressures from illegal land users and land uses to re-clear these restoration areas can be effectively reduced.

Considerations

- Wildlife and wildlife habitat restoration is an important part of forest and biodiversity conservation and local livelihoods that could be an important part of a portfolio of REDD+ activities, provided that
    - The ideas in the ART Ficha be developed and explained at a level of detail sufficient to implement them.
    - Community members are effectively trained to implement and monitor the activities.
    - Clear monitoring indicators, methods and procedures for monitoring can be established, including indicators of wildlife population health.

- The likelihood that the restoration component of wildlife management can be a creditable activity for REDD-based payments will depend on:
    - The participatory land-use zoning process described in "Natural Resource Governance" includes conservation areas for wildlife as well as a plan, with maps, for establishing restoration corridors.
    - See considerations for "Restoration and Reforestation."

Improved Land-Uses

Sustainable forest management (SFM) practices and improved cattle management were both identified as areas for improving current land use practices. The former is articulated to some degree in the ART Ficha, while the latter was only mentioned as an idea during the EP Carbon workshop.

SFM is described in the ART Ficha as a broad approach for addressing unsustainable forest uses, and is described primarily as a means for controlling forest degradation from selective logging and unsustainable fuelwood consumption. The current proposal for SFM will depend on the land use planning processes that are utilized when the environmental management plan is updated, and will depend on the land use planning and zoning decisions that are determined during that process. It also describes establishing managed wood lots and training community members to implement and maintain them (see Restoration and Reforestation). The SFM proposal also mentions establishing wood mills as a means for promoting alternative livelihoods (see Alternative Livelihoods).

The idea for improved cattle management is not mentioned in an ART Ficha, and instead only appeared as an idea mentioned in the EP Carbon workshop as a possible activity to diminish the impact of cattle production conducted by campesinos. As a result, the activity has no further details or plans associated with it, and no further information exists concerning how the activity might be put into use when illegal cattle are present in the *resguardos*. Improved cattle management practices may be an option depending on how difficult it is to remove illegal cattle from the *resguardos*. If cattle cannot be removed, practices to limit their impact and further expansion will be necessary to consider. They may also be desirable to develop if there are *legal* cattle within the *resguardos*, a point around which there is some uncertainty.

<u>Considerations</u>

Forest Uses

1. The time-horizon for successful SFM requires long-term planning, implementation, and sustained continual management over the long-term to be successful. This can be a challenge when there are pressures for short-term income is a higher priority. Short-term economic needs will also need to be considered in an SFM plan, particularly the flow of non-timber forest products.

2. There is not a clear vision yet for whether the Barí would be interested in harvesting valuable timber species using SFM by formalizing sustainable community forest enterprises. The ART Ficha identifies a goal of restoring 320 ha of native forest for "conservation and sustainable use of species of socioeconomic value" and outlines a process for identifying and restoring them. However, there is no mention as to whether SFM will be used to manage and continue harvesting timber species in general, whether it will be limited to managing woodlots, and whether SFM might be a broader strategy to address unsustainable or illegal selective logging in areas beyond the initial 320 ha that have been proposed. Community Forest Enterprises are a concept that has been used in other parts of the tropics to incentivize the protection of forest resources based on the sustained long-term value it has versus short-term income made by non-forest land uses. This topic requires further investigation.

3. Non-timber forest products are important to the Barí, especially for handicrafts. An SFM plan must include management plans for non-timber forest products, including inventories, estimations of sustainable yields, and monitoring processes. This has only been implied in the ART Ficha and will be important for securing sustainable raw materials for handicrafts (See Alternative Livelihoods).

4. Financing for SFM activities can be challenging and difficult to obtain. No mention has been made as to whether any policy or advocacy for improving access to finance for SFM is needed or relevant.

Non-forest Land Uses

5. Improving cattle management may be an important activity to limit further damage from existing areas of cattle production, but this has not been addressed in ART Fichas. In particular, it may prove to be an important activity to implement in areas where campesinos/colonos have been authorized to have cattle so as to reduce encroachment into the *resguardos*.
6. The impact of subsistence agriculture by the Barí on forest loss is likely to be significant, as well as for campesinos. Sustainable agricultural practices were not identified as a potential activity in the ART Fichas, and this may be a gap that needs to be investigated further, as it has significant implications for avoiding additional forest loss and related GHG emissions.

Monitoring and Enforcement

Monitoring and enforcing land use policies and regulations is an important element of natural resource management, however this has only been mentioned in a limited way in the ART Fichas, though it was raised during the EP Carbon workshop. Currently, there are only two mentions of such activities in the *resguardos*. The first pertains reclaiming and reforesting illegal clearings, and the second pertains to promoting participatory monitoring and enforcement with communities. The process and strategy for reclaiming lands or monitoring and enforcing them with community involvement was not elaborated upon in the ART Fichas. These ideas were also mentioned to EP Carbon, but no further plans for doing so were identified, suggesting that updated monitoring and enforcement processes may need to be developed. The ART Fichas contain numerous maps that indicate that monitoring of deforestation and illicit crops is ongoing, but it no further discussion or plans have been identified that articulate a monitoring and enforcement strategy specifically for REDD+.

<u>Considerations</u>

1. A specific exercise may need to occur in order to gather and evaluate the current monitoring and enforcement strategies, and the roles and responsibilities between indigenous, civil and governmental stakeholders for the *resguardos* concerning illegal and unsanctioned land uses.
2. A high degree of project effectiveness can likely only be justified if there is a coherent strategy for monitoring and enforcement of illegal land uses.
3. There is likely to be a high level of risk to anyone associated with monitoring and enforcement activities.

Alternative Livelihoods

The ART Fichas propose establishing sustainable community enterprises as a means for supplementing income in an environmentally sustainable way, and as an alternative to some of the economic activities that are currently causing deforestation and forest degradation within the MB and GC RIs. The specific ideas for enterprise development include formalizing and commercializing traditional handicrafts (e.g. baskets, mats) made by women's organizations through training in entrepreneurship and marketing, and

utilizing and marketing non-timber forest products, particularly those used in handicrafts. It also calls for establishing wood mills in approximately 16 communities to aid in the development of marketing sustainably-sourced timber and non-timber products. Each of these enterprises has been identified in the ART Ficha, with a general strategy for each. However, more specific assessments and plans still need to be developed to describe and support how the specific processes will help implement and mature these concepts with the communities over time.

Considerations:

- Although the proposed activities are likely to be beneficial to community development, there is currently no analysis provided to EP Carbon that estimates the timeline for development, and the extent to which the benefits from these activities compete with, or
- could otherwise deter income/benefits from unsanctioned or illegal land uses. Therefore, it is currently difficult to estimate the effectiveness of these activities on GHG emissions.
- The time and effort for developing stable sustainable community enterprises is likely to be substantial, as it requires significant and ongoing technical support. Therefore, in the short term, direct conservation-oriented activities such as monitoring and enforcement may need to be prioritized at the beginning in the project lifetime to ensure that GHG reductions are generated and justified early-on.
- The alternative livelihood activities that have been proposed in the ART Ficha are oriented towards the Bari, however, the livelihood needs the land users responsible for illegal land uses must also be considered. Monitoring and enforcement activities will be important for these land users initially, however, there must be a plan in place for alternative livelihood development for these groups to assure overall long-term effectiveness. The current ART Ficha does not address this point.

Household Needs

There are several activities proposed or otherwise identified to address household needs that are likely contributing to forest degradation from both the Barí communities and unsanctioned land users alike. The interest in clean cookstoves from the Barí was identified in both the ART Ficha and the EP Carbon workshop, which depending on their design, reduce or replace fuelwood consumption and can contribute to improved public health outcomes through improved ventilation of cooking areas. The ART Ficha also identifies the need to create managed wood lots on previously cleared sites as the main source for fuelwood in the *resguardos*. Taken together, these two activities could substantially reduce GHG emissions and habitat loss from forest degradation. However, in their current state, these are still aspirational concepts that will require, substantial additional planning to more clearly specify their technical approach and implementation process.

Considerations

- There are markets for GHG credits from clean-cookstoves that could offset their investment, however, it is unclear if the scale of this initiative makes this feasible, given the relatively modest size of number of households in the *resguardos*. A feasibility analysis of the crediting potential from clean-cookstoves is advisable, but was beyond the scope of this analysis.
- If crediting from the GHG reduction of clean-cookstoves is feasible, a separate GHG accounting methodology for clean-cookstoves must be used and the relevant GHG accounting procedures such as baseline establishment, an accepted cook stove design, and monitoring methods must be developed. This may have to be presented and validated/verified as a separate project under a separate project description if the timing of this activity is unable to coincide with the project development timeline for REDD+ activities. All of these considerations have not been included in this study and require further analysis.
- The data from the EP Carbon workshop suggested that fuelwood consumption is also being driven by illegal land users, however, the current ART proposal does not seem to address this source of demand. The full effectiveness of clean cookstoves and related wood lots cannot be fully realized and will only be partially effective until the fuelwood demand from, and presence of, illegal land users is addressed as well.
- Managed woodlots will require some of the similar considerations as described in "Restoration and Reforestation".

ALIGNMENT BETWEEN PROPOSED ACTIVITIES AND BASELINE LAND USES

As identified in the previous section the *resguardos* have developed a portfolio of potential project activity concepts that could address many sources of deforestation and forest degradation from within the communities and promote reforestation. However, many of the proposed project activities, such as Restoration and reforestation, and Sustainable Forest Management, and are more oriented towards addressing drivers of forest degradation from the Barí versus drivers of deforestation, especially those associated with illegal land users. Therefore, the proposed activities may not yet be justified in projecting a level of high level effectiveness in generating quantifiable reductions in deforestation and forest degradation. These include baseline activities such as community members practicing shifting "slash and burn"-type agriculture and associated poor fire management, timber harvesting, and coca cultivation, which will require more specific strategies to effectively mitigate them. Furthermore, monitoring and enforcement activities were also not discussed in detail, likely out of security concerns. These are discussed in more detail later on.

On the other hand, all of the proposed activities have strong potential for adding co-benefit layers that increase community wellbeing and protect biodiversity in addition to climate benefits, such as VCS's Climate, Community, and Biodiversity (CCB) standard

and Sustainable Development Verified Impact Standard (SD VISta). Adding co-benefit layers can help projects sell credits for premium prices, increasing the financial feasibility of project implementation. Additionally, the community has already developed a robust plan for many types of agroforestry, restoration, and reforestation activities which could be credited separately as afforestation/reforestation projects, separately from avoided deforestation. Carbon removal credits also often reach premium prices on voluntary markets, as they are currently attractive to credit buyers. A more thorough restoration plan, detailed in Section 9.1 Project Development Recommendations, would be required to determine the feasibility of these activities, which was not considered in this report.

Shifting Agriculture

- Analyze land use patterns - The specific pattern and nature of activity shifting agriculture has not been fully analyzed or described. Doing so would help tailor the design of alternative or complementary agriculture strategies to more effectively limit its effect on remaining natural forests. These depend on the site-specific factors that influence the local patterns of shifting agriculture, such as soil type, slope, aspect, seasonality, and the full range of cultivated goods that occur. These issues would have to be more formally identified, characterized, and considered.

- Alternative products or strategies - More specific sustainable agriculture alternatives have not yet been defined or articulated to limit the potential cumulative effect of shifting agriculture. Potential sustainable agriculture activities would need to be carefully planned in coordination with community members to ensure they would meet the communities' food security and/or income needs, are feasible and climate change resilient, and any surplus crops to be sold have accessible and reliable market chains.

    - Agroforestry systems have been identified Various mixed-value agroforestry designs are a common choice to fully or partially replace shifting agriculture practices, taking into account design and management principles to limit the effects of climate change. Their design, and purpose should be aligned to match the local needs, and possibly the demand for market goods.

- Gathering market information - Conducting local market studies are advisable in order inform whether the outputs of any sustainable agricultural practices, or related value-added processes from sustainable practices such as agroforestry, could be fully or partially oriented towards filling a regional market demand to create opportunities for alternative income generation. Currently, we could not identify whether there were opportunities to access or meet any particular regional market demands for agricultural products.

- Improved fire management practices - EP Carbon could only find monitoring evidence for uncontrolled fire management practices. An analysis of current fire management practices may need to be evaluated, along with potential mitigation

actions. Similar projects have formed and trained local fire management crews to monitor fire-use and to employ strategies to minimize its potential for unmanaged effects.

Cattle production

Cattle production has been identified in the EP Carbon workshops a driver of deforestation, but the ART Fichas we received did not address any specific strategies to confront or limit this threat in detail. It may be possible that other analyses have been conducted on the matter, but from the perspective of the resources that were consulted here, this issue appears to be unaddressed. EP Carbon has presented some options on this driver as discussed in the previous section.

Coca Cultivation

One of the most serious drivers of deforestation in the region and the *resguardo* is coca cultivation. These activities are largely perpetuated and/or supported by outside illegal groups that exert much control over the region, meaning any interventions could be challenging and could negatively impact the communities' security. It is unclear at the moment which agents are primarily responsible for coca cultivation within the *resguardo*: community members supported by illegal groups, outside groups such as *campesinos* or *colonos*, or the illegal groups themselves. Additionally, it is unclear if the alternative livelihoods proposed would be financially competitive with the lucrative activity of coca cultivation. Marketing handicrafts would likely be a fairly small-scale activity, and wood mills require much investment, infrastructure, and capacity-building before benefits would reach community members.

As mentioned previously, relatively little discussion was presented at the EP Carbon workshops or in the ART Fichas concerning more specific measures for monitoring and enforcement against illegal land uses, even though some references were made to re-claiming lands degraded by various illegal uses for restoration outcomes.

Extractive Industries

None of the evaluated sources contained specific concerns or specific activities to address threats concerning land use by extractive industries. EP Carbon understands this may be a potential threat, but it is unclear whether it is a realistic enough threat at this time to warrant further action.

Commercial Agriculture

The EP Carbon Workshop outputs suggested that some illegal land uses in the *resguardos* produced products for legal commercial agricultural markets. No further project activity proposals were mentioned here concerning this issue, although it may be an issue to investigate further to determine whether any project activities with legal supply chains may be needed to remove financial incentives for legal crops that may be associated with illegal deforestation.

ADDITIONALITY CONSIDERATIONS

Regardless of which standard or methodology is used for a REDD project, project proponents must demonstrate that project activities are additional. In simple terms, additionality demonstrates that project activities would not have been implemented without additional revenue generated from the sale of generated carbon credits. Annex A analyzed the differences between three potential standards: the VCS, *CerCarbono,* and *ProClima.* One of the criteria in which these standards was assessed was by ease of demonstrating additionality. The conclusion of this analysis was that demonstrating additionality would be simpler with the two Colombian standards, *CerCarbono* and *ProClima*. However, the BioREDD projects were all able to demonstrate additionality following the requirements of the VCS. It is likely that this REDD project would be able to use similar arguments to demonstrate additionality and that the demonstration of additionality would not be a significant hurdle during project development.

The VCS requires the demonstration of additionality using the tool VT0001: Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, v3.0 (Verra, 2012). This tool outlines four steps for demonstrating additionality. They are:

IDENTIFICATION OF ALTERNATIVE LAND USE SCENARIOS TO THE PROPOSED VCS AFOLU PROJECT ACTIVITY: Section 5.1.4 Other Baseline Scenarios

1. Section 5.2 of this report assesses the most likely baseline scenario for this project and identified that deforestation trends will continue without intervention. While deforestation rates within the Indigenous Reserves have been relatively low, the higher rates outside demonstrate the real threat of deforestation within the region. Alternatively, activities could be implemented that protect forests from outside threats and provide alternative livelihoods to local people. The BioREDD projects found that implementation of these types of activities is unlikely without additional revenue provided by carbon finance.
2. Investment Analysis: This is an optional step, as either the Investment Analysis and/or Barrier Analysis can be completed. The BioREDD projects included an investment analysis in their barrier analysis, a likely pathway for demonstrating additionality in these project sites.
3. Barrier Analysis: A barrier analysis demonstrates that project activities would not be implemented with revenue from carbon finance. The following barriers were identified:
    a. Investment barriers
    b. Institutional barriers
    c. Technological barriers
    d. Barriers related to local tradition
    e. Lack of organization of local communities
    f. Barriers related to land tenure and property rights

g. Barriers related to markets (including unregulated and informal), transport, and storage
h. Remoteness of AFOLU activities
i. Lack of infrastructure

It is likely that all of these identified barriers would be applicable to the potential GCMB REDD Project. While demonstrating these barriers would require supporting data and information, these are real barriers standing in the way of the implementation of these activities. On the other hand, these barriers do not prevent the most likely baseline scenario identified in Step 1.

4. Common practice analysis: Even though there are dozens of REDD projects throughout Colombia now, deforestation remains unchecked in many areas. This includes the GCMB region, even though it is within *PNN Catatumbo Barí*. Financial resources for preventing deforestation are limited in the region, even though park managers are likely receptive to implementing increased protection measures. Potential project activities, including supporting local governance capacity, land titling, value added products, and local capacity building are not common in the region.

Even using the VCS additionality tool, the most rigorous of the three standards assessed, it is unlikely that a REDD project in this region will run into issues demonstrating additionality. While supporting evidence would need to be collected to expand the argument above, this is a low risk to project implementation.

RISKS

INTERNAL RISK

Insufficient management capacity (low) - The management team from the Paramos and Forests Program includes individuals with significant experience and skills necessary to successfully undertake, manage project activities, and train local communities to eventually assume more leadership responsibility. The current technical team consists of Wildlife Works Carbon, with 20+ years of REDD project development experience, and the EP Carbon team, with extensive experience in AFOLU project design and carbon accounting under the VCS Standard. Presumably, a team similar to this one would support the Barí communities to implement the project, thereby reducing the non-permanence risk stemming from low project management capacity.

Lack of local capacity (moderate) - The project will likely need to invest heavily into training and capacity building of local communities to establish a strong local project management structure, and to operate and manage various project activities aimed at reducing deforestation. The effectiveness of activities to reduce deforestation ultimately depends on the ability of local communities to take ownership of the design and daily management of many important activities to reduce deforestation and to re-orient land uses and economic activities away from activities that threaten forest resources. The

underserved nature of this area and its local community means that significant resources may have to be dedicated to strengthening community capacity across a range of skills, including administration and management, finance, and general record keeping.

Lack of alignment between local authorities (high). There are currently no binding agreements between the indigenous reserves and the project team for any long-term project plans, and no general assembly has convened to discuss these issues. Considering the two reserves are independent entities within the proposed grouped project, they will need to agree on a project governance structure, a benefit sharing mechanism, and a grievance mechanism to address future potential issues and potential internal conflicts, should they arise. Failure to do so could prevent the implementation of REDD project activities.

Financial risk (moderate) – The financial scenarios (see Annex H. Financial for a breakdown of the scenarios) are primarily dependent on how quickly and effectively the community can implement emissions reductions activities within the project area (See Project scenario emissions are calculated in the same way as baseline scenario emissions, using the same applicable parameters reported in Table D2 above. There are two important exceptions that account for differences in *ex-ante* project emissions estimates. The first is that historical deforestation rates from RP2 (see Table D 5 of Annex D. Geospatial Analysis) are used to estimate deforestation in the project scenario, as this is believed to be the most accurate estimate of future deforestation without implementation of project activities. However, as project activities are expected to be effective in reducing deforestation, especially due to increased adoption and implemented activities over time, an effectiveness parameter is used to discount ex-ante estimates of deforestation in the project scenario. This is done by applying a discount factor, referred to as an Effectiveness Index (EI). Average historical deforestation and the EI parameters for each site are reported in Table E 3 below.

Table E 3 in the Preliminary Carbon Accounting Annex for a breakdown of adoption rates) as well as the dynamics of the voluntary credit prices throughout the project lifetime. Our analysis suggests that when the project includes avoided degradation as well as avoided conversion to Non-Forest, there are three viable scenarios: High Crediting/High Price, with positive cash flow in Year 4; High Crediting/Medium Price, with positive cash flow in Year 4; and Conservative Crediting/High Price, with a positive cash flow occurring in Year 6. A fourth High Crediting/Low Price scenario is also possible, being cash flow positive in year 6, but likely only viable with grants. This suggests that the project is less viable if credits are sold on Colombian compliance markets, which are more stable but do not reach high prices.

Measuring degradation is overall more difficult to monitor and prevent, so there is a risk that project activities will not stop degradation at a level that maintains the models' financial predictions. On the other hand, in these viable scenarios, the project has a considerable amount of up-front resources to dedicate toward implementing forest governance, alternative livelihoods, and overall emission reduction activities, which will help reduce the overall risk and difficulties of activity implementation. This widespread

rapid implementation may effectively curb degradation to a level within the scenario predictions.

EXTERNAL RISK

The Catatumbo region is identified by the persistence and increase of crops for illicit use and the confrontation between illegal armed groups for control of this type of crop, drug trafficking routes and in the general control of the territory, including border crossings to Venezuela. The historical presence of the conflict in this area, from the beginning of the formation of the different guerrilla groups and the appearance of the self-defense groups, has left numerous acts of violence and displacement of the population throughout more than 40 years of armed conflict. (Centro Nacional de Memoria Historica, 2018).

According to the Fundación Ideas para la Paz (Fundacion Ideas Para La Paz Fip et al., 2020), the recent armed strikes by the ELN and the EPL illustrates the difficult moment in which the current process of territorial transformation the Catatumbo region finds itself. The lack of a clear strategy to generate security conditions in the stabilization stage is showing effects in the resurgence and reconfiguration of the dynamics of violence and the degradation of armed confrontation. Three dynamics converge in this region that need to be identified and addressed jointly: first, the instability in the regulation exercised by different illegal armed groups, which has led to processes of fragmentation and disputes; second, the pressure and influence of the Venezuelan crisis, whose most visible image is the difficult situation faced by migrants; and third, the deterioration of security and the humanitarian impact, which has spread from Catatumbo to the border of the Metropolitan Area of Cúcuta. *Fundación Ideas para la Paz* has opined that considers that the State's response has been incomplete and partial and fragmented. It is not clear how the security efforts are generating the conditions to implement the Development Programs with Territorial Approach (PDET), as well as the transformation of the territory. There is consensus that the military response is necessary but insufficient, especially when it is reactive and intermittent, and does currently not guarantee the protection of communities.

Resource rights (**critical**)- Although the legal land tenure or carbon rights of the Barí are not in question, there are significant land disputes from illegal land users and land uses, without a formalized strategy for lowering future deforestation or reclaiming illegally cleared land. The status of land tenure or carbon rights belonging to the Barí people within the MB or GC indigenous reserves is clear. The Barí people are recognized by Colombia as the legitimate owner of the territory within the PNN Catatumbo, as evidenced by Resolution 102 of November 28, 1988, and Resolution 105 of December 15, 1981. (*The UN Mission Finalizes Activities of Neutralization of the FARC-EP Armament*, 2017). However, other parts of this report describe disputes arising from the illegal encroachment and land uses that are driving increases in deforestation within the *resguardos* (see *Baseline Conditions*).

Weak Governance and Political Instability (critical) - The governance and security situation in the Catatumbo region threatens the ability for projects such as REDD projects to effectively reduce emissions from deforestation. The Catatumbo region and Catatumbo Barí National Natural Park, where the GC and MB reserves are located, are some of the most dangerous in Colombia, with factions seeking to control the region's resources after the FARC signed a peace deal in 2016 and surrendered their weapons to the United Nations in 2017 (*The UN Mission Finalizes Activities of Neutralization of the FARC-EP Armament*, 2017).

Guerilla groups have contributed to fragmentation and disputes among communities for over 40 years and put the area at medium risk associated with personal violence and public attacks (Scoreboard_AssessmentPreFeasibility.xlsx). There is an ongoing history of deforestation and conflict stemming from illicit crop cultivation, immigration across the adjacent Venezuelan border, agro-industrial practices, and mining operations. Deforestation and land-use stemming from coca cultivation and the economies surrounding it is particularly difficult to manage, as illicit crops bring in more income than traditional crops.

Additionally, the project area is adjacent to the Venezuelan border, which is currently facing a nationwide crisis; migrants frequent the area, which could pose a risk to forest resources and community stability. The risks associated with these factors are mitigated somewhat by agreements between the National Parks and the Barí people. Specifically, The Management Plan of the PNN Catatumbo National, approved by Resolution 0278 on July 23, 2018. Agreements following this plan establish coordination between the indigenous authorities and the PNN authorities. The goals of this agreement include minimizing instances of unauthorized anthropic activities and intrusion, strengthening the control and protection of the territory to facilitate the conservation of the area's biodiversity, as well as the ethnic and cultural survival of the Barí people. So far, however, the outcome of these plans is difficult to quantify, as violence is still present in the area. A foundation for achieving the Barí goals of stabilization is in place, but it is unclear if plans will be able to be fully achieved.

On February 9, 2021, the Ombudsman's Office of Colombia, who is responsible for overseeing the protection of civil and human rights within Colombia, (issued a warning (Early Warning 004-21) indicating that the civilian population is at increased risk by the continuous confrontation between the Popular Liberation Army (*Ejército Popular de Liberación* - EPL) and Hope, Peace, Liberty (*Esperanza, Paz y Libertad* - EPL) faction groups and their direct effect on the territories of the Barí people. Reports from OCHA (United Nations Office for Humanitarian Response) show that compared to 2017, in 2018 there was an increase of 469% in mass displacement actions; 643% in accidents due to anti-personnel mines, unexploded munitions, and improvised explosive devices; 175% in homicides of social leaders and human rights defenders; and 324% in the restriction of access to goods and services (United Nations Office for the Coordination of Humanitarian Affairs, 2022). As a result, the issues surrounding governance and security are perhaps the most critical risks facing the viability of a REDD project in the Catatumbo National Park.

NATURAL RISK

Natural Risks (low) - Within the project area and the surrounding region, we have identified some minor natural risks.

Fire - Given the region and ecology, we expect fire risk to be low, and this is supported by the PDET REDD Spatial Analysis Report findings: fire risk as determined by multiannual hotspot frequency using IDEAM and NASA data from 2000-2021 gives the GCMB area a "low" fire risk ranking (). The United Nations DesInventar database for natural disasters has multiple records of forest fires since 2008. However, they are mostly caused by anthropogenic forest clearing so development of a fire management plan will minimize these risks. There is no information on whether carbon stocks were affected. Extreme weather risk to carbon stocks due to flooding and landslides is low.

Earthquakes - Earthquakes are present in the area, with the USGS Earthquake database (*USGS Latest Earthquakes*, n.d.) showing most occurring along the southern boundary of Norte de Santander, south of the GCMB area and in the magnitude of 3 to 5 on the Richter scale. Earthquakes of this strength are not considered threatening to the communities or the landscape, and likely pose little to no threat to the project. The closest active volcano is over 350km away.

Pests and Disease - The DesInventar shows no reports of significant pest or disease outbreaks in the region. The Food and Agriculture Organization published a report (Allard & Fao, 2007) stating that insects infect about 1.2% of forest plantations, but have no information on any native or introduced pests or diseases that significantly impact naturally regenerating forests in this project area or Colombia overall.

3

ANNEX D. GEOSPATIAL ANALYSIS

GOAL

The goal of this analysis was to understand the rates and dynamics of historical deforestation in the project area in both the baseline and project scenarios. Outputs of this analysis were used along with information within the Colombian *Nivel de Referencia de Emisiones Forestales* (NREF) as inputs in the accounting model to determine activity data in the baseline scenario. Baseline activity data was determined from the NREF instead of through the identification of appropriate reference regions since Colombian law currently requires that all new REDD projects use the NREF. Thus, we also aimed to spatially allocate baseline activity data from the NREF across the five biomes included in the NREF.

Specific goals were as follows:

1. Review previous preliminary spatial analysis
2. Determine REDD eligible area
3. Determine deforestation rates during the two reference periods
4. Stratify project area based on deforestation risk
5. Estimate baseline activity data for each area of interest

SUMMARY

EP Carbon performed a geospatial analysis that included reviewing previous preliminary spatial work accomplished for these project sites as well as performing a new analysis better aligned with current requirements and law within Colombia. We assessed both GC and Motilón Barí Indigenous Reserves (GC and MB IRs) together as a grouped project, and also included potential expansion areas the indigenous groups are in the process of potentially having jurisdiction over (although carbon rights and land tenure in those regions remain tenuous; see Section 2.4 of main report). This analysis involved evaluating the Columbian *Nivel de Referencia de Emisiones Forestales* (NREF), relevant standards and methodologies, and jurisdictional setting to determine the best approach with the data available. Following this review, two historical reference periods (RPs) were identified (2010-2014 (RP1) and 2015-2019 (RP2)) and deforestation dynamics in and around these IRs were analyzed. The latest Colombian NREF, recently reviewed by the UNFCCC, allocates baselines based on sub-national biomes. We aligned our analysis as best as possible with what we know to be the data sources and methods used by the Colombian government to establish the sub-national baselines. However, our approach may have varied in technique and assumptions, meaning that the final numbers may significantly change once the updated NREF and associated risk zoning data is available. It will be essential to reevaluate the baseline activity data after that point in later stages of project development.

The results of our analysis revealed that while the deforestation rate appears to be increasing throughout the region, rates of deforestation remain relatively low within the IRs, with an observed deforestation rate of less than 0.1% in RP1, increasing to nearly 0.4% in RP2. On the other hand, increasingly higher rates of deforestation are observed in the surrounding *Resoluciones Barí* and Pre-Extension areas (see Figure D 1, Table D 1 below). This is likely due to increased pressures on the region due to armed conflict, illicit economies, and migration. These are relatively recent pressures, as the 2016 peace agreement between the Colombian government and FARC guerilla groups opened the region to new faction groups, as did the recent political upheaval in Venezuela. Consequently, we observed a much higher deforestation rate in RP2. The NREF does take this into consideration by estimating an increase in deforestation from the historical rate observed from 2008-2017, meaning baseline emissions for 2018-2022 estimated in the NREF exceed the average historical rate of deforestation.

FIGURE D 1: DEFORESTATION IN THE PROJECT AREAS

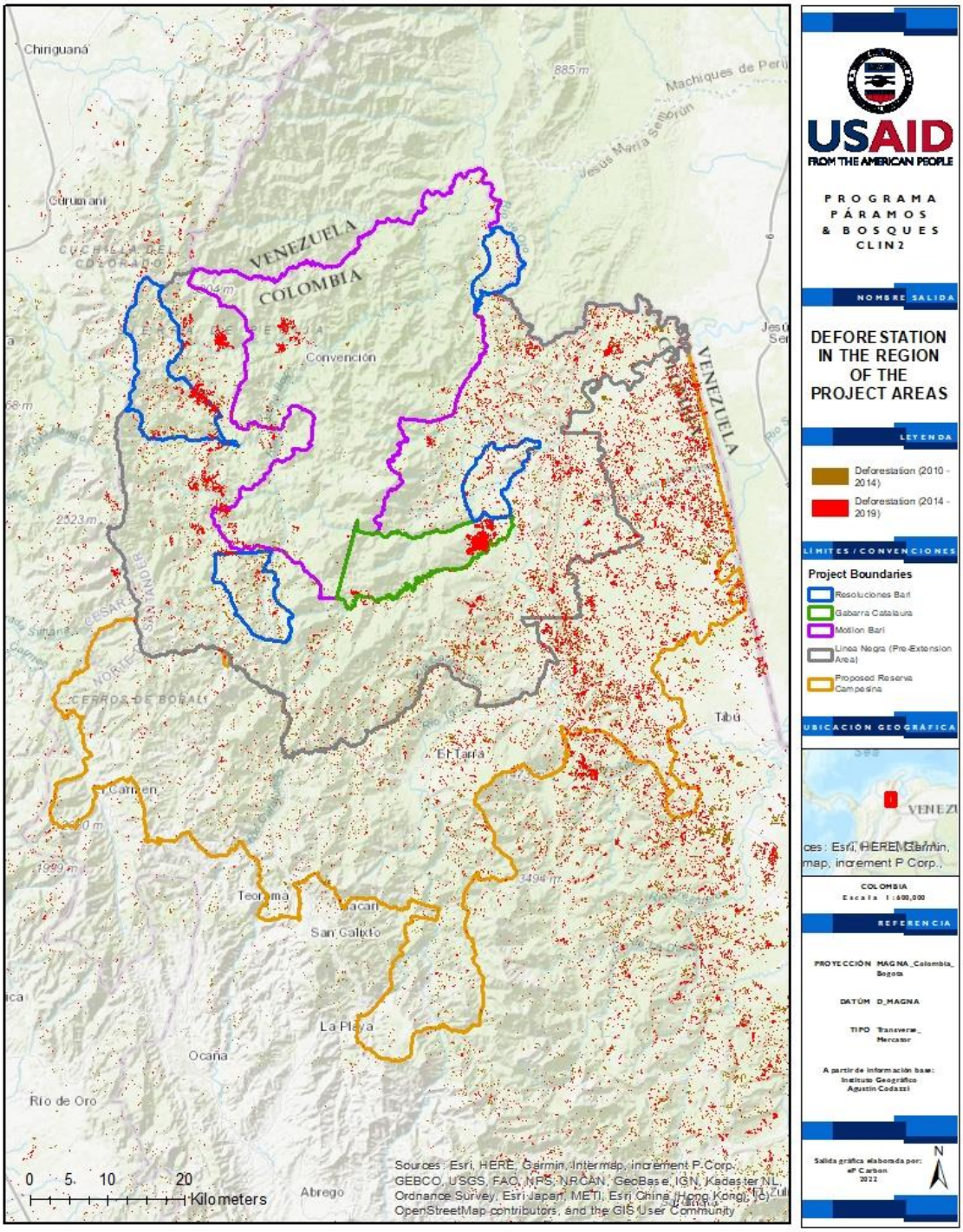
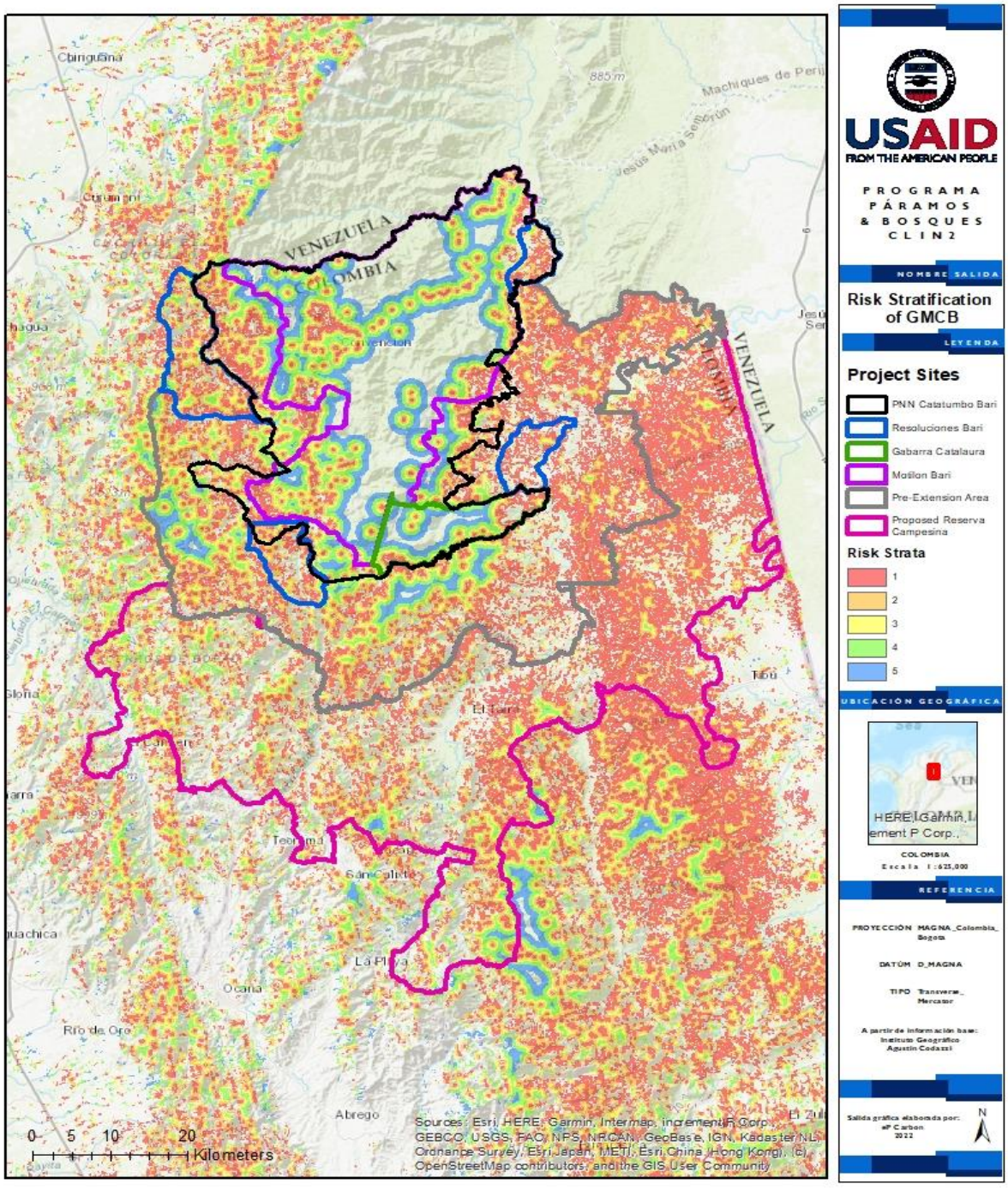


TABLE D 1 FOREST COVER AND DEFORESTATION RATES WITHIN THE GCMB REGION FROM 2010-2019

Site	Forest Cover 2010 (ha)	Forest Cover 2015 (ha)	Estimated Deforestation in RP1 (ha)	RP1 Annual Deforestation Rate (%)	Forest Cover 2020 (ha)	Estimated Deforestation in RP2 (ha)	RP2 Annual Deforestation Rate (%)
GCMB IRs	113,420	112,899	521	-0.09%	110,904	1,996	-0.36%
Pre-Extension Area	126,719	121,534	5,185	-0.84%	111,462	10,072	-1.73%
Resoluciones Barí	17,514	16,460	1,054	-1.24%	15,010	1,450	-1.84%

While the NREF establishes baseline activity data at the national and biome level, it does not spatially allocate baseline deforestation and associated emissions. This allocation is done using a risk map that assesses the likelihood of a forest area to be deforested. Multiple inputs and parameters can be used to produce a valid risk map, and the Colombian government is in the process of developing one to support project development nested into the NREF. However, that data is still not available to the public. Instead, EP Carbon proportionally allocated baseline activity data based on distance from historical deforestation. Our results suggest that there is a relatively low area at high risk of deforestation within the IRs (i.e., much of the area is at "zero risk"), and that deforestation within the IRs has been highly localized, likely due to frontier expansion. Conversely, the areas surrounding the reserves, including the potential expansion areas, had a high proportion of areas at higher risk of deforestation ("high" risk strata), and the pattern was mosaicked and evenly spread across the area (Figure D 2). These patterns and dynamics could reduce crediting potential within the reserves if they are shown (using the assumptions of these JNR rules) to be at low risk of deforestation. The implications of this analysis for crediting potential are detailed in 8.2 Crediting and Annex E. Preliminary Carbon Accounting.

FIGURE D 2: RISK STRATIFICATION IN THE ANDES BIOME WITHIN THE GCMB SITES[4]



[4] Areas with no risk strata were outside the processing extent and are part of risk stratum five

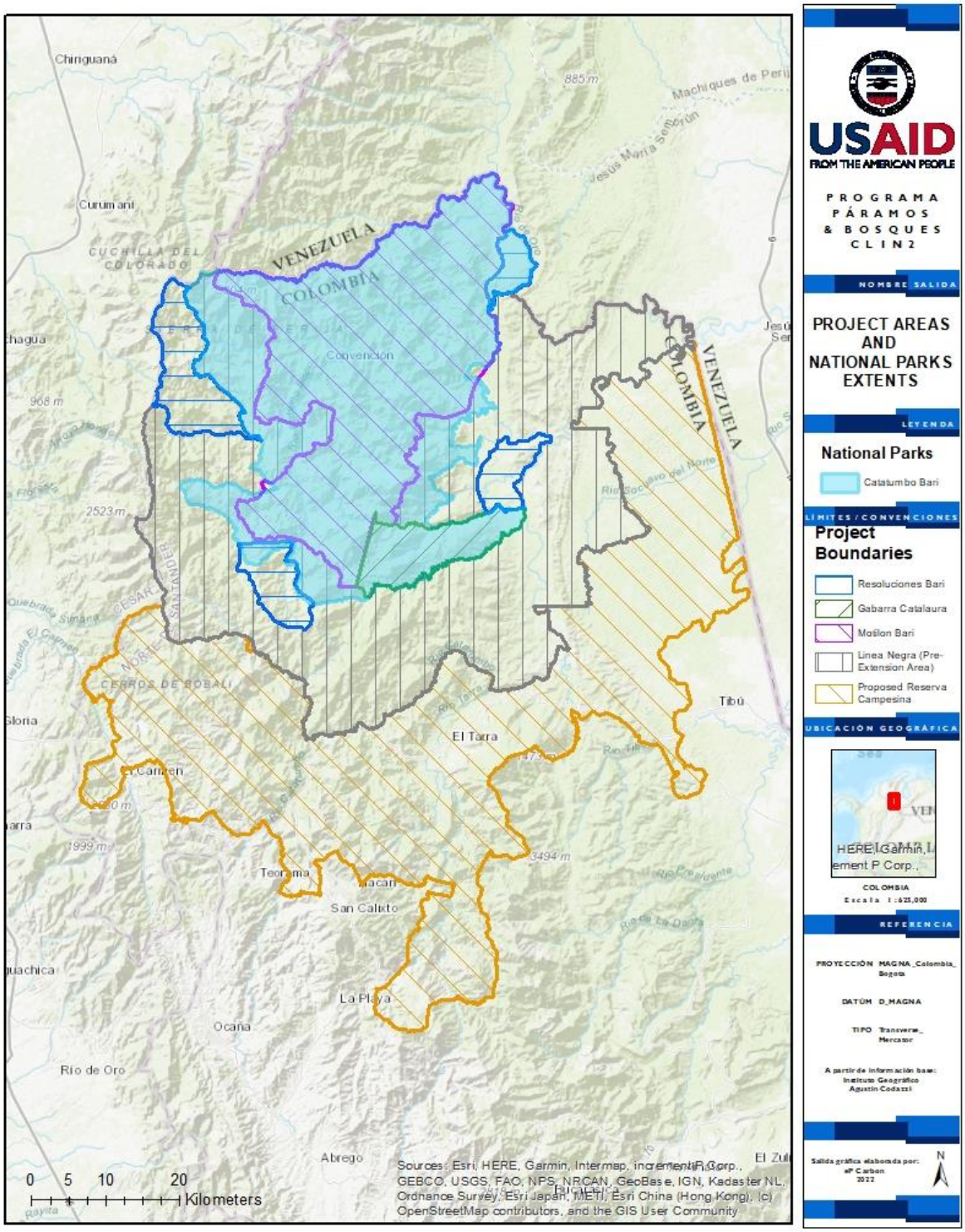
PRELIMINARY SPATIAL ANALYSIS

As part of the previously submitted Intermediate Report, 14 potential project sites were systematically assessed for potential feasibility for a REDD project. One of the criteria in this assessment was the historical rate of deforestation observed at each site since 2005. Relevant geospatial data collected and analyzed included IDEAM thematic forest layers and Hansen Global Forest Change datasets, which were used to estimate remaining forest area and deforestation rates. Other key data layers were density maps of fire risk and biodiversity records. Using the spatial data, reference area polygons for each of the fourteen sites were created. In consultation with USAID, ART, and EP Carbon, a suitability index / scoreboard ranking method was created and each of the 14 potential projects were scored. More information on these analyses can be found in the Intermediate Report. This report provided information for selecting which of the 14 to proceed with and prioritize for additional analyses.

GABARRA-CATALAURA AND MOTILÓN BARÍ SITE

Two potential project sites that were assessed in the *Intermediate Report* were the GC Indigenous Reserve (GC IR) and the *MB* Indigenous Reserve (MB IR). Since both of these reserves are located within *PNN Catatumbo Barí*, they were assessed together as a potential grouped project (referred to as "*GC Motilón Barí*", or "GCMB"). The implications of combining these areas into a grouped project are discussed in more detail in Annex B. Following the completion of the Intermediate Report, we determined that the MB+GC RIs grouped project could potentially expand into some of the surrounding areas, including sites being considered under *Resoluciones Barí* and a potential Pre-Expansion area. While there are several issues concerning land tenure and carbon rights in these expansion zones, the spatial analysis and carbon accounting for these areas were completed using the same data and procedures in order to provide an estimate of carbon credit generation. While there are significant barriers that would need to be addressed in order to include them in the GCMB grouped project, those were not considered in the spatial analysis or carbon accounting. The map below (Figure D 1) shows the boundaries of each of the potential project sites. The Proposed "Reserva Campesina" area has been included in this figure and other maps, but has been excluded from the analysis at this time due to identified barriers that may prevent it from being included in the REDD project.

FIGURE D 1: MAP OF BOUNDARIES OF THE GCMB SITES ASSESSED IN CONTEXT OF NATIONAL PARKS



COLOMBIAN NREF AND RISK ALLOCATION

THE NIVEL DE REFERENCIA DE EMISIONES FORESTALES IN COLOMBIA

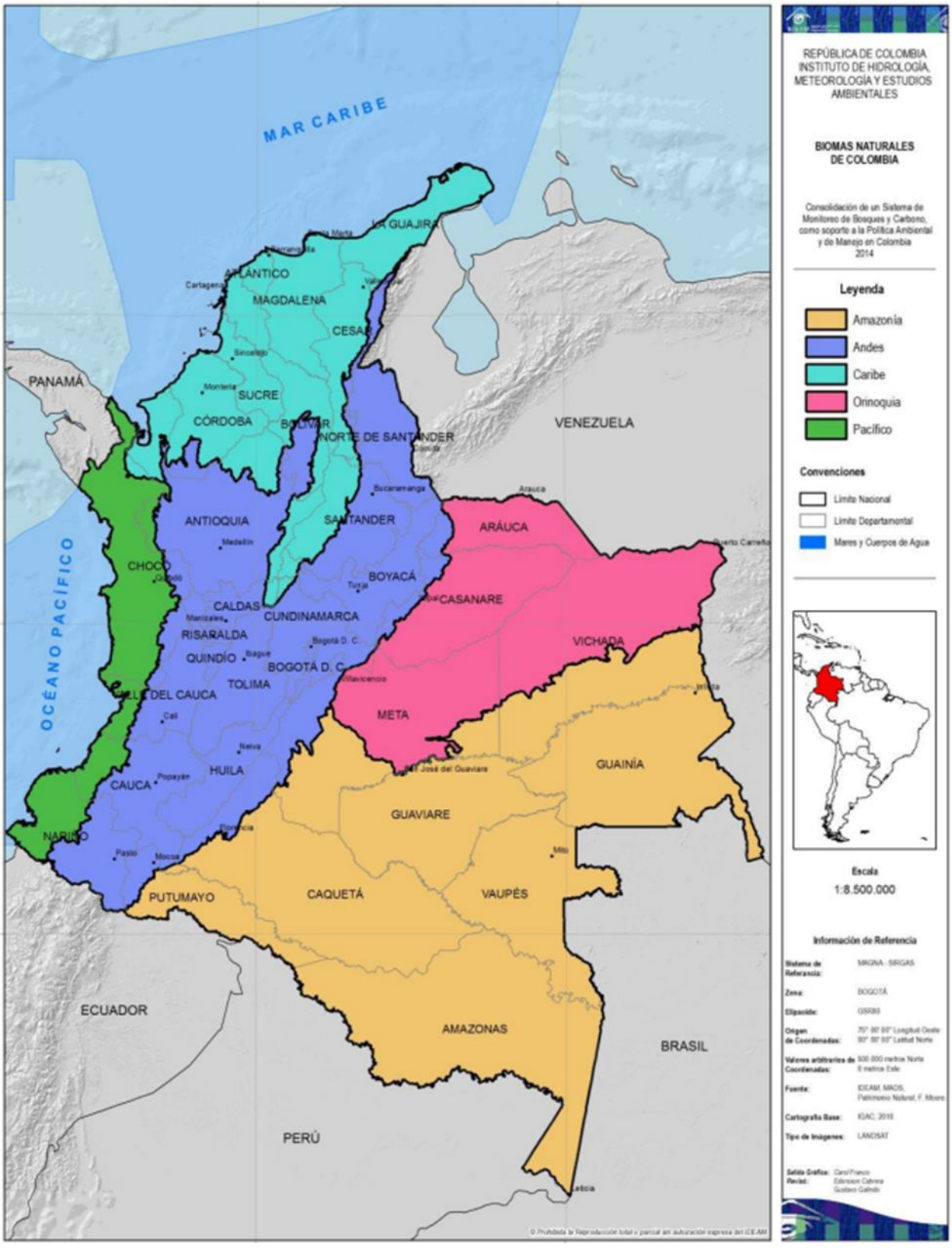
Colombia's Resolution 1447 instituted that as of 2018 all newly developed REDD projects will need to establish their baseline using the latest NREF submission to the UNFCCC. Constituting a type of jurisdictional nesting, REDD projects will use this established baseline to estimate baseline emissions for the REDD project area. This is a shift from many initial REDD projects, which established baseline scenarios through the identification of an appropriate reference area based on methodological requirements such as forest type and agents/drivers of deforestation. Historical rates of forest changes were typically observed within this reference area across a reference period that typically lasted around 10-12 years. These historical rates of change then establish future baseline rates of change in the REDD project area.

The Colombian NREF establishes the national baseline for emissions from deforestation across the country. The national baseline is split into what can be considered sub-national baselines across five biomes. These five biomes are: *Amazónico, Orinoquía, Andes, Pacífico*, and *Caribe* (Figure D 2). The sum of baseline emissions across all five biomes is equal to the NREF for Colombia.

The NREF recently completed technical review as part of the submission to the UNFCCC, clearing a significant hurdle in the acceptance of the NREF for establishment of the baseline during project development. Resolution 1447 (Ministry of Environment and Sustainable Development, 2018, Chapters 41, paragraph 2) clearly states that emissions reductions from all future projects in Colombia will need to use the NREF for development of REDD projects. Thus, in order to be consistent with the NREF, the appropriate biome was selected as the reference region for each site.

Once the requisite data needed for baseline activity data allocation is released by the Colombian government, future REDD projects may not be required to identify an appropriate reference area or observe historical LULC changes across a reference period. Instead, the sub-national baseline for the biome would be the reference region. This is consistent with Verra's proposed changes to VCS unplanned deforestation methodologies (including VM0006 and VM0015) in draft modules released for public comment in April 2022.

FIGURE D 2: MAP OF BIOMES WITHIN COLOMBIA (FIGURE 1 OF MINAMBIENTE & IDEAM, 2019)



While the Colombian NREF provides a breakdown of historical deforestation emissions from 2000-2017 for each biome, baseline emissions for 2018-2022– the applicable period for the current NREF submission– are only provided at the national level. The Colombian government has estimated in the current NREF that baseline deforestation would be higher from 2018-2022 compared to the 10-year reference period from 2008-2017. This increase is likely a result of changing national circumstances, notably the signing of the peace agreement in 2016 between the Colombian government and FARC, which has changed the sociopolitical environment across Colombia and actually resulted in increased rates of deforestation. Since the NREF does not report baseline emissions for each biome for 2018-2022, it was necessary to disaggregate the reported increases in baseline emissions to the sub-national level for each biome. This was accomplished using the same data as reported in the NREF when available in order to follow the methods as closely as possible.

While the NREF does not directly report historical deforestation rates within each biome, it does report total deforestation for the years 2001-2017. This allowed for the calculation of historical deforestation rates when combined with the forest/non-forest dataset for the year 2000 available through IDEAM's geoportal (IDEAM, 2020). The NREF also provides information on a logistical model that was used to estimate the exponential increase in deforestation rates for 2018-2022 (MINAMBIENTE & IDEAM, 2019). This logistical model primarily uses two parameters: total area susceptible to deforestation and rates of exponential increase in deforestation rates, both reported for each biome (Tables 5 and 6 of the NREF). We used this data to project potential changes in baseline deforestation rates for each biome.

As previously mentioned, the NREF does not provide a sub-national breakdown of baseline emissions or deforestation rates. However, Table 8 of the NREF reports total baseline deforestation at the national level. Thus, it is possible to combine the results of calculated deforestation rates with total forest area in each biome to ascertain baseline deforestation for each individual biome. The sum of deforestation within these biomes could then be compared to the national numbers reported in Table 8 to select an appropriate model for each year of the baseline period. The model most closely predicting the national baseline was selected for each year.

Table D 2 compares the results of our model to the deforestation reported in Table 8 of the NREF.

TABLE D 2 COMPARISON OF ESTIMATED ANNUAL DEFORESTATION ACROSS BIOMES COMPARED TO TOTAL REPORTED DEFORESTATION IN NREF[5]

Biome	Average Deforestation 2008-2017 (ha)	Estimated Deforestation in 2018 (ha)	Estimated Deforestation in 2019 (ha)	Estimated Deforestation in 2020 (ha)	Estimated Deforestation in 2021 (ha)	Estimated Deforestation in 2022 (ha)
Amazónico	80821	94,807.8	99,140.1	102,026.1	104,910.3	107,792.7
Orinoquía	10119	18,867.8	20,197.8	21,083.8	21,969.3	22,854.2
Los Andes	27686	38,151.7	40,561.8	42,167.5	43,772.4	45,376.4
El Pacífico	9846	11,101.8	11,472.6	11,719.6	11,966.4	12,213.1
El Caribe	15061	25,108.7	27,229.1	28,639.8	30,048.0	31,453.8
Total Estimated Deforestation (ha)	**143,533**	**188,037.8**	**198,601.4**	**205,636.7**	**212,666.3**	**219,690.1**
Total Reported Deforestation (ha)	**143,532.6**	**189,134.8**	**198,903.1**	**207,527.1**	**214,758.3**	**220,391.8**

The total difference between our estimated deforestation and that reported in the NREF is less than 2,000 ha for each year of the baseline period, with our selected model conservatively underestimating baseline deforestation. With these results, EP Carbon determined it was appropriate to use estimated deforestation rates for these years. As it is unclear how baseline deforestation will be estimated in future NREFs beyond 2022, it was conservatively assumed during modelling that baseline deforestation beyond 2022 will be the same as is reported for 2022 in the current NREF (Table D 3).

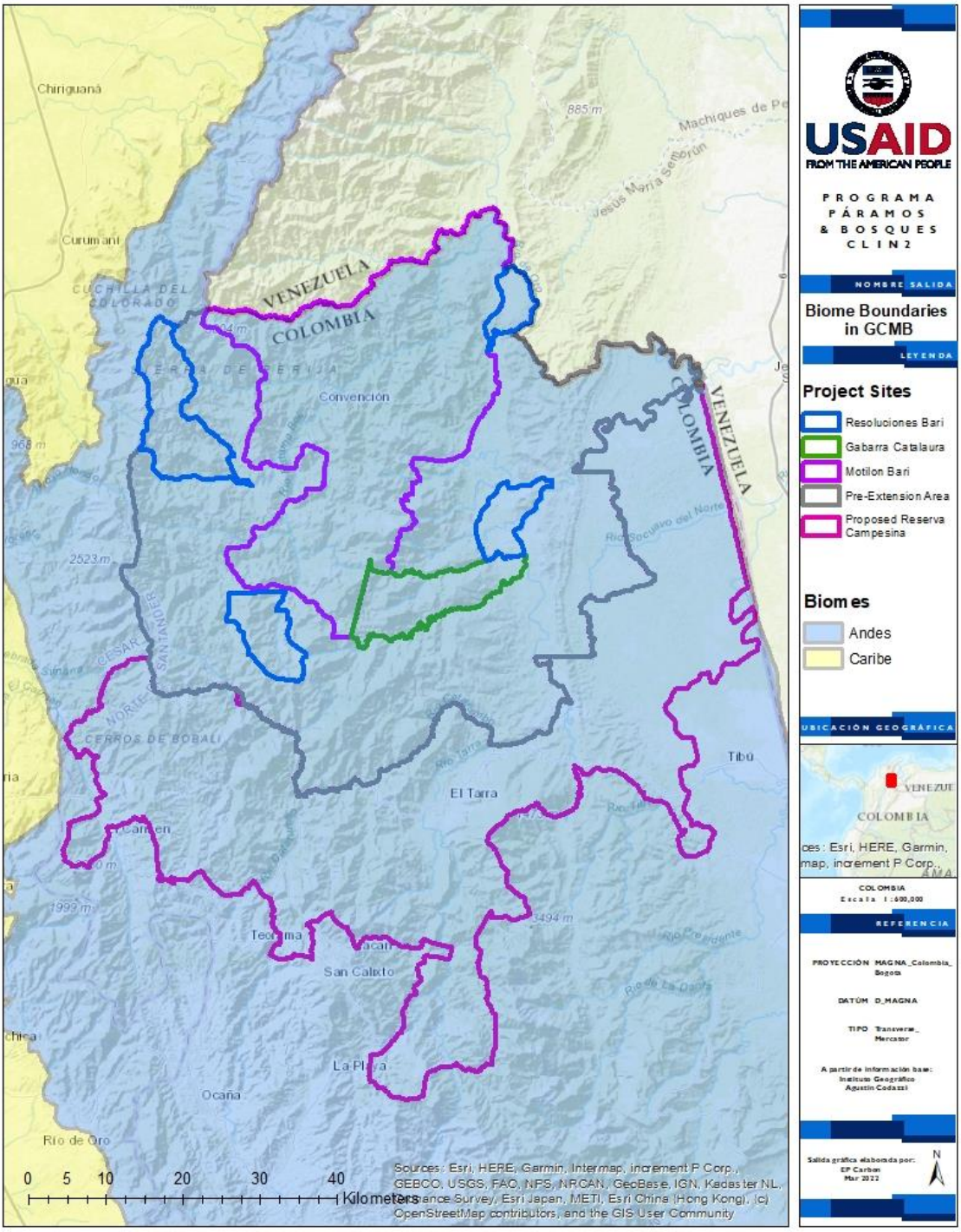
[5] Estimated deforestation reported in this table for each biome represents the parameter $FREL_{JNR}$ in **Error! Reference source not found.** below and the "Total Deforestation (ha)" parameter in the provided accounting model. It is conservatively assumed that deforestation rates beyond 2022 will be equal to what are reported in the NREF for 2022.

TABLE D 3 ESTIMATED BASELINE DEFORESTATION RATES FOR THE PERIOD 2018-2022 WITHIN EACH BIOME

Biome	Historical Deforestation Rate for 2008-2017 (%/yr)	Estimated Deforestation Rate in 2018 (%/yr)	Estimated Deforestation Rate in 2019 (%/yr)	Estimated Deforestation Rate in 2020 (%/yr)	Estimated Deforestation Rate in 2021 (%/yr)	Estimated Deforestation Rate in 2022 (%/yr)
Amazónico	-0.20%	-0.24%	-0.25%	-0.26%	-0.27%	-0.28%
Orinoquía	-0.50%	-0.96%	-1.04%	-1.10%	-1.15%	-1.22%
Los Andes	-0.26%	-0.37%	-0.39%	-0.41%	-0.42%	-0.44%
El Pacífico	-0.20%	-0.23%	-0.24%	-0.25%	-0.25%	-0.26%
El Caribe	-0.95%	-1.67%	-1.84%	-1.97%	-2.11%	-2.26%

Based on the exponential increase in deforestation estimated by the logistical model, it is possible that the model is overestimating deforestation in biomes that had high historical rates of deforestation (e.g., *El Caríbe*) and is underestimating deforestation in biomes with low historical rates (e.g., *Amazónico* and *El Pacífico*). Prior to project development once the updated NREF is submitted and approved, it will be critical to mitigate this uncertainty through communication with IDEAM in order to access requisite data for project development. Additionally, as the most recently submitted NREF is only valid through 2022 and it is unknown how baseline deforestation rates may change in Colombia's next NREF submission, we conservatively projected that deforestation rates estimated for 2022 will continue across the project lifetime. This is an additional source of uncertainty that will likely be a risk across the lifetime of all projects, as it is unclear how the NREF may change over time and the impacts that may have on project crediting.

FIGURE D 3: BIOMES AND THE PROJECT AREA SITES



RISK MAPPING APPROACHES

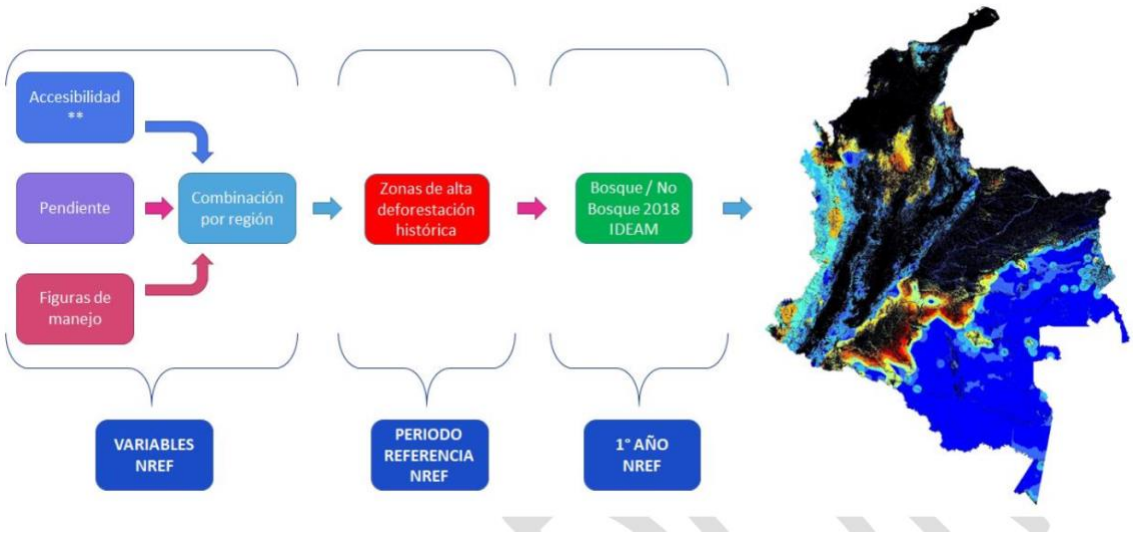
The NREF establishes baseline activity data for the entire biome, but, as deforestation is not uniform across biomes, not all forest areas are at equal risk of deforestation. In other words, the NREF by itself does not establish baseline activity data for forested areas. Instead, a risk map is needed to spatially allocate the NREF across a biome. A risk map for the Colombian biomes is under development by government organizations, such as IDEAM, but it has not yet been released to the public and was not accessible for this analysis. Without this data, it was necessary to estimate a risk map using available data.

Determining an appropriate spatial allocation is challenging, as risk maps can vary significantly depending on the data used and the approach selected. Risk maps can include a variety of different inputs, such as distance to forest edge, forest area remaining, distance to roads, and more. While a fully developed risk map should be selected from several predictive models that include a variety of these different inputs, this work is still underway by the Colombian government. The resulting zoning risk map will allocate the activity data from the NREF across sites to establish the Maximum Mitigation Potential (MMP), the maximum allocation of baseline emissions, for each site.

Details on the zoning risk map are still limited. A draft document "*Zonificación del NREF*" has been circulated that provides limited details on the zoning risk approach being considered by the Colombian government. This document includes a draft of the risk map for all of Colombia, but the map is not at sufficient resolution to be analyzed (Figure D 4). The underlying data is not being shared outside of the government at this time. For this reason, a simplified approach was selected for this analysis that can be objectively applied to all sites. However, as details on the official zoning allocation remain limited, the risk map produced will be different than that of the Colombian government and will provide different estimates of baseline activity data. This remains as one of the significant sources of uncertainty in the estimate of baseline emissions of this report.

EP Carbon has selected a distribution of baseline activity data using distance from recent deforestation. This has been found to be a strong explanatory factor for distribution of deforestation in tropical forests (Vieilledent et al., 2013) although research specific to Colombia was not found. Additionally, Figure D 4 is taken directly from the draft document "*Zonificación del NREF*" and highlights areas of high historical deforestation for distribution over the NREF. For this reason, it was determined that applying a risk stratum to all remaining forest areas in each biome based on their distance from recent (5 years) historical deforestation was an appropriate and objective approach to NREF allocation. While there are potential limitations to this approach (see Limitation and Challenges below), it appears to be a reasonable proxy for the forthcoming official risk map.

FIGURE D 4: DESCRIPTION OF THE NREF AND RISK ZONING ALLOCATION[6]



METHODS

DATA SOURCES

With our decision to allocate baseline activity data based on distance from recent deforestation, available LULC and historical deforestation data was assessed and analyzed to determine the appropriate allocation. The primary data source for this analysis was the "*Bosque No Bosque*" dataset produced by *IDEAM* (*Geovisor*, n.d.). This data, produced annually from 2012-2019, is also available for 2010 and provides a national map of areas meeting the national definition of forest in a technical annex to the dataset (Galindo et al., 2014). Forest area is defined as land occupied mainly by trees that may contain shrubs, palms, *guaduas*, herbs, and lianas in which tree cover is dominant. It stipulates a minimum canopy density of 30%, a minimum canopy height (in situ) of 5 m at the time of identification, and a minimum area of 1.0 ha. Forest areas do not include the tree cover of commercial forest plantations, palm cultivation, and trees planted for agricultural production.

The forest cover data can be used to assess deforestation by assessing the annual changes in forest cover. This product ("*Cambio de Bosque*") is also published by IDEAM and was used in our analysis to quantify deforestation. However, upon further assessment, it was observed that there were significant gaps in the data, as large areas were classified as "No Data". In order to use a complete dataset, these gaps were filled in with the widely used Global Forest Change (Hansen et al., 2013). Areas that were classified as "No Data" were replaced with data from the Global Forest Change dataset in order to provide a complete picture of forest areas and deforestation for the areas of interest.

[6] p. 10 of the "Zonificación del NREF"

REDD ELIGIBLE AREA AND HISTORICAL DEFORESTATION

Areas eligible for REDD activities need to meet the definition of "forest" (defined above) for at least 10 years prior to the project start date. This means that areas that have been classified as non-forest within 10 years of the project start date would not be eligible for inclusion in a REDD project. However, the most recent forest data is only available through 2019, while the project start date is unlikely to be prior to 2022. This means that the listed project areas will need to be updated at project development. In order to estimate potential REDD project areas, a raster dataset of remaining forest areas as of the start of 2020 (produced from the combination of the two datasets discussed above) was clipped to the boundaries of each site. Estimated REDD project areas for each site within the region are listed in Table D 4.

TABLE D 4 TOTAL SIZE AND ESTIMATED REDD PROJECT AREA FOR EACH SITE UNDER CONSIDERATION FOR THE GCMB REDD PROJECT

Site	Total Area (ha)	Estimated REDD Project Area (ha)	Proportion of Total Area Eligible for REDD (%)
GCBM IRs	119,819.1	108,863.6	90.9%
Resoluciones Barí	30,023.0	14,739.2	49.1%
Pre-Extension Area	194,714.7	109,448.1	56.2%

The results provided in Table D 4 provide some insight into the remaining forest areas and deforestation patterns observed in these sites. The forests within the GCBM IRs make up over 90% of the total area of the site, while forests within the *Resoluciones Barí* and Pre-Extension areas are around 50% of the total area of their respective sites. An analysis of deforestation trends in these three sites demonstrates that the differences in remaining forest may be driven by recent deforestation.

In order to determine recent deforestation trends, the forest and deforestation data were assessed across two five-year reference periods. The first reference period (RP1) is from 2010-2014 while the second reference period (RP2) is 2015-2019. Two five-year reference periods were selected so that the relationship between deforestation locations in RP1 and RP2 could be assessed for the risk allocation. To accomplish this, forest cover was analyzed at three points in time: 2010, 2015, and 2020. While IDEAM includes forest regeneration in its forest/non-forest dataset, regrowth was conservatively excluded from this analysis. The differences in forest cover were assessed at each time point to estimate rates of deforestation. Estimated deforestation rates were calculated using Puyravaud's equation:

$$r_{t1-2}(\%) = \left[\left(\frac{1}{t_2 - t_1}\right) * \left(\ln\frac{A_{t2}}{A_{t1}}\right)\right] * 100$$

Where:

$r_{t1-2}(\%) =$	Deforestation rate for reference period; %
t_1	Initial year of reference period; year
t_2	Final year of reference period; year

A_{t1} Total forest area at start of reference period; ha
A_{t2} Total forest area at end of reference period; ha

Forest cover and deforestation rates for each site across both reference periods are provided in Table D 5 below. These data were calculated by taking IDEAM's forest/no-forest datasets for the given dates in RP1/RP2, backfilling any areas of missing data with Hansen Global Forest Change data (Hansen et al., 2013) for the same time period, and clipping that composite dataset to the extent of the proposed project area.

TABLE D 5 FOREST COVER AND DEFORESTATION RATES WITHIN THE GCMB REGION FROM 2010-2019

Site	Forest Cover 2010 (ha)	Forest Cover 2015 (ha)	Estimated Deforestation in RP1 (ha)	RP1 Annual Deforestation Rate (%)	Forest Cover 2020 (ha)	Estimated Deforestation in RP2 (ha)	RP2 Annual Deforestation Rate (%)
GCMB IRs	113,420	112,899	521	-0.09%	110,904	1,996	-0.36%
Pre-Extension Area	126,719	121,534	5,185	-0.84%	111,462	10,072	-1.73%
Resoluciones Barí	17,514	16,460	1,054	-1.24%	15,010	1,450	-1.84%

All three potential project sites showed a significant increase in deforestation from RP1 to RP2. Within the two IRs, deforestation more than quadrupled from RP1 to RP2, although the deforestation rate of -0.36% in RP2 is still relatively low compared to the surrounding sites. The RP2 rate, however, is very similar to the estimated rate of deforestation for the Andes biome (Table D 5 above). The deforestation rate within the Pre-Extension area nearly doubled and is approaching the high rate observed within the *Resoluciones Barí* boundaries. While this area had the lowest proportional increase in deforestation from RP1 to RP2, it had the highest overall deforestation rate in both RP1 and RP2. This increasing trend in deforestation in all three sites is of note, as the proposed risk allocation approach does not account for this observed trend; it is primarily based on the deforestation observed in RP2. While this means that the projected baseline activity data is likely conservative, it is also likely that this approach is not properly accounting for the increasing risk of deforestation in this region. This could prove a challenge for project implementation if the risk allocation approach taken by the Colombian government does not account for changing trends in deforestation due to more recent pressures.

BIOME AND SITE RISK MAPPING

While baseline data provided in the NREF and extrapolated for each biome (Table D 3 above) can be used to directly estimate baseline emissions for the biome of interest, in order to estimate baseline emissions for an area of interest within a biome it is

necessary to allocate that activity data across the biome. For example, in the Andes biome it is estimated that, from 2022 onwards there will be 45,376 ha of deforestation across the entire biome. But this estimate does not distribute the baseline activity data to any specific site. For this analysis, EP Carbon utilized the relationship between deforestation data for RP1 and RP2 in order to estimate what percentage of deforestation occurs near areas previously deforested. This approach relies on the premise that areas recently deforested are more likely to be deforested in the future (supporting evidence for this approach was provided in the Risk Mapping Approaches section above).

In order to assess the spatial relationship between historical and projected deforestation, EP Carbon reclassified the deforestation data for RP1 as either deforestation or unchanged. The Euclidean Distance tool was then applied to the deforestation data in order to create a map of distance (in meters) from previous deforestation from 2010-2014 (RP1) across the biome. In order to stratify this data, these distances were re-classified into one of five strata. The proportion of deforestation allocated to each stratum was estimated by clipping the reclassified risk strata raster to areas deforested in RP2 and then calculating the proportion of deforestation in RP2 that occurred within each of the five risk strata based on RP1 data. Table D 6 presents the proportion of deforestation allocated to each of the five risk strata. Stratum one represents the highest risk of deforestation, as these areas are less than 250 m from areas recently deforested. Stratum five, on the other hand, represents zero risk, since less than 5% of total deforestation across the Andes biome occurred at distances greater than 1,250 m from recent deforestation. Zero risk is applied to this stratum since the VCS Draft JNR Allocation tool requires a zero-risk stratum to which no baseline activity data is allocated. The deforestation that is predicted by the model to be allocated to this stratum is instead distributed across the other four stratum (Adjusted Proportion of RP2 deforestation in Table D 6).

TABLE D 6 PROPORTION OF DEFORESTATION IN RP2 WITHIN EUCLIDEAN DISTANCE OF RP1 DEFORESTATION WITHIN THE ANDES BIOME

Stratum	Distance from Recent Deforestation (m)	Proportion of RP2 Deforestation	Adjusted Proportion of RP2 Deforestation[7]	Baseline Deforestation Allocated to each Risk Stratum in 2022 and after (ha)
1	0-250	52.6%	54.9%	25,185.2
2	250-500	25.3%	26.5%	12,134.8
3	500-750	10.4%	10.8%	4,970.7
4	780-1,250	7.3%	7.6%	3,477.9

[7] These values represent the parameter $PFREL_i$ in the equation below (adapted from the VCS JNR Allocation Tool Guidance) and is the "Proportion of Deforestation %" in the supporting accounting model.

5	1,250+	4.4%	0.0%	0.0

These results suggest that deforestation in the Andes biome does indeed follow the expected pattern of deforestation occurring near areas recently deforested. Over 50% of deforestation in RP2 occurred within areas between 0 and 250 m from areas deforested in RP1. Less than 5% of deforestation occurred within stratum 5, i.e., less than 5% of deforestation occurred in areas that are 1,250 m or further from areas recently deforested. The proportions were conservatively adjusted so that 0% of deforestation is distributed to areas that do not fall within 1,250 m of areas previously deforested. This is consistent with both VCS JNR Requirements, stipulating to not allocate deforestation to lowest risk areas, and with VM0015 Methodology requirements that baseline deforestation be initially allocated to areas at highest risk.

The baseline deforestation in the Andes biome of 45,376 ha is likewise distributed to each updated risk stratum based on recent deforestation as estimated from RP2 deforestation data. This was performed by repeating the Euclidean distance analysis for only deforestation observed in RP2. This stratifies the remaining forest areas in the biome based on the distance from RP2 deforestation. Figure D 5 presents the risk stratification for the Andes biome within the GCMB sites.

FIGURE D 5: RISK STRATIFICATION IN THE ANDES BIOME WITHIN THE GCMB SITES[8]

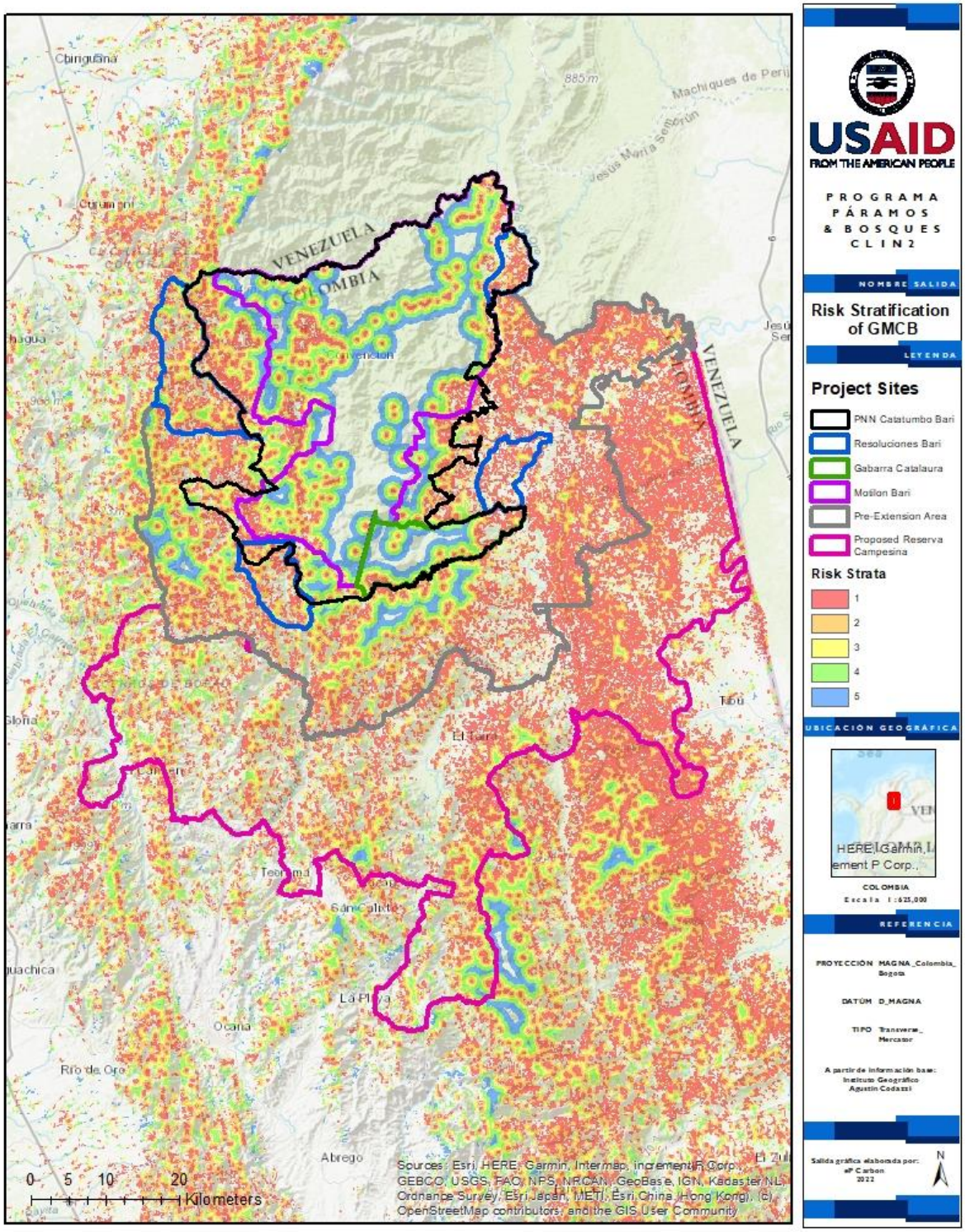


Figure D 5 makes it clear that much of the region within and surrounding the *PNN Catatumbo Barí* are at high risk of deforestation. However, the forested areas within GCMB IRs are relatively low risk, with much of it being classified in risk stratum five (representing no risk of deforestation). This aligns with the observation that the rate of deforestation within these IRs is relatively low compared to much of the surrounding region. Another factor impacting the risk allocation within the IRs is that deforestation has been localized in certain areas (eastern edge of GC IR, western edge of MB IR), following more of a frontier pattern of deforestation. On the other hand, the *Resoluciones Barí* and Pre-Extension areas have both much more deforestation and a more dispersed, mosaic pattern of deforestation. According to this allocation approach, this pattern puts these areas at higher risk of deforestation. As a result, the GCMB IRs are allocated a lower proportion of baseline activity data.

TABLE D 7: PROPORTION OF EACH RISK CLASS WITHIN THE GCMB SITES RELATIVE TO THE ANDES BIOME[9]

Section	Area in Risk Class 1 (ha/% of total risk stratum)	Area in Risk Class 2 (ha/% of total risk stratum)	Area in Risk Class 3 (ha/% of total risk stratum)	Area in Risk Class 4 (ha/% of total risk strata)
GCMB IRs	12,425.1 (15.5%)	11,447.9 (14.3%)	11,375.4 (14.2%)	20,793.4 (26.0%)
Pre-Extension Area	90,722.9 (47.3%)	52,368.6 (27.3%)	23,332.6 (12.2%)	16,878.8 (8.8%)
Resoluciones Barí	14,984.3 (50.0%)	9,940.9 (33.2%)	3,804.1 (12.7%)	1,228.5 (4.1%)

ALLOCATION RESULTS

Baseline deforestation in this analysis is allocated uniformly across a risk stratum for this analysis; for example, each area that falls within risk class one is equally likely to be deforested in a given year. Instead of spatially distributing baseline deforestation it is *proportionally allocated* based on the proportion of the total risk stratum at the biome level within an area of interest. This is in line with the accounting requirements of the JNR Allocation Tool as well as the VM0015 Methodology. The area and proportion of each risk stratum within each project area are reported in Table D 8 below. These values were calculated by clipping the risk strata down to the project areas.

[8] Areas with no risk strata were outside the processing extent and are part of risk stratum five

[9] The "% of total site" reported in Table D 7 for each risk stratum represents the parameter "Proportion of Site (%)" in the accounting model. It is calculated as the total forest area within a risk stratum of a site divided by the total forest area of the site. It is presented for informational purposes but is not included in the FREL allocation equation presented below and is not directly involved in carbon accounting.

TABLE D 8: PROPORTION OF EACH RISK CLASS WITHIN THE GCMB SITES RELATIVE TO THE ANDES BIOME[10]

Section	Area in Risk Class 1 (ha/% of total risk stratum)	Area in Risk Class 2 (ha/% of total risk stratum)	Area in Risk Class 3 (ha/% of total risk stratum)	Area in Risk Class 4 (ha/% of total risk strata)
GCMB IRs	12,425.1 (0.6%)	11,447.9 (0.5%)	11,375.4 (0.7%)	20,793.4 (0.6%)
Pre-Extension Area	90,722.9 (4.3%)	52,368.6 (2.5%)	23,332.6 (1.5%)	16,878.8 (4.5%)
Resoluciones Barí	14,984.3 (0.7%)	9,940.9 (0.5%)	3,804.1 (0.2%)	1,228.5 (0.7%)

Baseline activity data can then be proportionally allocated to each area of interest using the following equation, adapted from the VCS JNR Allocation Tool Guidance:

$$PFREL_p = \sum_1^I (PFREL_i * FREL_{JNR} * PFREL_{i,p})$$

Where:

$PFREL_p$	Portion of jurisdictional FREL allocated to project *p*
$PFREL_i$	Portion of jurisdictional FREL allocated to risk class *i*
$FREL_{JNR}$	Total jurisdictional FREL
$PFREL_{i,p}$	Portion of risk class *i* within project *p*
I	Total number of risk classes

THIS EQUATION HAS BEEN ADJUSTED TO ALLOCATE BASELINE ACTIVITY DATA INSTEAD OF EMISSIONS IN ORDER TO PROVIDE ACCOUNTING INFORMATION FOR ALL POOLS AS WELL AS ADDITIONAL ESTIMATES OF BASELINE ACTIVITY DATA. THIS PROCESS WAS COMPLETED FOR ALL RISK CLASSES ACROSS ALL SITES TO PROVIDE BASELINE ACTIVITY DATA FOR EACH SITE. THE RESULTS OF THIS ANALYSIS ARE COMPARED TO AVERAGE HISTORICAL DEFORESTATION FROM 2015-2019 IN

Table D 9 below. The historical deforestation data columns refer to results from the IDEAM forest/no-forest dataset backfilled with Hansen Global Forest Change data, while the baseline deforestation data columns refer to results from the accounting model.

[10]The proportion "% of total risk stratum" reported in Table D 8 for each risk stratum represents the parameter "Proportion of Risk Class in Biome" within the carbon accounting model, or $\boldsymbol{PFREL_{i,p}}$ in **Error! Reference source not found.**. It is calculated as the total area within each risk stratum of each site divided by the total area within each biome risk stratum.

TABLE D 9 BASELINE DEFORESTATION DATA ALLOCATED TO EACH GCMB SITE COMPARED TO ANNUAL AVERAGE HISTORICAL DEFORESTATION FROM 2015-2019

Site	Average Annual Historical Deforestation in RP2 (ha)	Average Historical Deforestation Rate in RP2 (%)	Estimated Baseline Deforestation (ha)	Estimated Baseline Deforestation Rate (%)
GCMB IRs	416.6	-0.37%	285.3	-0.3%
Pre-Extension Area	2,014.3	-1.73%	1,483.8	-1.4%
Resoluciones Barí	289.9	-1.84%	249.6	-1.7%

For all three sites the estimated baseline deforestation rate is less than the historical deforestation rate from RP2. This demonstrates some of the challenges for each of these sites, as project crediting will be limited to reductions in project scenario deforestation from the allocated baseline scenario deforestation. If project activities are unable to reduce deforestation below the allocated baseline deforestation, there will be no emissions reductions as a result of project activities. On the other hand, the baseline deforestation rates are all higher than the historical deforestation rates observed during RP1, meaning that if project activities are able to reduce deforestation to the same rate as RP1, there is crediting potential. Annex E details crediting potential for each site, as well as project design configuration and options for preventing baseline deforestation being less than the most recent historical deforestation data, which could pose a serious risk to these projects.

LIMITATION AND CHALLENGES

Potential issues with the spatial analysis are closely tied to the carbon accounting. Relevant limitations and challenges are discussed in more detail in Annex E.

CONCLUSIONS

The GCMB IRs were selected for additional analysis due to the high rates of deforestation observed in the identified reference regions. This updated analysis found that while deforestation in the areas bordering the GCMB IRs is very high and the rate of deforestation within the IRs has increased recently, it is still relatively low. Since REDD projects in Colombia will need to use the NREF, baseline activity data will be allocated based on the risk of deforestation. This analysis suggests that even though surrounding regions are at high risk, this does not necessarily result in the IRs themselves being considered at high risk. Thus, the proportional allocation of baseline activity data remains relatively low. This limits the MMP of a potential REDD project within the GCMB IRs. On the other hand, the surrounding region, especially the *Resoluciones Barí* and pre-extension areas appear to be at a much greater risk of deforestation. There may be an opportunity to expand the project to these areas,

greatly increasing the MMP of a REDD project. However, expanding to these areas would only be possible if land tenure and carbon rights issues were resolved. Additionally, effective implementation of project activities would be required to generate emissions reductions. Further socialization of the project, including stakeholder consultation and Theory of Change exercises, would be needed in order to assess the feasibility of expanding project activities to these areas outside the GCMB IRs.

Due to limitations in available data and the lack of requisite data from the Colombian government, baseline activity data for these areas could change significantly depending on the allocation approach adopted. Until this data is released, some uncertainty will remain with regards to REDD project development in Colombia. Some key assumptions were made due to data limitations and lack of supporting information from the Colombian government. While the approach described in this report is believed to be reasonable and justifiable, there are other valid approaches that may allocate baseline deforestation differently to the benefit of the GCMB IRs. It is recommended that project proponents continue to attempt to access the risk zoning data needed to more accurately estimate baseline activity data for each site. If this data is accessible, this spatial analysis could be updated, and the outputs could be used in updating the estimates of emissions reductions. Updating this data and the results of the socialization process could significantly reduce the remaining uncertainty in the estimates of emissions reductions. Annex E provides further details on the methods, results, and remaining sources of uncertainty in these estimates.

ANNEX E. PRELIMINARY CARBON ACCOUNTING

GOAL

This technical annex provides an estimate of emissions reductions for each site of the proposed REDD project within the GC and Motilón Barí Indigenous Reserves (GC and MB RIs) and potential expansion into the surrounding region. It is also meant to provide transparency about the processes we completed to produce these estimates, the remaining sources of uncertainty in data, and the selection of relevant parameters that will impact the estimate of emissions reductions. These estimates are largely based on baseline activity data that was discussed in more detail in Annex D. Geospatial Analysis, which is recommended for review prior to this annex.

SUMMARY

We decided to provide three separate crediting instances for the GC and MB RI's and the adjacent Resolución Barí and Pre-Extension areas. It is unlikely that the Resolución Barí or Pre-Extension areas will have their land title and carbon rights discrepancies resolved before the initial validation, so the potential start date for those areas is 2024 and 2026 repsectively, while the GC and MB IRs are expected to begin generating credits in 2022 in our model. Preliminary crediting estimates for the potential project sites within and near Parque Nacional Natural (PNN) Catatumbo Barí are relatively low, especially for the GC and MB IRs. These low crediting estimates are primarily due to two factors. The first is that the Andes biome has a relatively low rate of deforestation compared to some of the other biomes, particularly the Caribbean and Amazon biomes, which have higher baseline deforestation rates. This results in a lower amount of baseline activity data to allocate to project sites within the Andes biome. The second factor reducing the crediting estimate, especially in the GC and MB IRs, is that historical deforestation in this area is relatively low compared to the surrounding areas. Thus, these areas are considered lower risk and allocated a lower proportion of baseline activity data. On the other hand, the potential project sites surrounding the GC and MB RIs have more historical deforestation, and are thus assessed at higher risk and allocated a higher proportion of baseline activity data. However, land tenure concerns (see Section 2.4 of the GCMB Pre-Feasibility Report) and effective implementation of project activities remain outstanding concerns for expanding the project to these sites.

Several key assumptions were made for this analysis of potential project crediting. Baseline activity data was estimated using projections of the Colombian NREF and proxy risk zoning data, as the NREF has not yet been approved and the risk zoning data has not been released to the public. More information on these limitations is discussed in Annex C. Project adoption across project sites and effectiveness of project activities were estimated in three separate potential scenarios. Maximum Potential (MMP), High Scenario, and Conservative Scenario. Variations in these scenarios are rooted in how

quickly and effectively the areas adopt and implement emissions reduction activities. These are based on the current understanding of potential implementation capacity, but these parameters are preliminary estimates and should be refined throughout the development process See Table E 2 for more information relating to adoption and implementation parameters for the different scenarios. While the accounting assessment was primarily focused on emissions reductions from avoided deforestation, emissions reductions from avoided degradation were also estimated based on data from existing REDD projects in Colombia. Finally, leakage and the buffer contribution were estimated using standard values for projects in early stages but can be improved upon following additional data collection and stakeholder consultation. The crediting estimates provided in this report are likely conservative and reasonably accurate, but they should not be understood as a final estimate of emissions reductions. Preliminary carbon accounting prior to project validation and verification is an iterative process that should improve over time as additional data and information are collected and integrated into the analyses.

OVERVIEW

Estimating emissions reductions is primarily an accounting exercise that combines collected data with methodological requirements. However, in early stages of project development, such as this assessment of project feasibility, limited baseline data and information is available. Additionally, emissions reductions are based off of the difference between baseline and project scenario emissions. As the project scenario has not yet been implemented, an *ex-ante* estimate must be made using historical data and parameters that project the success of implemented activities in reducing GHG emissions. This introduces a degree of uncertainty that is difficult to quantify, especially with the additional uncertainty that is the result of incomplete baseline data in the Colombian NREF and supporting data that has not been released (see Annex D. Geospatial Analysis). Thus, the goal of this annex and preliminary analysis is to not only provide an estimate of emissions reductions and potential project crediting, but also to identify sources of uncertainty and how these estimates may be updated over time to reduce this uncertainty. This allows the carbon accounting to be an iterative process that improves over time with additional data and information, reducing the overall risk to project implementation.

METHOD SELECTION

The methods for estimating baseline deforestation activity data for each area of interest were reported in Annex D. Geospatial Analysis. With this generated baseline activity data, carbon accounting is primarily determined by applying appropriate emissions factors (EFs) to the corresponding transition. However, other important factors determining emissions reductions are the project adoptions rates and effectiveness of project activities. The adoption rate is the percentage of the grouped project area that is participating in the project and eligible for generating emissions reductions. This can be established in the accounting model for each area of interest and each year of the project. The effectiveness of project activities is determined as the percentage reduction in project scenario deforestation compared to historical rates. The combination of these

factors, along with estimating standard emissions reductions calculations such as leakage and the buffer contribution, determine the quantity of Verified Carbon Units (VCUs) eligible for sale as emissions reductions.

Since the proposed projects would use Colombia's NREF for establishing the baseline for each site and it is likely the project will need to use the forthcoming VCS modules for estimating an unplanned deforestation baseline, these carbon accounting estimates followed procedures that align with both. Specifically, we established baseline activity data using the NREF, while we generated emissions reductions using methods believed to be consistent with the VCS consolidated methodology modules. This was because the NREF includes two carbon pools that decay over time, belowground biomass (BGB) and soil organic carbon (SOC), and VCS methodologies currently require these pools to be conservatively accounted for as decaying over 10 and 20 years, respectively. These accounting principles are appropriate for other methodologies and standards, although there may be minor technical differences in the selection of parameters and reporting of emissions estimates.

METHOD

CARBON STOCKS AND EMISSIONS FACTORS

Baseline emissions are generally estimated through the combination of baseline transition rates and the appropriate EFs. Typically, REDD project development requires an inventory of the project area to estimate carbon stocks and derive appropriate EFs, calculated as the difference in carbon stocks before and after forest conversion. However, the proposed REDD projects would need to nest into sub-national baselines, which have pre-approved EFs all projects must use. This project will be required to use these same EFs to calculate the Maximum Mitigation Potential (MMP), which is the maximum quantity of emissions reductions for which the project would be eligible.

The Colombian NREF includes the three carbon pools: aboveground biomass (AGB), belowground biomass (BGB), and soil organic carbon (SOC). While the AGB and BGB pools are common for REDD projects, the SOC pool is typically excluded. This conservative exclusion is normally due to the uncertainty of impact on SOC stocks following conversion to non-forest. However, since the NREF includes this pool and it is permitted under the VCS, it has been included in this analysis.

The NREF accounts for emissions from the AGB and BGB pools in the same year as the deforestation event. However, the VCS currently requires consideration of decay in the BGB pool, typically over a period of 10 years. While it is possible that a methodology deviation accounting for BGB in the same way as the NREF would be approved by auditors, EP Carbon has conservatively modelled emissions over a period of 10 years following deforestation. The NREF already accounts for SOC decay over a period of 20 years, which aligns with the requirements of the VCS. Emissions factors are reported for each relevant biome in Table E 1 below. Notably, emissions factors are highest in Los Andes, presenting significant potential for emissions reductions with successful implementation of project activities.

TABLE E 1 ESTIMATED DEFORESTATION EMISSIONS FACTORS FOR RELEVANT BIOMES (TABLE 4 OF MINAMBIENTE & IDEAM, 2019)

Biome	AGB (tCO_2 ha^{-1})	$BGB_{10\ years}$ (tCO_2 ha^{-1} yr^{-1})	$SOC_{20\ years}$ (tCO_2 ha^{-1} yr^{-1})
Los Andes	265	6	23

Since the REDD projects would nest into a sub-national baseline, they will be able to use national inventories instead of collecting project-specific data at validation and verification. This will reduce costs involved with REDD project development, especially initial costs, since an inventory can require a significant investment before any credits are issued. On the other hand, this does provide an additional source of future uncertainty, as these emissions factors are subject to change at each updated NREF submission. The NREF estimates uncertainty in the Andes biome at 6% for AGB and 5.6% for BGB.

BASELINE SCENARIO DEFORESTATION EMISSIONS

With estimated baseline activity data and EFs for each biome it is possible to estimate baseline emissions for each biome, as well as average baseline emissions per hectare within each biome. However, a sub-national baseline is only one requisite piece, as baseline emissions are not spread uniformly across a biome. Instead, baseline emissions are distributed to areas most susceptible to the risk of deforestation. More information on the distribution of baseline activity data and the current limitations in available data is reported in Annex D. Geospatial Analysis.

The final step before estimating baseline emissions is modelling out project adoption within each potential project site. When it comes to jurisdictionally nested REDD projects, adoption rates can be thought of as the proportion of total baseline emissions allocated within the potential REDD project area of a site, rather than the proportion of the total site area included in the project. This distinction is due to the risk map (discussed in Annex D. Geospatial Analysis), as baseline emissions are not uniformly spread across a site. Thus, targeted project activities in high-risk areas can have proportionally higher emissions reductions due to the greater potential provided by higher baseline emissions. This is a key strategy for using zoning data to target project activities in areas at higher risk of deforestation, as they will have greater conservation impact. This also allows for focused activities without trying to immediately implement activities across such a large area, ensuring initially limited resources are used to maximize impact.

Without the requisite zoning data and project implementation plans, modelling adoption rates for the GCMB grouped project is challenging, as an implementation plan of project activities is not available. The sites in which immediate implementation of project activities is likely are the GC and MB IRs. Project activities have been modelled as beginning in 2022 and expanding over the areas, with each crediting scenario reflecting different rates of baseline activity data across the boundaries of these two IRs. Again, this does not necessarily mean that each scenario's project activities would have to expand across the total potential project area (which is greater than 100,000 hectares) if

effective activities can be implemented in areas at high risk of deforestation. Thus, targeting activities in high-risk areas allows the project to have a much smaller initial project area. Once the zoning data is published and implementation plans are finalized, adoption rates can be updated within this accounting model to more accurately reflect the proportion of baseline emissions that are expected to be reduced as a result of project activities. The accounting model also reflects the grouped project model within each site by modelling an annual increase of the total REDD project area within each site until reaching a maximum of 100%. This scaling up approach reflects the inclusion of all eligible areas within a project site susceptible to deforestation. Table D 2 provides the parameters for all sites that will impact baseline emissions estimates.

TABLE E 2 RELEVANT PARAMETERS FOR MODELLING BASELINE EMISSIONS ACROSS GCMB PROJECT SITES

Project Site	Crediting Scenario	First Project Year	Maximum Project Area (ha)	Initial Adoption Rate (%)	Annual Increase in Adoption Rate (%/yr)
GCMB IRs	MMP	2022	108,863.6	100%	0%
	High	2022	108,863.6	50%	25%
	Conservative	2022	108,863.6	50%	10%
Resoluciones Barí	MMP	2024	14,739.2	100%	0%
	High	2024	14,739.2	50%	25%
	Conservative	2024	14,739.2	33%	17%
Pre-Extension Area	MMP	2026	109,448.1	100%	0%
	High	2026	109,448.1	50%	10%
	Conservative	2026	109,448.1	25%	25%

Based on currently available information on previously implemented and planned project activities, crediting of historical project activities that would be eligible for REDD appears limited. Without this evidence readily available, EP Carbon has selected a potential project start date of 2022 for the GC and MB IRs, 2024 for the Resoluciones Barí area, and 2026 for the Pre-Extension area. These dates should be updated following the development of an implementation plan in order to improve the accuracy of the baseline emissions estimate, reported below.

PROJECT SCENARIO DEFORESTATION EMISSIONS

Project scenario emissions are calculated in the same way as baseline scenario emissions, using the same applicable parameters reported in Table D2 above. There are two important exceptions that account for differences in *ex-ante* project emissions estimates. The first is that historical deforestation rates from RP2 (see Table D 5 of Annex D. Geospatial Analysis) are used to estimate deforestation in the project scenario, as this is believed to be the most accurate estimate of future deforestation without implementation of project activities. However, as project activities are expected to be effective in reducing deforestation, especially due to increased adoption and implemented activities over time, an effectiveness parameter is used to discount ex-ante

estimates of deforestation in the project scenario. This is done by applying a discount factor, referred to as an Effectiveness Index (EI). Average historical deforestation and the EI parameters for each site are reported in Table E 3 below.

TABLE E 3 RELEVANT PARAMETERS FOR MODELLING PROJECT SCENARIO EMISSIONS ACROSS GCMB PROJECT SITES

Project Site	Average Historical Deforestation in RP2 (ha)	Crediting Scenario	Initial Effectiveness Index (%)	Annual Increase in Effectiveness Index (%)	Maximum Effectiveness Index (%)
GCMB IR's	1,996	MMP	100%	0%	100%
		Conservative	50%	3%	90%
		High	70%	3%	90%
Resoluciónes Barí	1,450	MMP	100%	0%	100%
		Conservative	50%	3%	90%
		High	70%	3%	90%
Pre-Extension Area	10,072	MMP	100%	0%	100%
		Conservative	50%	3%	90%
		High	70%	3%	90%

In this analysis, effectiveness estimates are based on experience with existing similar REDD projects. Effectiveness is dependent on the amount of targeted intervention and capacity building that is accomplished to ensure that forest protection activities are occurring and are effective. Actual results are tied to the actions taken on the ground and the willingness of communities and individuals to participate in this kind of behavior change as a result of project activities providing alternative options.

DEGRADATION EMISSIONS

EP Carbon initially provided an estimate of emissions reductions from avoided deforestation, broadly defined as conversion of forest to a non-forest LULC class. It did not include potential emissions reductions from avoided degradation, which is generally a reduction in carbon stocks of a forest without the conversion to a non-forest LULC class. This was done for several reasons. The first is that monitoring degradation continues to be challenging, as degraded areas are much more difficult to detect in remote sensing data. The supporting 'Forest/Non-Forest' dataset used in the production of the NREF has no information on the degradation quantity or patterns throughout Colombia. Additionally, the Colombian NREF does not include emissions from degradation and the VCS consolidated methodology modules do not clearly articulate how baseline deforestation and degradation are reconciled, especially when a project will need to use the baseline for deforestation established by the NREF. Finally, the addition of accounting for avoided emissions from forest degradation has methodological implications, as only the VM0006 Methodology clearly allows for generating emissions reductions from avoided unplanned degradation. While the VM0006 Methodology has been used successfully in other REDD projects in Colombia, it does have unique considerations and challenges for project development (See Annex A. Standards and Methodologies Review).

However, feedback from local communities and project partners suggest that excluding degradation does not properly account for the potential reduction in GHG emissions as a result of project activities. Activities that reduce deforestation would likely have an impact on reducing forest degradation. Similarly, degradation continues to be a significant driver in the reduction of carbon stocks in the area, and if project activities are solely focused on deforestation, they may not properly address degradation.

In order to address this gap in the preliminary accounting, EP Carbon made a preliminary assessment of baseline and project scenario emissions from forest degradation. This was done primarily based on the emissions profile of the eight existing BioREDD projects in Colombia. These projects were selected as they use the VM0006 Methodology and have all undergone validation and verification previously. They also provide real data on baseline and project scenario emissions from degradation. This is especially valuable due to the lack of inclusion of degradation in the NREF or supporting data used in its development.

Rather than attempt to completely disaggregate the complex accounting of the BioREDD projects into baseline activity data for forest degradation, EP Carbon determined that identifying the proportion of emissions from degradation relative to emissions from deforestation would provide a simple parameter that could be applied to baseline and project scenario deforestation emissions in order to estimate degradation emissions. This parameter could then be applied to the estimated deforestation emissions for selected pools. As discussed previously, the Colombian NREF includes deforestation emissions from the AGB, BGB, and SOC pools. While forest degradation would certainly have an impact on the AGB and BGB pools, it is much less certain what sort of impact forest degradation would have on the SOC pool. For this reason, emissions from forest degradation were only accounted for in the AGB and BGB pools; the SOC pool was conservatively excluded.

The proportion of degradation parameter was selected by baseline emissions from deforestation and forest degradation separately. The uncertainty of degradation emissions is very important in the VM0006 Methodology, but was excluded from this analysis as it was having a significant impact on emissions estimates in projects with higher uncertainty in the degraded forest LULC class. The proportion of emissions from degradation relative to emissions from deforestation were calculated for each project. A weighted average was then calculated across all eight projects based on the total project area. The results of this analysis are provided in Table E 4 below.

TABLE E 4 ESTIMATED AVERAGE BASELINE SCENARIO EMISSIONS IN GCMB PROJECT SITES

BioREDD Project	Baseline Scenario Deforestation Emissions (tCO_2e)	Baseline Scenario Degradation Emissions	Project Area (ha)	Proportion of Degradation/ Deforestation Emissions
BCBM	1,106,022	2,398,884	83,452	216.9%
BMF ACAPA	2,576,081	335,181	58,212	13.0%
Cajambre	701,581	1,288,424	60,316	183.6%
CDD	1,371,039	1,829,780	118,318	133.5%
Concosta	1,630,757	368,461	54,623	22.6%
Mutata	633,470	406,856	34,288	64.2%
Rio Pepe	1,121,345	1,070,818	48,177	95.5%
SUPP	1,519,506	1,403,958	47,667	92.4%

As the proposed project sites do not neighbor any of the existing BioREDD projects, a weighted average across all sites of 121% was selected for this parameter and used in both the HCS and CCS. This selection was made due to the lack of other available data. However, there are large differences in the existing BioREDD projects, meaning there is significant uncertainty in the degradation emissions estimate as a result of the addition of this parameter. Work should continue in identifying the impact of degradation on carbon stocks in the region. Simultaneously, additional clarity is needed on how to resolve baseline degradation with an established baseline focused solely on deforestation, as is the Colombian NREF.

RESULTS AND ANALYSIS

ESTIMATE OF BASELINE SCENARIO EMISSIONS

The model is set up to estimate emissions reductions across a 30-year project lifetime, the standard crediting period for REDD projects. Baseline emissions are reported for the three project sites considered for this analysis of the GCMB grouped project. Baseline emissions are reported for 10-year periods of 2022-2031, 2032-2041, and 2042-2051. As previously stated, only the GCMB IRs project site is modelled as beginning in 2022. Resoluciones Barí and the pre-extension area are modelled as starting in 2024 and 2026, respectively. Complete annual crediting estimates for each site are provided at the end of this annex. In all sites, baseline emissions are expected to increase over time. This is due to both the modelled increase in the adoption rate as well as the accumulation of decay within the BGB and SOC pools.

TABLE E 5 ESTIMATED AVERAGE BASELINE SCENARIO EMISSIONS IN GCMB PROJECT SITES

Site	Scenario	2022-2031			2032-2041			2042-2051		
		Average deforestation Emissions (tCO_2e)	Average degradation Emissions (tCO_2e)	Total average emissions (tCO_2e)	Average deforestation Emissions (tCO_2e)	Average degradation Emissions (tCO_2e)	Total average emissions (tCO_2e)	Average deforestation Emissions (tCO_2e)	Average degradation Emissions (tCO_2e)	Total average emissions (tCO_2e)
GCMB IR's	MMP	59,942	48,467	108,409	96,235	52,870	149,105	110,847	52,870	163,717
	Conservative	49,005	40,732	89,737	91,195	52,674	143,869	110,197	52,870	163,067
	High	54,166	44,526	98,693	93,779	52,846	146,624	110,765	52,870	163,636
Resoluciónes Barí	MMP	48,859	41,547	90,406	78,439	46,170	124,609	96,694	46,255	142,950
	High	36,595	32,269	68,864	73,227	45,729	118,956	95,231	46,255	141,487
	Conservative	43,214	37,398	80,612	76,179	46,020	122,199	96,197	46,255	142,453
Pre-Extension Area	MMP	269,092	241,851	510,943	430,230	271,869	702,100	566,266	274,922	841,188
	Conservative	128,333	119,441	247,774	363,692	257,365	621,057	532,898	274,897	807,794
	High	229,686	210,241	439,928	416,131	270,216	686,347	560,779	274,922	835,701

TABLE E 6 ESTIMATED AVERAGE PROJECTSCENARIO EMISSIONS IN GCMB PROJECT SITES

Site	Scenario	2022-2031			2032-2041			2042-2051		
		Average deforestation Emissions (tCO_2e)	Average degradation Emissions (tCO_2e)	Total average emissions (tCO_2e)	Average deforestation Emissions (tCO_2e)	Average degradation Emissions (tCO_2e)	Total average emissions (tCO_2e)	Average deforestation Emissions (tCO_2e)	Average degradation Emissions (tCO_2e)	Total average emissions (tCO_2e)
GCMB IR's	MMP	0	0	0	0	0	0	0	0	0
	Conservative	27,920	22,649	50,569	31,379	13,199	44,578	23,744	7,918	31,662
	High	15,477	12,158	27,635	17,697	8,085	25,782	17,309	7,792	25,101
Resoluciónes Barí	MMP	0	0	0	0	0	0	0	0	0
	High	18,202	15,811	34,013	23,189	11,671	34,861	18,843	5,915	24,758
	Conservative	11,330	9,515	20,845	12,347	6,040	18,388	13,088	5,693	18,782
Pre-Extension Area	MMP	0	0	0	0	0	0	0	0	0
	Conservative	76,150	70,216	146,365	139,885	87,979	227,864	122,980	40,988	163,968
	High	74,756	67,320	142,076	80,391	43,314	123,705	89,542	38,109	127,651

Of the three sites, the pre-extension area has the highest average baseline emissions in all three time periods, even in the first 10 years of the project in which project activities are not modelled as beginning until 2026. This is due to the higher rate of historical deforestation in this area, resulting in a greater allocation of the NREF due to a larger proportion of the area being classified as high-risk strata. Conversely, the GCMB IRs are similarly sized yet have much lower baseline emissions. In fact, the area of these two IRs is more than seven times greater than the *Resoluciones Barí* area, but average baseline emissions are only slightly higher. Again, this supports the observation in Annex D that deforestation in the IRs is significantly lower than the other two sites, resulting in much of the two IRs' area being placed in low-risk strata. While this allocation does limit the MMP of the two sites, it is not the only factor that will impact emissions reductions and overall crediting.

ESTIMATE OF PROJECT SCENARIO EMISSIONS

Initial effectiveness for MMP, CCS, and HCS were set at 100%, 50%, and 70% respectively, resulting in respective 100%, 50%, and 30% decreases from historical deforestation and emissions in the project scenario. As effectiveness was initially set at 100% for MMP, there was no increase in effectiveness across the project lifetime, as maximum effectiveness was already achieved. For the Conservative and High scenarios, effectiveness increases annually at a rate of 3%, assuming the project will become more effective as capacity increases, until a maximum effectiveness of 90% is reached. (Table E 3). Again, these parameters should be updated following the establishment of an implementation plan and consultation with local communities on how effective project activities can be in reducing deforestation. Table E 6 above reports estimated project emissions across potential sites within the GCMB grouped project.

Within all GCMB sites, project emissions are estimated to be significantly lower than baseline emissions. However, achieving these substantially lower emissions will require implementation of targeted project activities that are successful in reducing deforestation and conserving existing forest areas.

NET EMISSIONS REDUCTIONS AND CREDITING ESTIMATES

Actual project crediting is based on the difference in carbon stocks between the baseline and project scenarios after accounting for leakage and contributions to a buffer pool, as required by the VCS. Activity shifting leakage results from the displacement of land use change activities from within the project area to lands outside of the designated project area due to project activities. For example, this could involve the displacement of conversion for agriculture or pasture to forests outside the project area but within a designated leakage area. In order to model leakage emissions, we assumed that across all crediting scenarios, there would be a constant 15% of gross emissions reductions (i.e., baseline emissions – project emissions) displaced as activity-shifting leakage throughout the project lifetime. For most projects this is a conservative estimate and many projects, such as the BioREDD projects, are able to reduce activity-shifting leakage emissions to 0 tCO_2.

Market effects leakage results from project activities reducing the supply of agricultural and forest commodities, leading to changes in market supply. It is assumed that any resulting decrease in the supply of a commodity with a constant demand would result in the unfulfilled demand for that commodity being met through an increase in supply of that commodity elsewhere in the country. These market effects would theoretically result in an increase in emissions in other areas of the country as the agricultural supply would increase there to meet remaining demand. However, market leakage is primarily the result of the displacement of logging activities. While logging may be a driver of deforestation within some sites, it is likely that this logging is actually driving degradation, as areas are not converted to non-forest as a result of these activities. Thus, market leakage is modelled as 0 in all sites.

REDD projects receive credits based on the difference in emissions between the baseline and project scenarios. Typically, net emissions reductions (NERs) are calculated by subtracting project and leakage emissions from gross baseline emissions. NERs are displayed as a positive number, although they show the overall emissions prevented from being released into the atmosphere as a result of the project. Finally, the total Verified Carbon Units (VCUs) generated by the project take into account the VCS buffer allocation, which is a percentage of credits determined by the project's risk rating that are kept by the VCS in order to safeguard against project failure. EP Carbon has selected a risk rating of 15% across all potential crediting scenarios across the project lifetime for this analysis based on experience with similar projects. If the project is developed under the VCS, the Non-Permanence Risk (NPR) Tool is used to assess a risk rating for the project. Most projects observe a higher risk rating in initial project years followed by a decrease over time as the project becomes established and financially stable through the sale of credits, although the VCS does not allow for a risk rating less than 10%. While the accounting model conservatively estimates that the risk rating will remain at 15% across the project lifetime, it also estimates a buffer release every six years, which assumes that the buffer pool is not used by the project and that the risk rating will not increase over time. If true, the buffer allocation is "released" back to the project during those years. Table E7 below presents average VCUs for each site across a 10-year period. A full estimate of annual emissions reductions for each site is at the end of this annex.

TABLE E 7 TOTAL ESTIMATED VCUS IN GCMB PROJECT SITES

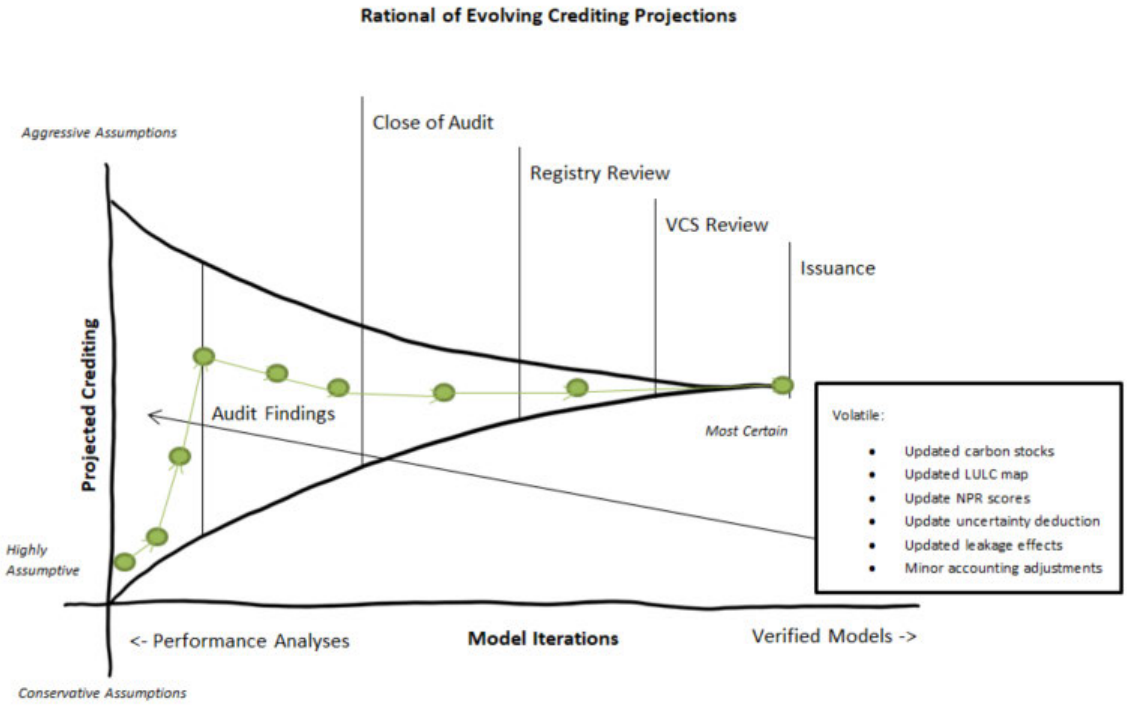
PNN	Scenario	VCUs 2022-2031 (tCO_2)	VCUs 2032-2041 (tCO_2)	VCUs 2042-2051 (tCO_2)	VCUs across project lifetime (tCO_2)
GCMB IR's	MMP	1,539,267	2,222,327	2,548,109	6,309,703
	Conservative	553,456	1,452,937	2,003,457	4,009,851
	High	1,006,314	1,788,511	2,140,977	4,935,802
Resoluciónes Barí	MMP	1,023,252	1,843,876	2,208,913	5,076,041
	High	392,531	1,226,462	1,772,884	3,391,878
	Conservative	674,685	1,526,506	1,899,712	4,100,904
Pre-Extension Area	MMP	4,311,943	10,314,545	12,910,200	27,536,688
	High	853,372	5,671,914	9,670,906	16,196,193

	Conservative	2,507,802	8,209,379	10,799,228	21,516,409

LIMITATIONS AND CHALLENGES

The preliminary carbon accounting results presented in this report should be considered as a current best estimate of emissions reductions based on available data and information. In general, across the potential parameters that have been selected, it is likely that actual credit generation will fall within the High or Conservative estimate range meet or exceed these projections. However, significant sources of uncertainty remain. As additional data becomes available (particularly the updated NREF and zoning) and more information is collected the accounting model can be updated and improved, reducing this uncertainty. Figure E 1 presents a visual representation of how crediting estimates typically evolve over time during REDD project development.

FIGURE E 1: EVOLUTION OF CREDITING PROJECTIONS FOR REDD PROJECT DEVELOPMENT



Addressing the following limitations and challenges with updated information and data will improve crediting projections:

- Colombian NREF: While the current NREF has been reviewed by the UNFCCC and available for use, the supporting risk zoning data is unavailable. Additionally, it is only valid through 2022, when project activities are expected to begin. Any adjustments to future NREFs will directly impact the baseline emissions that will be allocated. More information on this issue is provided in Annex D. Geospatial Analysis.

- Risk Allocation: Colombian government agencies are currently working on completing risk zoning data that will serve as the risk map for baseline emissions allocation. This data will be used to calculate the MMP of each project site. However, their results have not been finalized and released to the public. The risk allocation used for this analysis is believed to be a reasonable proxy of the final zoning data, but there will almost certainly be differences in the final risk zoning data that will impact MMP estimates. More information on this issue is provided in Annex D. Geospatial Analysis.

- Project Adoption: The accounting model was established with the assumption that project activities will begin in a sub-area of the GC and MB RIs and then expand over time across the entirety of these IRs as well as into the *Resoluciones Barí* and pre-extension areas. However, without a completed plan for implementation of activities it is challenging to predict how and where the project may expand over time. Completing the implementation plan will allow for the model to be updated with more realistic parameters for project expansion.

- Project Effectiveness Index: The accounting models crediting scenarios currently predict that the project will be effective in reducing deforestation from observed historical rates. While the relevant parameters were established based on our current understanding of the project sites and experience with similar projects, actual project emissions will be estimated based on the monitored land use and land cover (LULC) change within project sites. Although this data will likely not be collected until monitoring for project verification, consultation with communities on agents and drivers of deforestation along with a Theory of Change exercise discussing how effective project activities can be in addressing these threats will reduce uncertainty in this parameter.

- Activity Shifting Leakage: Similar to the project effectiveness index, actual activity shifting leakage data will likely not be collected until monitoring for verification. However, the community consultations and Theory of Change exercises could provide some insight into anticipated leakage.

- Risk Rating: The risk rating is used to calculate the percentage of emissions reductions contributed to the buffer pool and is calculated using the VCS NPR Tool (Verra, 2019). While risks for the project sites have been assessed qualitatively (6.4), additional data and information will need to be collected and analyzed in order to calculate the actual risk rating for each site.

CONCLUSIONS

This analysis identified the potential of a REDD project in the GCMB RIs and surrounding areas and found that there is potential for generating emissions reductions within the IRs themselves, although the MMP may be limited due to lower rates of

historical deforestation. This results in much of the GC and MB RIs being identified as at lower risk of deforestation than much of the surrounding region. However, if implemented project activities are sufficiently effective to reduce deforestation to rates observed prior to 2015, VCU credit generation from just avoided deforestation is likely to exceed 25,000 VCUs by year five of the project. If degradation is included, VCUs would exceed 25,000 by year 3. The differences in annual VCUs between crediting scenarios decrease throughout time. By the end of the project lifetime, very similar crediting profiles are estimated in the different scenarios for the GC and MB RIs, as adoption and effectiveness are modelled as being similar by that time.

Similar differences in crediting potential between the scenarios exist for the Pre-Extension and *Resoluciones Barí.* If the project was able to expand into the surrounding *Resoluciones Barí* and Pre-Extension areas, the potential emissions reductions increase significantly, especially in regard to the Pre-Extension area. However, including these areas requires resolving issues regarding land tenure and implementation of effective activities in areas at high risk of deforestation with limited governance and institutional support, which is why we recommend focusing on the potential GCMB crediting and this was the sole focus of the financial analysis.

While these estimates are intended to provide a conservative assessment of likely crediting scenarios, there are limitations in available data that result in uncertainty for these estimates. For this reason, these accounting estimates should be updated as relevant data and information are released by the Colombian government and collected within the project region. The carbon accounting model (Annex F. Carbon Accounting Model) will be provided so that interested parties may explore the impact of changes to parameters on emissions reductions estimates. Additional financial considerations were taken into account in a separate financial model (Annex G. Financial Model).

ESTIMATED EMISSIONS REDUCTIONS ACROSS EACH PROJECT SITE

TABLE E 8 ANNUAL CREDITING ESTIMATE FOR GC AND MB RIS

Project Year	Crediting Scenario	Sum of Baseline Emissions (tCO2e)	Sum of Project Emissions (tCO2e)	Sum of Activity Shifting Leakage (tCO2e)	Sum of Buffer Contribution (tCO2e)	Sum of Buffer Release (tCO2e)	Sum of VCUs (tCO2e)
1	MMP	171,143	0	25,671	25,671	0	119,800
	Conservative	85,572	63,057	3,377	3,377	0	15,760
	High	85,572	37,834	7,161	7,161	0	33,416
2	MMP	181,293	0	27,194	27,194	0	126,905
	Conservative	107,761	75,625	4,820	4,820	0	22,495
	High	133,433	54,266	11,875	11,875	0	55,416
3	MMP	191,443	0	28,717	28,717	0	134,010
	Conservative	130,965	87,456	6,526	6,526	0	30,457
	High	183,831	68,387	17,317	17,317	0	80,811
4	MMP	201,593	0	30,239	30,239	0	141,115
	Conservative	155,185	98,473	8,507	8,507	0	39,698
	High	193,981	65,821	19,224	19,224	0	89,712
5	MMP	211,743	0	31,762	31,762	0	148,220
	Conservative	180,419	108,604	10,772	10,772	0	50,271
	High	204,131	62,881	21,188	21,188	0	98,875
6	MMP	221,894	0	33,284	33,284	21,537	176,863
	Conservative	206,668	117,773	13,334	13,334	5,100	67,327
	High	214,281	59,567	23,207	23,207	11,515	119,815
7	MMP	232,044	0	34,807	34,807	0	162,431
	Conservative	216,819	117,077	14,961	14,961	0	69,819
	High	224,431	55,879	25,283	25,283	0	117,987
8	MMP	242,194	0	36,329	36,329	0	169,536
	Conservative	226,969	116,007	16,644	16,644	0	77,673
	High	234,581	51,817	27,415	27,415	0	127,935
9	MMP	252,344	0	37,852	37,852	0	176,641
	Conservative	237,119	114,563	18,383	18,383	0	85,789
	High	244,731	47,381	29,603	29,603	0	138,145
10	MMP	262,494	0	39,374	39,374	0	183,746
	Conservative	247,269	112,745	20,179	20,179	0	94,167
	High	254,881	48,877	30,901	30,901	0	144,203
11	MMP	268,988	0	40,348	40,348	0	188,291
	Conservative	255,591	109,205	21,958	21,958	0	102,470
	High	263,203	49,565	32,046	32,046	0	149,547

12	MMP	275,482	0	41,322	41,322	51,606	244,443
	Conservative	263,547	105,104	23,766	23,766	20,154	131,065
	High	270,611	49,949	33,099	33,099	35,055	189,519
13	MMP	281,976	0	42,296	42,296	0	197,383
	Conservative	271,138	100,467	25,601	25,601	0	119,470
	High	277,105	50,098	34,051	34,051	0	158,905
14	MMP	288,470	0	43,270	43,270	0	201,929
	Conservative	278,363	95,321	27,456	27,456	0	128,130
	High	283,599	50,382	34,983	34,983	0	163,252
15	MMP	294,964	0	44,245	44,245	0	206,475
	Conservative	285,223	89,693	29,329	29,329	0	136,871
	High	290,093	50,800	35,894	35,894	0	167,505
16	MMP	301,458	0	45,219	45,219	0	211,020
	Conservative	291,717	83,610	31,216	31,216	0	145,674
	High	296,587	51,353	36,785	36,785	0	171,664
17	MMP	307,952	0	46,193	46,193	0	215,566
	Conservative	298,211	77,289	33,138	33,138	0	154,645
	High	303,081	52,041	37,656	37,656	0	175,728
18	MMP	314,446	0	47,167	47,167	83,247	303,359
	Conservative	304,705	77,033	34,151	34,151	42,707	202,077
	High	309,575	52,863	38,507	38,507	61,667	241,366
19	MMP	320,940	0	48,141	48,141	0	224,658
	Conservative	311,199	76,913	35,143	35,143	0	164,000
	High	316,069	53,820	39,337	39,337	0	183,574
20	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	317,693	76,927	36,115	36,115	0	168,536
	High	322,563	54,777	40,168	40,168	0	187,450
21	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	320,940	74,683	36,938	36,938	0	172,380
	High	325,810	54,299	40,727	40,727	0	190,058
22	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	323,537	72,239	37,695	37,695	0	175,909
	High	327,434	53,282	41,123	41,123	0	191,906
23	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	325,485	69,642	38,376	38,376	0	179,090
	High	327,434	51,846	41,338	41,338	0	192,911
24	MMP	327,434	0	49,115	49,115	114,525	343,728
	Conservative	326,784	66,941	38,976	38,976	69,064	250,954
	High	327,434	50,650	41,518	41,518	88,597	282,346
25	MMP	327,434	0	49,115	49,115	0	229,203

	Conservative	327,434	64,183	39,488	39,488	0	184,275
	High	327,434	49,693	41,661	41,661	0	194,419
26	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	327,434	61,417	39,903	39,903	0	186,212
	High	327,434	48,975	41,769	41,769	0	194,921
27	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	327,434	59,024	40,261	40,261	0	187,887
	High	327,434	48,496	41,841	41,841	0	195,256
28	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	327,434	56,871	40,584	40,584	0	189,394
	High	327,434	48,257	41,876	41,876	0	195,424
29	MMP	327,434	0	49,115	49,115	0	229,203
	Conservative	327,434	54,956	40,872	40,872	0	190,734
	High	327,434	48,257	41,876	41,876	0	195,424
30	MMP	327,434	0	49,115	49,115	141,550	370,753
	Conservative	327,434	53,282	41,123	41,123	94,717	286,623
	High	327,434	48,257	41,876	41,876	112,889	308,312

TABLE E 9 ANNUAL CREDITING ESTIMATE FOR RESOLUCIONES BARÍ

Project Year	Crediting Scenario	Sum of Baseline Emissions (tCO2e)	Sum of Project Emissions (tCO2e)	Sum of Activity Shifting Leakage (tCO2e)	Sum of Buffer Contribution (tCO2e)	Sum of Buffer Release (tCO2e)	Sum of VCUs (tCO2e)
1	MMP	0	0	0	0	0	0
	Conservative	0	0	0	0	0	0
	High	0	0	0	0	0	0
2	MMP	0	0	0	0	0	0
	Conservative	0	0	0	0	0	0
	High	0	0	0	0	0	0
3	MMP	149,731	0	22,460	22,460	0	104,812
	Conservative	49,411	30,409	2,850	2,850	0	13,301
	High	74,866	27,645	7,083	7,083	0	33,055
4	MMP	158,611	0	23,792	23,792	0	111,028
	Conservative	77,047	45,137	4,787	4,787	0	22,338
	High	116,739	39,651	11,563	11,563	0	53,961
5	MMP	167,492	0	25,124	25,124	0	117,244
	Conservative	106,149	59,110	7,056	7,056	0	32,927
	High	160,831	49,968	16,629	16,629	0	77,604
6	MMP	176,372	0	26,456	26,456	10,706	134,166
	Conservative	136,715	72,239	9,671	9,671	2,204	47,337
	High	169,712	48,094	18,243	18,243	5,291	90,424
7	MMP	185,252	0	27,788	27,788	0	129,676
	Conservative	168,747	84,434	12,647	12,647	0	59,019
	High	178,592	45,945	19,897	19,897	0	92,852
8	MMP	194,132	0	29,120	29,120	0	135,892
	Conservative	179,036	84,892	14,122	14,122	0	65,900
	High	187,472	43,524	21,592	21,592	0	100,764
9	MMP	203,012	0	30,452	30,452	0	142,109
	Conservative	187,916	84,384	15,530	15,530	0	72,473
	High	196,352	40,829	23,328	23,328	0	108,866
10	MMP	211,892	0	31,784	31,784	0	148,325
	Conservative	196,796	83,602	16,979	16,979	0	79,236
	High	205,232	37,861	25,106	25,106	0	117,160
11	MMP	220,772	0	33,116	33,116	0	154,541
	Conservative	205,676	82,547	18,469	18,469	0	86,191
	High	214,112	34,620	26,924	26,924	0	125,645
12	MMP	229,653	0	34,448	34,448	35,908	196,664
	Conservative	214,556	81,218	20,001	20,001	14,986	108,323

	High	222,993	35,713	28,092	28,092	24,761	155,857
13	MMP	235,334	0	35,300	35,300	0	164,734
	Conservative	222,381	78,967	21,512	21,512	0	100,390
	High	230,273	36,216	29,109	29,109	0	135,840
14	MMP	241,016	0	36,152	36,152	0	168,711
	Conservative	229,678	76,166	23,027	23,027	0	107,458
	High	236,755	36,497	30,039	30,039	0	140,180
15	MMP	246,697	0	37,005	37,005	0	172,688
	Conservative	236,447	72,849	24,540	24,540	0	114,518
	High	242,436	36,605	30,875	30,875	0	144,081
16	MMP	252,379	0	37,857	37,857	0	176,665
	Conservative	242,688	69,047	26,046	26,046	0	121,549
	High	248,118	36,813	31,696	31,696	0	147,913
17	MMP	258,060	0	38,709	38,709	0	180,642
	Conservative	248,402	64,793	27,541	27,541	0	128,526
	High	253,799	37,118	32,502	32,502	0	151,677
18	MMP	263,742	0	39,561	39,561	63,442	248,061
	Conservative	254,083	60,349	29,060	29,060	34,138	169,752
	High	259,481	37,522	33,294	33,294	48,394	203,764
19	MMP	269,423	0	40,413	40,413	0	188,596
	Conservative	259,765	55,730	30,605	30,605	0	142,824
	High	265,162	38,025	34,071	34,071	0	158,996
20	MMP	275,105	0	41,266	41,266	0	192,573
	Conservative	265,446	55,543	31,485	31,485	0	146,932
	High	270,844	38,626	34,833	34,833	0	162,553
21	MMP	280,786	0	42,118	42,118	0	196,550
	Conservative	271,128	55,455	32,351	32,351	0	150,971
	High	276,525	39,325	35,580	35,580	0	166,040
22	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	276,809	55,466	33,202	33,202	0	154,940
	High	282,207	40,024	36,327	36,327	0	169,528
23	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	280,616	54,420	33,929	33,929	0	158,337
	High	285,047	39,675	36,806	36,806	0	171,761
24	MMP	286,468	0	42,970	42,970	91,321	291,848
	Conservative	283,485	52,983	34,575	34,575	57,612	218,963
	High	286,468	38,932	37,130	37,130	72,771	246,046
25	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	285,417	51,212	35,131	35,131	0	163,943
	High	286,468	37,883	37,288	37,288	0	174,010

26	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	286,411	49,164	35,587	35,587	0	166,073
	High	286,468	37,008	37,419	37,419	0	174,621
27	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	286,468	46,897	35,936	35,936	0	167,699
	High	286,468	36,309	37,524	37,524	0	175,111
28	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	286,468	44,876	36,239	36,239	0	169,114
	High	286,468	35,785	37,602	37,602	0	175,478
29	MMP	286,468	0	42,970	42,970	0	200,527
	Conservative	286,468	43,127	36,501	36,501	0	170,338
	High	286,468	35,435	37,655	37,655	0	175,723
30	MMP	286,468	0	42,970	42,970	116,296	316,823
	Conservative	286,468	41,554	36,737	36,737	81,066	252,505
	High	286,468	35,260	37,681	37,681	95,548	271,394

TABLE E 10 ANNUAL CREDITING ESTIMATE FOR PRE-EXTENSION AREA

Project Year	Crediting Scenario	Sum of Baseline Emissions (tCO2e)	Sum of Project Emissions (tCO2e)	Sum of Activity Shifting Leakage (tCO2e)	Sum of Buffer Contribution (tCO2e)	Sum of Buffer Release (tCO2e)	Sum of VCUs (tCO2e)
1	MMP	0	0	0	0	0	0
	Conservative	0	0	0	0	0	0
	High	0	0	0	0	0	0
2	MMP	0	0	0	0	0	0
	Conservative	0	0	0	0	0	0
	High	0	0	0	0	0	0
3	MMP	0	0	0	0	0	0
	Conservative	0	0	0	0	0	0
	High	0	0	0	0	0	0
4	MMP	0	0	0	0	0	0
	Conservative	0	0	0	0	0	0
	High	0	0	0	0	0	0
5	MMP	889,936	0	133,490	133,490	0	622,955
	Conservative	222,484	154,130	10,253	10,253	0	47,848
	High	444,968	184,956	39,002	39,002	0	182,008
6	MMP	942,716	0	141,407	141,407	20,024	679,925
	Conservative	324,673	214,134	16,581	16,581	1,538	78,915
	High	693,842	265,284	64,284	64,284	5,850	305,841
7	MMP	995,496	0	149,324	149,324	0	696,847
	Conservative	432,139	270,990	24,172	24,172	0	112,804
	High	955,911	334,313	93,240	93,240	0	435,119
8	MMP	1,048,275	0	157,241	157,241	0	733,793
	Conservative	544,884	324,331	33,083	33,083	0	154,387
	High	1,008,691	321,769	103,038	103,038	0	480,845
9	MMP	1,101,055	0	165,158	165,158	0	770,739
	Conservative	662,906	373,792	43,367	43,367	0	202,380
	High	1,061,470	307,397	113,111	113,111	0	527,852
10	MMP	1,153,835	0	173,075	173,075	0	807,684
	Conservative	786,207	419,008	55,080	55,080	0	257,039
	High	1,114,250	291,196	123,458	123,458	0	576,138
11	MMP	1,206,614	0	180,992	180,992	0	844,630
	Conservative	914,785	459,612	68,276	68,276	0	318,621
	High	1,167,030	273,168	134,079	134,079	0	625,703
12	MMP	1,259,394	0	188,909	188,909	162,100	1,043,676
	Conservative	1,048,641	495,239	83,010	83,010	37,391	424,772
	High	1,219,809	253,311	144,975	144,975	99,654	776,203
13	MMP	1,312,174	0	196,826	196,826	0	918,522

	Conservative	1,143,279	507,029	95,438	95,438	0	445,375
	High	1,272,589	231,626	156,144	156,144	0	728,674
14	MMP	1,364,954	0	204,743	204,743	0	955,468
	Conservative	1,196,059	498,141	104,688	104,688	0	488,542
	High	1,325,369	238,939	162,965	162,965	0	760,501
15	MMP	1,398,722	0	209,808	209,808	0	979,105
	Conservative	1,244,085	484,133	113,993	113,993	0	531,967
	High	1,368,643	242,300	168,951	168,951	0	788,440
16	MMP	1,432,490	0	214,874	214,874	0	1,002,743
	Conservative	1,290,211	467,210	123,450	123,450	0	576,101
	High	1,407,164	244,180	174,448	174,448	0	814,089
17	MMP	1,466,259	0	219,939	219,939	0	1,026,381
	Conservative	1,334,436	447,503	133,040	133,040	0	620,853
	High	1,440,932	244,908	179,404	179,404	0	837,217
18	MMP	1,500,027	0	225,004	225,004	323,050	1,373,069
	Conservative	1,376,759	425,146	142,742	142,742	129,825	795,955
	High	1,474,701	246,294	184,261	184,261	232,739	1,092,624
19	MMP	1,533,795	0	230,069	230,069	0	1,073,657
	Conservative	1,417,182	400,269	152,537	152,537	0	711,839
	High	1,508,469	248,339	189,020	189,020	0	882,091
20	MMP	1,567,564	0	235,135	235,135	0	1,097,295
	Conservative	1,455,703	373,003	162,405	162,405	0	757,890
	High	1,542,237	251,042	193,679	193,679	0	903,837
21	MMP	1,601,332	0	240,200	240,200	0	1,120,932
	Conservative	1,492,323	343,482	172,326	172,326	0	804,189
	High	1,576,006	254,404	198,240	198,240	0	925,122
22	MMP	1,635,100	0	245,265	245,265	0	1,144,570
	Conservative	1,527,042	342,662	177,657	177,657	0	829,066
	High	1,609,774	258,424	202,703	202,703	0	945,945
23	MMP	1,668,869	0	250,330	250,330	0	1,168,208
	Conservative	1,560,810	342,073	182,811	182,811	0	853,116
	High	1,643,543	263,103	207,066	207,066	0	966,308
24	MMP	1,702,637	0	255,396	255,396	488,493	1,680,339
	Conservative	1,594,578	342,142	187,866	187,866	258,923	1,135,629
	High	1,677,311	267,781	211,429	211,429	374,074	1,360,744
25	MMP	1,702,637	0	255,396	255,396	0	1,191,846
	Conservative	1,619,905	337,021	192,433	192,433	0	898,019
	High	1,694,195	265,442	214,313	214,313	0	1,000,127
26	MMP	1,702,637	0	255,396	255,396	0	1,191,846
	Conservative	1,641,854	330,628	196,684	196,684	0	917,858
	High	1,702,637	260,471	216,325	216,325	0	1,009,516
27	MMP	1,702,637	0	255,396	255,396	0	1,191,846
	Conservative	1,660,427	323,199	200,584	200,584	0	936,060
	High	1,702,637	253,453	217,378	217,378	0	1,014,429

28	MMP	1,702,637	0	255,396	255,396	0	1,191,846
	Conservative	1,675,622	314,965	204,099	204,099	0	952,460
	High	1,702,637	247,604	218,255	218,255	0	1,018,523
29	MMP	1,702,637	0	255,396	255,396	0	1,191,846
	Conservative	1,687,441	306,162	207,192	207,192	0	966,895
	High	1,702,637	242,925	218,957	218,957	0	1,021,798
30	MMP	1,702,637	0	255,396	255,396	645,075	1,836,921
	Conservative	1,695,883	297,023	209,829	209,829	398,413	1,377,615
	High	1,702,637	239,416	219,483	219,483	512,461	1,536,715

ANNEX F. CARBON ACCOUNTING MODEL

See Excel spreadsheet attachment named "Annex F – REDD_Accounting_GCMB_v3.0.xlsx" for full carbon accounting model.

ANNEX G. FINANCIAL MODEL

See Excel spreadsheet attachment named "Annex G - Financial Projections GCMB v1.3.xlsx" for full financial model

ANNEX H. FINANCIAL SUPPORTING INFORMATION

TABLE H 1: DEFINITIONS OF THE OUTPUTS OF THE FINANCIAL SUMMARY MODEL

Output	Description
Capital Required	Total funds required to set up, implement, and monitor the Project over a 30-year timeframe less any profit generated by the Project. This item corresponds to the funds that will need to be raised from external parties to develop the Project. Refer to Section 8.4 for a description of the main costs of the Project and Section 8.6 for an overview of the potential funders.
The Net Present Value (NPV)	Present value of all the cash inflows and outflows of the project calculated over 30 years (pre-tax).
The Internal Rate of Return (IRR)	Financial return that the Project is expected to generate annually over 30 years (pre-tax). The communities will not receive this rate of return each year. Instead, the IRR is a financial metric that indicates the profitability of a project over a specific period of time
Cash Flow Breakeven Point	We used Verra's definition in the AFOLU Non-Permanence Risk Tool v4.0. The breakeven point corresponds to the year in which the cumulative cash flow is positive (i.e., cash flow in exceeds cash flow out) and stays positive.
First X-Year Cash Flow	This item corresponds to the cumulative net cash flows generated by (or required for) the project in the first 5, 10, and 15 years and over the project lifetime. It represents the cash that the project will generate for the communities. When negative, the Project incurs more costs than it generates profits and external capital is required to fund the deficit. When positive, the Project generates more profit than it incurs costs. The communities are the beneficiary of this profit, after any

	revenue split arrangements have been settled with the potential financiers of the Project.

TABLE H 2 - SUMMARY OF COSTS ASSOCIATED WITH PROJECT DEVELOPMENT AND IMPLEMENTATION

Cost Category	Description	Assumption
Project Development	Fees payable to EP Carbon for providing technical support. This includes a comprehensive review of the documentation, the preparation of the Project Description and the first Monitoring and Implementation Report (MIR).	Approx. [redacted]
Follow-on MIRs	Fees payable to EP Carbon for preparing subsequent MIRs throughout the project lifetime.	Circa [redacted] for each individual follow-on MIR.
VCS and CCB Registration and Issuance	Fees levied by the VCS and CCB standards at the start of the Project and at each credit issuance event.	Varies per year based on the issued credit volume. Starts at circa [redacted] in year 1 and reaches a maximum at circa [redacted] in year 30.
Validation and Verification	Expenses associated to (i) the VCS and CCB audit work and audit fees at the validation stage as well as at each verification event, and (ii) baseline revisions every six years.	Validation: [redacted] one-off cost (VCS and CCB). Verification: [redacted] every 2 years (VCS and CCB). Baseline: [redacted] every 6 years.
Bank fees	Colombian banks charge transfer fees on all transactions as well as foreign exchange conversion fees on transactions involving foreign currencies.	3% of annual revenues.
Fiduciary benefit sharing	Percentage of revenue allocated to a third-party fiduciary who will manage the funds of the Project.	3% of annual revenues.
Marketing and Selling	Expenses associated with the preparation of marketing materials, media collection, trips to carbon expos, visit to buyers,	Fixed cost: [redacted] per year.

	and commissions to sales representatives. Marketing and selling expenses generally involve a fixed and variable cost component.	Variable cost: 5% of annual revenues.
General and Administrative	Costs associated with managing the day-to-day running of the Project (e.g., office rent, overheads, staff travel, fuel, etc.).	Varies per year. Averages approx. [redacted] per year.
Equipment	Costs to purchase computers, cameras, vehicles, forestry tools, and software to handle the administration and monitoring of the Project.	Varies per year. Averages at [redacted] per year.
Human Resources	Costs of employing on the ground staff and a management team to oversee the Project.	Varies per year. Ramps up to roughly [redacted] as of year 6.

TABLE H 3: COMPARISON OF POTENTIAL INVESTORS IN THE PROJECT

	Equity investor	Lender	Ex-ante credit buyer	Donor
Instrument	Stock (equity stake)	Interest-bearing loan	Pre-sale	Grant
Description	Funder is a shareholder in the project along with the community.	Funder lends money to the Project. The Project company has to pay back the borrowed fund and pay interests.	Funder is a buyer who agrees to buy credits before verification and issuance.	Funder donates money in exchange for the Project to deliver community, climate, and/or biodiversity impact outcomes.
Risk appetite	Medium. Equity investors invests in partly de-risked projects only, generally post feasibility study. In very rare cases, the funder may invest prior to a feasibility study.	Low. Lenders generally invests post project validation.	Medium-High. Buyers may purchase credits from early-stage projects (pre-feasibility) assuming high quality credits, a clear crediting path, and a discounted price.	Medium. Varies vastly per donor and grant types.
Timing to funding	Generally between 4 and 15 months. *Projects that can share a lot of data upfront in a structured fashion tend to be processed much faster than projects with minimal data available.*	Generally between 6 and 12 months. *Projects that can share a lot of data upfront in a structure fashion tend to be processed much faster than projects with minimal data available.*	Generally between 3 and 8 months.	Varies vastly per donor and grant types.
Ticket size (size of typical investment)	Varies vastly per investor – from a million up to double digit millions of US dollars.	Varies vastly per investor – from a million up to double digit millions of US dollars.	Based on the credit volume and the credit price.	Smaller ticket – a couple of thousands to one digit millions of dollars.

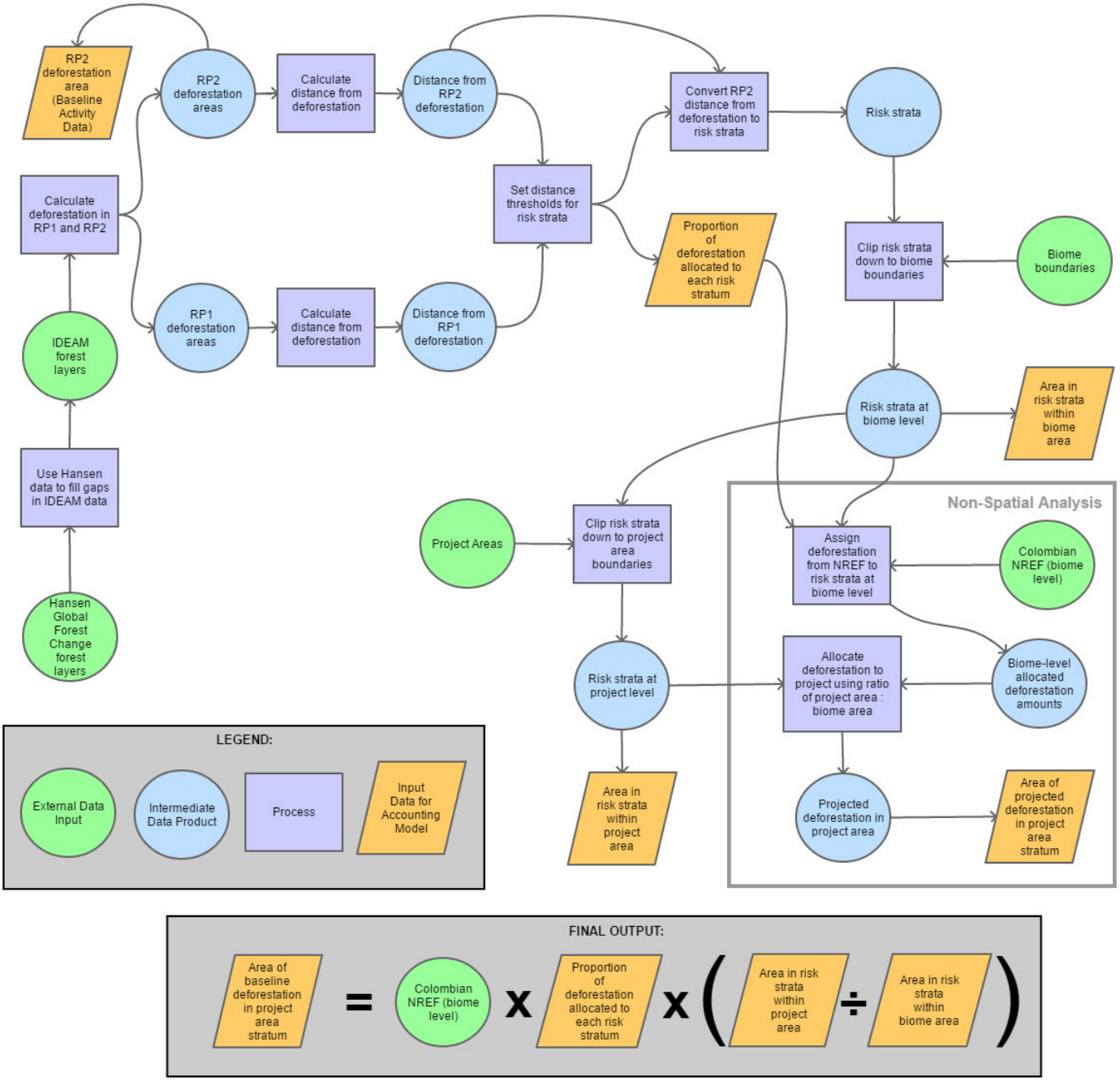
Ownership stake	Yes. The percentage ownership would generally be a controlling minority (30-49% of the Project).	No	No	No
Control	High. Equity investors can hold seats on the Board of Directors of the Project company. This allows them to vote on key matters related to the Project, e.g., budgets, project expansions and other strategic matters.	Medium. Lenders verify a number of financial ratios (called covenants) related to the Project on a quarterly basis, e.g. the interest coverage ratio. Any breach of covenants triggers may trigger a penalty for the borrower, the Project company.	Low. The Project is responsible for delivering a specific amount of credits to the buyer within a specific timeframe, as per an Emission Reduction Purchase Agreement (ERPA). Failing to deliver in line with the ERPA terms may trigger a liability for the project.	Medium-Low. Donors require regular reporting on key impact and performance metrics. Poor reporting practices or below expected performance may block future funding events.

ANNEX I. PROJECT TIMELINE

See Excel spreadsheet attachment named "Annex I - Project Timeline GCMB v1.0" for project timeline chart.

ANNEX J. FLOWCHART OF GEOSPATIAL AND ACCOUNTING PROCESS

FIGURE J 1: FLOWCHART OF GEOSPATIAL AND ACCOUNTING PROCESS



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