



CASE STUDY REPORT

INTEGRATING VOLUNTARY BIODIVERSITY CREDITS INTO CONSERVATION PROJECTS: LESSONS FROM COLOMBIA AND ETHIOPIA

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EXECUTIVE SUMMARY

This Case Study Report explores the potential of biodiversity credits as part of the market-based mechanisms to incentivize the protection and restoration of biodiversity. Biodiversity credits serve as economic tools that generate positive impacts on biodiversity by valuing and supporting conservation efforts. The document discusses the application of the Protocol for Issuing Voluntary Biodiversity Credits (VBC) in projects in Colombia and Ethiopia, aiming to test the Protocol's effectiveness and scalability.

The Protocol provides guidelines for registering, quantifying, and issuing VBC, ensuring transparency, result measurement, and long-term sustainability. It governs the issuance of Voluntary Biodiversity Credits, representing preserved and/or restored ecosystems that contribute to the conservation of threatened habitats and ecosystem services. The number of credits a project can issue depends on factors such as ecosystem threat level, connectivity, project duration, and preservation/restoration actions.

The El Globo Cloud Forest Habitat Bank was implemented as the pilot project for the Protocol. Subsequently, the Protocol was applied to Aguadulce-Río Sumapaz Habitat Bank. The projects followed the Protocol's methodology in determining the credits to be issued based on threat levels, connectivity, project duration, and actions. The registration documents were prepared for both projects. It is worth mentioning that milestone compliance verification is undergoing for El Globo project.

In Ethiopia, the Protocol was tested in the Agama Participatory Forest Management (PFM) project. A workshop was conducted to introduce the concept of VBC, and ongoing discussions are taking place with environmental authorities to ensure compliance with regulations and address community needs. Nevertheless, Protocol's application on the PFM was challenging since information on threat category was not available for the area, and aspects

such as the project duration and the area where preservation and restoration actions are going to take place are yet to be determined.

The implementation of biodiversity credits faces challenges such as limited scalability due to the small market size and the need for integration into larger conservation plans. Factors such as site selection, property ownership, project design, governance, and monitoring processes are crucial for success. Market dynamics, regulatory frameworks, stakeholder engagement, and available biodiversity initiatives also determine the mechanism's scope.

Several insights were gathered by applying the Protocol in diverse contexts and ecosystems, to enhance its effectiveness and address multifactorial considerations. The document emphasizes the importance of considering all aspects of biodiversity credit projects and provides a comprehensive understanding of the experiences gained through visiting the projects, collecting various actors' comments and testing how the Protocol's guidance responds to the key features of each project. The Protocol offers a potential path to fund biodiversity preservation and restoration while benefiting local communities, but its scalability depends on market dynamics and the availability of relevant initiatives.

In general terms, this Case Study Report provides valuable insights into the implementation of the Protocol for Issuing Voluntary Biodiversity Credits in various projects, highlighting the need for comprehensive strategies and the potential of market-based mechanisms in promoting biodiversity conservation. The assessment of the applicability of VBC in the projects demonstrates their feasibility as market-based conservation strategy, emphasizing their alignment with international agreements and the unique considerations for each project. These insights contribute to effective decision-making and sustainable biodiversity outcomes within the VBC framework.

1. INTRODUCTION

1.1. Opportunity in biodiversity credits and tendencies

Biodiversity is the variety of living organisms present in an ecological system, encompassing species, genetic diversity, and ecosystem diversity (CBD, 1992; Feest et al., 2010; Díaz et al., 2019). It also includes the genetic diversity within species, abundance and richness, the variety of habitats and species distribution as well as the ecological processes that support life on Earth (Díaz et al., 2019; Mace et al., 2020; IPBES, 2019). Nevertheless, despite its intrinsic value, biodiversity is under danger due to a variety of threats that risk both its survival and crucial ecological processes. Habitat loss, pollution, invasive species, climate change, and overuse of natural resources are some of the major challenges to biodiversity nowadays (CBD, 2014; Bongaarts, 2019; Díaz et al., 2020).

In response to these threats and the need to tackle complex societal challenges like adaptation to global change, food security, and access to water, amongst others, there is growing recognition and adoption of *Market-based mechanisms*. The Market-based mechanisms play a vital role by mobilizing economic incentives to promote the conserva-

tion and sustainable use of natural resources (ten Kate et al., 2004; Wunder et al., 2008). At the same time, they provide innovative perspectives that strategically align environmental goals with economic interests, attending both the preservation and restoration of biodiversity (ten Kate et al., 2004). Some examples of Market-based mechanisms are biodiversity offsets, eco-certifications, payment for ecosystem services (PES), carbon credits, and biodiversity credits.

Biodiversity Credits

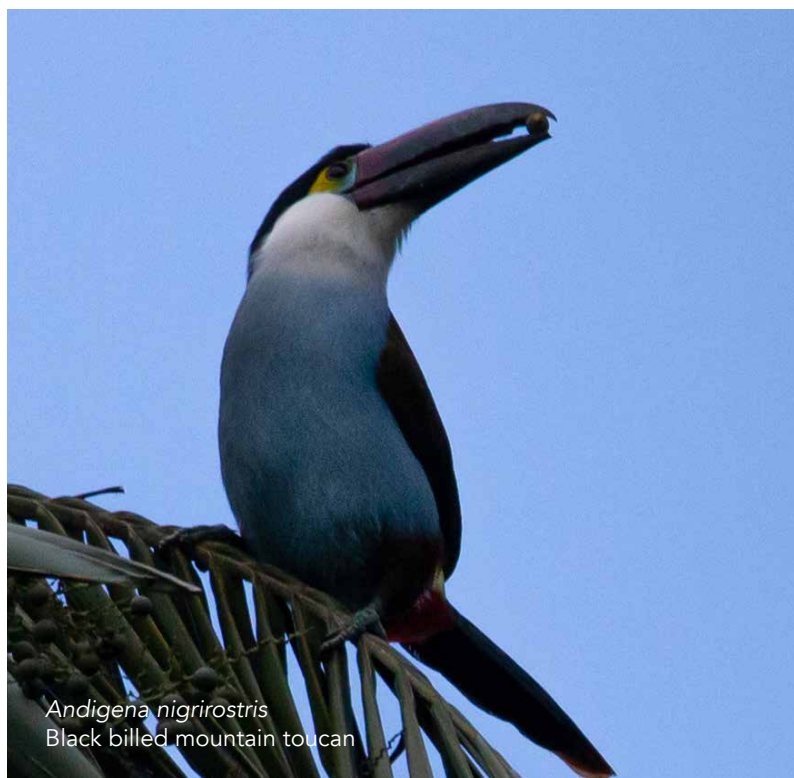
Biodiversity credits constitute a market-based mechanism designed to incentivize the protection and restoration of biodiversity (World Economic Forum, 2022). They serve as an economic tool that enables the financing of activities that generate verifiable positive impacts on biodiversity, such as the preservation and/or restoration of natural habitats, species, landscapes and/or ecosystems (World Economic Forum, 2022). These credits are created and sold in the form of biodiversity units, providing a mechanism for valuing, and supporting conservation efforts (Porrás & Steele, 2020).

Biodiversity credits not only compensate for ecological value lost in projects and mitigate negative impacts on biodiversity but also contribute to enhancing local biodiversity without any compliance obligation (OCDE, 2016; Nature Finance & Nature Markets, 2022). In contrast, biodiversity offsets require a like-for-like approach (Nature Finance & Nature Markets, 2022). Including biodiversity credits in the mitigation hierarchy (Avoid, Reduce, Restore & Regenerate, Transform) is recommended due to limited global interchangeability of biodiversity (McKenney & Kiesecker, 2010).

By incorporating biodiversity credits into different initiatives, organizations can emphasize the significance of avoiding and reducing negative impacts on biodiversity, while also prioritizing restoration, regeneration, and transformative actions that contribute to biodiversity conservation (Nature Finance & Nature Markets, 2022). This integrated approach recognizes the unique nature of biodiversity and highlights the need for comprehensive strategies that encompass a range of conservation measures.

The general process for issuing biodiversity credits, in despite of the characteristics of the project, involves identifying a site with a significant ecological value and assess its biodiversity baseline (OCDE, 2016). As next general step, a management plan is developed and implemented to preserve and/or restore biodiversity, including monitoring schemes (OCDE, 2016). When the three main steps are fully implemented, the project can generate biodiversity credits that can be sold to stakeholders, companies, natural people, and other actors (ten Kate & Bishop, 2004; OCDE, 2016).

Several programs exemplify the implementation of Biodiversity Credits. For instance, *Wilderlands*, a non-profit organization, has introduced *Biological Diversity Units (BDU)* as a nature-based credit system. Each BDU represents one square meter of high conservation value land. *Re-planet*, a purpose-driven company, on the other hand, issues biodiversity credits based on the *Wallacea Trust Methodology*.



Andigena nigrirostris
Black billed mountain toucan

These credits signify successful efforts in increasing biodiversity or avoiding its loss. The *Value Nature's Verified Nature-Based Credits (VNBCs)* ensures the protection of one hectare of land for 10 years. Similar to Re-planet, *Value Nature's* credits also adhere to the Wallacea Trust Methodology. Finally, *Terrasos Voluntary Biodiversity Credits (VBC)* represent the conservation and management of 10 square meters of rare, threatened, or strategic ecosystems. These credits follow a self-developed *Protocol*, ensuring legal, technical, and financial compliance. The *Protocol*, which will be later explored in more detail, provides transparent guidelines for effective biodiversity preservation and stakeholder engagement.

These programs highlight the potential for scaling up biodiversity credits. They provide a path to fund the preservation and restoration of natural regions while also benefiting the local communities who live in/close to those areas. Nonetheless, while there is increased interest in incorporating biodiversity credits into projects around the world, some factors that determine the scope of the mechanism

By incorporating biodiversity credits into different initiatives, organizations can emphasize the significance of avoiding and reducing negative impacts on biodiversity, while also prioritizing restoration, regeneration, and transformative actions

in conservation activities must be considered. Site selection, property ownership status, project design quality, governance, and implementation and monitoring processes are amongst these factors (Phelps et al., 2016). While biodiversity credits have the ability to reduce the effects of human activities on biodiversity, they may not address fundamental causes such as habitat destruction or climate change (Bennett et al., 2015). To successfully address these drivers of biodiversity loss, biodiversity credits must be integrated into larger conservation plans (Bennett et al., 2015). This approach presents an opportunity to scale up and expand the biodiversity credits' mechanism rather than impose a limitation.

The extent of the biodiversity credits mechanism is determined by a number of market and commercial considerations as well. Market dynamics, regulatory frameworks, stakeholder engagement, and the availability of relevant biodiversity initiatives with measurable outcomes are examples of these (Maron et al., 2019; Stickler et al., 2020). It is critical to

understand that the market for biodiversity credits is currently very small, aspect that may limit both their scope and scalability, as well as potential partners' and clients' trust (Phelps et al., 2016).

This document gathers the outcomes of applying the *Protocol for Voluntary Biodiversity Credits* (VBC) in two projects in Colombia and one in Ethiopia. The initiatives were carried out under the financial support of *Partnerships for Forests*, with the aim of testing the protocol's applicability and scaling biodiversity protection in Colombia. The primary objective of this document is to provide a comprehensive understanding of the experiences gained from implementing the Protocol in diverse contexts, ecosystems, and countries. By gathering insights from various stakeholders, the document seeks to enhance the Protocol and emphasize the multifactorial nature of the VBC scalability process, highlighting the importance of considering all aspects of these projects.

2. METHODOLOGY

2.1. Terrasos Protocol Overview

The *Protocol for Issuing Voluntary Biodiversity Credits (VBC)* was developed in response to the growing need for effective biodiversity conservation measures that enables the participation of somehow overlooked actors such as the private sector. The Protocol aims to promote biodiversity conservation by supplying clear guidelines for projects to register, quantify, and issue VBC, while promoting transparency, result measurement, and long-term sustainability through financial and legal safeguards.

The Protocol is governed by principles that ensure transparency, rigor, and efficiency by reducing transaction costs. It provides a guide for stakeholders, including eligible projects, which prove quantifiable improvements in biodiversity by transitioning from a lower to a higher state of biodiversity. These projects must undertake preservation and/or restoration actions that comprehensively protect and restore biodiversity.

A Voluntary Biodiversity Credit (VBC) is a transactional unit that represents 10m2 of a preserved and/or restored ecosystem that is rare, strategic, threatened, and/or non-eligible for biodiversity offset schemes. These credits are technically, financially, and legally managed by the project structurer/owner for at least 20 years, and must prove quality, functionality, and contribution to the conservation of threatened habitats and ecosystem services. Credits can only be sold once the established ecological and management milestones are met.

The number of credits a project can issue is determined using a methodology based on four differentiating rather discounting factors: ecosystem threat level and extent, opportunities for connectivity, project duration and preservation and restoration actions. The highest the scores for each factor, the more credits the project can issue.

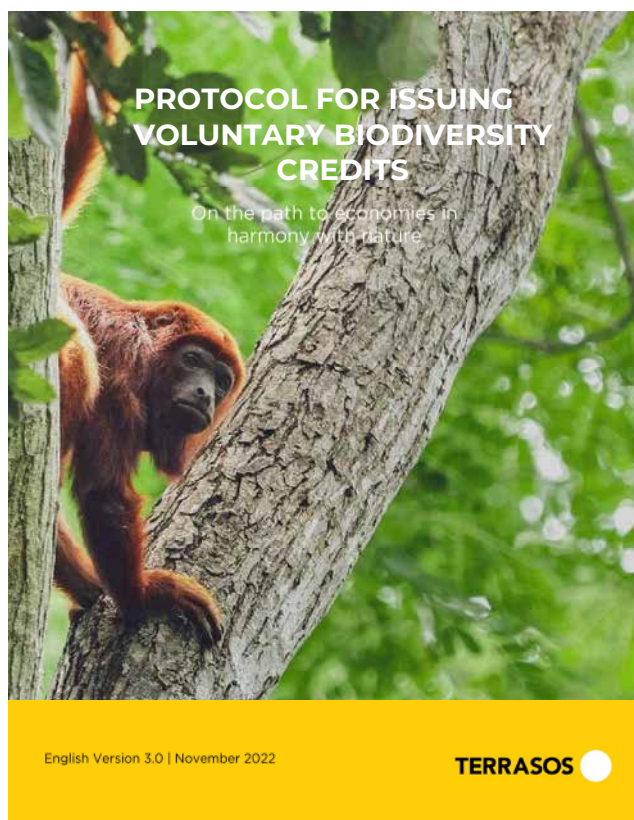


Image 1. Front cover of the third version of *The Protocol*

The Protocol incorporates a progressive credit release scheme, allowing the sale of credits only upon the fulfillment of predefined management and ecological milestones. An external verifier is involved to ensure compliance with these milestones and authorize the release of credits for commercialization. To promote transparency and traceability, a proposed registration platform will offer access to key project information and avoid double credit counting. Additionally, projects are required to monitor and evaluate both management and ecological milestones, as well as the available VBC, ensuring accountability and effectiveness.

Each project must prepare a *Registration Document* that includes technical, legal, and financial information of the project. This document

justifies the importance of the project in terms of additionality and complementarity, describes the objectives, conservation actions, management strategies, credit release schedule, and monitoring and evaluation plan. It must also demonstrate the legal and financial conditions for permanence, as well as establish the registration and environmental accounting process.

This Protocol aims to promote biodiversity conservation through the issuance of Voluntary Biodiversity Credits (hereinafter VBC). It provides clear guidelines for projects, promoting transparency, result measurement, and long-term sustainability.

2.2. Protocol application to El Globo Cloud Forest Project

The Protocol was first applied to the El Globo Cloud Forest Habitat Bank (hereinafter El Globo). The *El Globo project* is a Habitat Bank located in a forested area known for its remnants of native Andean cloud forests in Antioquia, Colombia. These cloud forests play a crucial role in regional development by offering a wide range of ecosystem services. They regulate water resources, sequester carbon, and facilitate nutrient cycling. El Globo is particularly significant due to its conservation of emblematic and endangered species, including the Yellow-eared Parrot (*Ognorhynchus icterotis*) and the Crested Eagle (*Spizaetus isidori*). The project aims to assess the impacts of deforestation and fragmentation on this highly biodiverse and threatened ecosystem.

Posterior to the Protocol's application, a registration document was created¹. This application serves as a pilot for the functioning of VBC in an ecologically strategic area that is duly registered with the environmental authority.

The Protocol application began with the determination and calculation of the four differentiating factors: ecosystem threat level, connectivity, project duration, and actions. This calculation was done without any consideration or exceptions based on the quality, location, or specific characteristics of the project. Considering the aforementioned, the following aspects should be highlighted:

¹. [El Globo Cloud Forest VBC Registration Document in Spanish](#). To access the English version, please contact us: biodiversitycredits@terrasos.co



Image 2. Mountains in El Globo project. Deep and preserved cloud forest vegetation dominates the landscape.

- Information regarding the level of threat is available in the updated threatened ecosystems map (Etter et al., 2017).
- The determination of the connectivity level was performed on a single polygon.
- The project duration was specified in a lease contract to restrict land use to preservation and restoration processes for 30 years.
- The preservation and restoration actions were previously determined in the Registration Document submitted to the MADS (Ministry of Environment and Sustainable Development, abbreviated as in Spanish) in 2021.

The determined credits will be released in five stages, as specified in the Credit Release Scheme (chapter 11 of the registration document), following the fulfillment and verification of ecological and management milestones. Additionally, the registration document was prepared as well as the verification process to ensure the milestone compliance and the correct application of the Protocol.

2.3. Protocol application to Aguadulce-Río Sumapaz Project

The Aguadulce project is the second project where the Protocol was applied. It features remnants of Premontane Moist Forest and scattered relicts of Tropical Dry Forest within the habitat bank but also outside the boundaries of the project area. Despite the strong expansion of agricultural frontiers in the project area and its surroundings, Aguadulce provides a wide array of ecosystem services as well as serve as steppingstone to various species. These services include water provisioning and regulation, seed dispersal, protection of key conservation species like the ocelot (*Leopardus pardalis*) and Jaguarundi (*Herpailurus yagouaroundi*), regulation of carbon emissions, and soil erosion control. The project aims to compensate for inevitable biodiversity losses resulting from urban growth, agricultural expansion, and major infrastructure development.

While following a similar methodology to the El Globo Pilot Project, with a registration document created as well², there were differences for Aguadulce in certain aspects.

2. To access the Aguadulce- Río Sumapaz Registration Document, contact us: biodiversitycredits@terrasos.co

- Two ecosystems with different threat categories were identified using the updated map of threatened ecosystems (Etter et al., 2017).
- Connectivity was assessed for the two separate properties individually.
- Although the project duration has been defined, a Joint Venture Agreement has not yet been signed to formalize it.
- The restoration and preservation actions are outlined in the zoning plan presented in the Registration Document submitted to the MADS in 2022.

With the previous information, the potential credits to be issued were calculated. Nonetheless, Registration Platform and sales channels have not been selected, and the milestone verification process has not commenced yet. Finally, while there are contractual agreements in place, such as the bonding agreement between the property owner and Terrasos, the lease contract, to limit the land use for the time the project will be operating, is still pending signature.

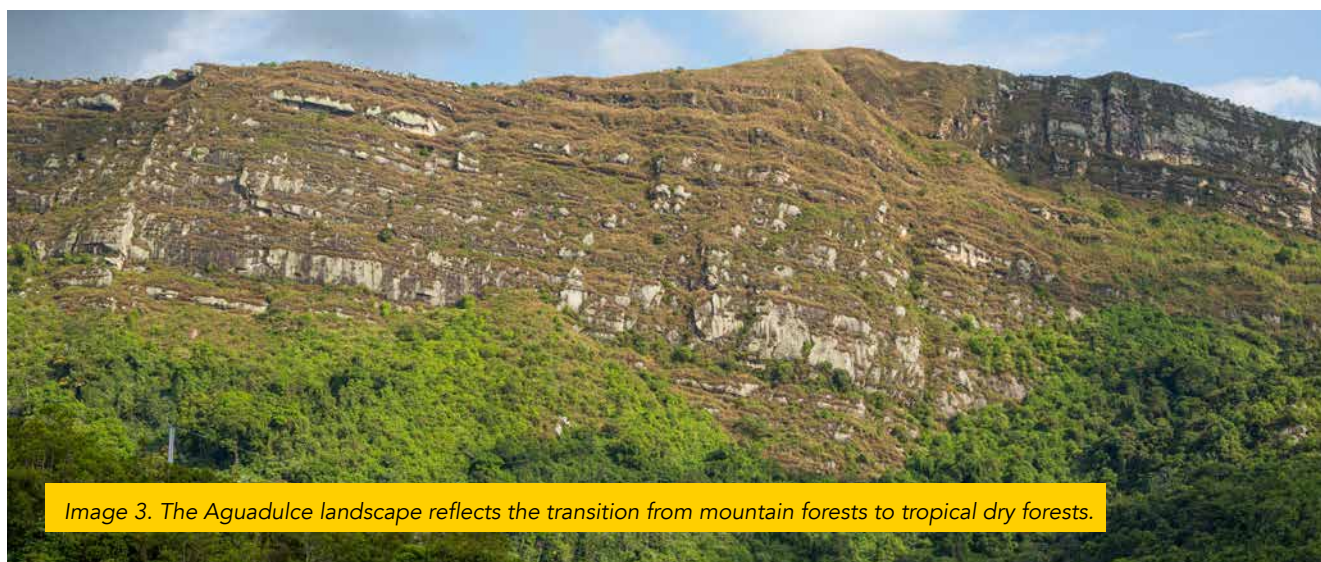


Image 3. The Aguadulce landscape reflects the transition from mountain forests to tropical dry forests.

2.4. Testing the Protocol in Agama PFM, Ethiopia

One of the aims of the P4F Terrasos funding was to test the Protocol in various geographic locations and diverse contexts to improve its effectiveness and further implementation. Additionally, gather feedback and make the Protocol more practical and applicable to different scenarios.

To select a suitable project for testing, a multicriteria matrix³ was used to evaluate potential P4F projects. Based on technical, socioeconomic, and strategic criteria, meetings were held with various project owners. Nevertheless, it was possible to arrange further discussions and the possibility of a field visit with GIZ and the Ethiopian Wild Coffee project, also financially supported by P4F. During these meetings, the Terrasos VBC team explained the Protocol and the definition of the VBC, highlighting how they can bring added value to projects. In return, GIZ supplied geographical information and assisted in selecting an ideal site for testing the Protocol, considering its size and management requirements. Moreover, a visit to the chosen area, eased by GIZ and the Agama Participatory Forest Management in Bonga, Ethiopia, was scheduled to conduct the testing.

The *Agama PFM* project focus on restoration and conservation of a strategic Moist Evergreen Afromontane Forest within the Kaffa Biosphere Reserve, Ethiopia. Located in an area subjected to significant anthropogenic intervention and urban/agricultural expansion, due to the increasing human population and the growing of garden coffee and tea plantations, Agama PFM provides essential ecosystem services. These services include regulation of carbon emissions, habitat provision for emblematic species such as the leopard (*Panthera pardus*), lion (*Panthera leo*), hyena (*Hyaenidae*), etc., food and wood provision, cultural and spiritual connection, amongst others. Furthermore, within the Agama PFM, various Non-Timber Forest Products (hereinafter NTFPs) are being produced to increase income streams for poverty-susceptible populations. Wild coffee plantations, honey, and clove production are some examples of the NTFPs. This project is engaged in reducing deforestation processes and reducing poverty.

3. To access the matrix where all international projects were evaluated, contact biodiversitycredits@terrasos.co



Image 4. The agricultural edge surrounding the PFM. Forest vegetation indicates the boundary of the Agama PFM

The initial phase of our visit to Agama PFM involved a meeting with the PFM council, where they provided an overview of the project, including details about the area, beneficiaries, activities, zoning, government relations, and socio-environmental challenges. Following that, a two-day workshop during the 25th and 26th of April of 2023 was conducted with sixteen participants. The workshop explored the role and significance of biodiversity in ecosystem services and emphasized

the need to integrate tools for valuing biodiversity protection and restoration. During the workshop, Terrasos team introduced the concept of VBC and explained the step-by-step process of generating credits to generate income. An interactive exercise was conducted to calculate the four factors. Based on this experience, a registration document⁴ for the project was drafted, and although some inputs are required for completion, it was provisionally determined the number of credits to be issued.



Image 5. Solomon Hailu, our partner from GIZ explaining the calculation of the differential factors in Amharic to the workshop participants.

Currently, ongoing discussions are taking place with the environmental authorities in the Kaffa region to thoroughly evaluate the project's compatibility and assess whether the VBC mechanism can strategically align with government regulatory frameworks and the aspirations of the local community. These discussions aim to ensure that the project's implementation adheres to environmental guidelines and legal requirements while also addressing the community's needs and preferences.

4. The Registration Document for the Agama PFM project is a proposal rather than an official document. Further discussions and arrangements with the local community as well as other stakeholders are necessary to define the course of action. To access the document, please contact us: biodiversitycredits@terrasos.co

3. RESULTS AND DISCUSSION

3.1. Key project features

The El Globo, Aguadulce and Agama PFM VBC projects are essential for the conservation and sustainable management of diverse ecosystems. By protecting and restoring these habitats, they contribute to the provision of critical ecosystem services and the preservation of endangered species, while also addressing the negative impacts of human activities such as deforestation, fragmentation, urban growth, and agricultural expansion. The Table 1 summarizes the essential characteristics of these projects for easier reference and some of the results of the Protocol application.

Table 1. Key features for the VBC projects

Project	El Globo Cloud Forest	Aguadulce - Río Sumapaz	Agama Participatory Forest Management
Area (ha)	340,11	124,2	1254,27
Location	Támesis, Antioquia, Colombia	Nilo, Cundinamarca, Colombia	Agama PFM, Yeyebito Kebele, Bonga Woreda, Ethiopia
Biotic and abiotic baseline	The preliminary biotic and abiotic baseline has a 1:5000 scale. It was performed for registering the Habitat Bank after the MADS in March 2021.	The preliminary biotic and abiotic baseline has a 1:25000 scale. It was performed for registering the Habitat Bank after the MADS in July 2022.	There is a biotic and abiotic characterization, although it was performed in 2016 as part of the commitments after the PFM.
Type of ecosystem	Andean Cloud Forest	Tropical Dry Forests and Mountainous Forests	Moist Evergreen Afromontane Forests in Ethiopian Highlands
Threat category for the ecosystem	Vulnerable (VU, RLE-IUCN).	Critically endangered (CR, RLE-IUCN) and Vulnerable (VU, RLE-IUCN).	Highly threatened (Kefalew et al., 2022). Critical or Endangered (Olson & Dinerstein, 2002).

Project	El Globo Cloud Forest	Aguadulce - Río Sumapaz	Agama Participatory Forest Management
Connectivity	Moderately supports/restores regional connectivity	Moderately supports/restores regional connectivity	Moderately supports/restores regional connectivity
Land ownership status	Is defined. The land is private property	Is defined. The land is private property	The government owns the land, but beneficiaries of the Participatory Forest Management (PFM) have rights to use it based on a management plan. Failure to comply with agreements on forest use and conservation may result in a modification of these rights.
Conservation easement	A Habitat Bank was registered, and a 30-year usufruct was signed to limit land use to conservation purposes.	A Habitat Bank was registered however the lease contract to limit land use to conservation purposes, that is to say, a joint venture agreement, has not been signed.	The PFM was duly established in 2005 and is operating to the date. Within the PFM agreement the land-use establishes that core forest zones are untouchable and buffer zones can be used for sustainable exploitation (NTFPs). However, for VBC a lease contract has not been defined nor signed.
Management strategies	Preservation, restoration, and enrichment	Preservation and restoration	The main management strategy is conservation of the forested area; restoration actions have not been included within the PFM. Further discussions are necessary.

Project	El Globo Cloud Forest	Aguadulce - Río Sumapaz	Agama Participatory Forest Management
Ecological and management milestones defined	Yes, milestones defined and audited for compliance.	Yes, milestones defined, but verification pending signing of easement.	No. Although some milestones were discussed with some of the members of the Agama PFM, further discussions are necessary to define a proper battery.
Developer	Terrasos	Terrasos	To be defined
Number of issued credits	310,315 (three hundred ten thousand three hundred fifteen)	101,166 (one hundred one thousand one hundred sixty-six).	1,105,775 (one million one hundred five thousand seven hundred seventy-five)
Third-party verifier	KPMG underwent the verification process for the first 2 years milestones ⁵ .	To be defined	To be defined
Registration Platform	The platform Biotrust, created by the Colombian company XM.	To be defined	To be defined
Sales channels	ClimateTrade ⁶ and Terrasos e-commerce ⁷ .	To be defined	To be defined
It is currently selling credits?	Yes	No	No

5. [KPMG Verification Letter](#)

6. To purchase or access the ClimateTrade marketplace, follow the link: [El Globo ClimateTrade](#)

7. To visit Terrasos' marketplace, go and [Act Now](#)

3.2. Assessment of the applicability of VBC in the projects

The assessment of the Voluntary Biodiversity Credits (VBC) applicability for El Globo, Aguadulce and Agama PFM projects is crucial for understanding their feasibility as market-based conservation strategies. Hereinafter, aspects about the additionality and complementarity of the project followed by protocol application, protection figures, economic viability, the governance and aspects related with the verification process will be discussed. This assessment aims to provide valuable insights for effective decision-making and sustainable biodiversity outcomes within the VBC framework.

3.2.1. Additionality

The projects demonstrate strong additionality through their proactive approaches to address biodiversity conservation challenges and provide essential ecosystem services. El Globo project actively combats deforestation and fragmentation, preserving endangered species and regulating water resources in the Andean cloud forest. Aguadulce compensates for biodiversity losses caused by urban growth and agricultural expansion, protecting forests, regulating carbon emissions,

and providing habitat and steppingstones for key species. Agama PFM focuses on restoring a vital forest within the Kaffa Biosphere Reserve, reducing deforestation, alleviating poverty through NTFPs production, and raising awareness about forest conservation. These projects go beyond business-as-usual efforts, making significant contributions to biodiversity preservation and sustainable ecosystem management.

This assessment aims to provide valuable insights for effective decision-making and sustainable biodiversity outcomes within the VBC framework.

Ognorhynchus icterotis

Image 6. Populations of yellow-eared parrots, critically threatened, are thriving within the El Globo project.

Furthermore, VBC enhance the additionality of these projects by providing a market-based mechanism to support and incentivize their conservation and restoration efforts. By generating and selling VBC, the projects receive financial resources that can be invested in expanding their activities, implementing additional conservation measures, and enhancing the long-term sustainability of the ecosystems. This additional funding allows the projects to go beyond their initial scope, intensify their conservation actions, and achieve greater impact in terms of biodiversity preservation and ecosystem services. The VBC mechanism encourages private sector participation and collaboration, amplifying the scale and effectiveness of conservation efforts, as well as promoting the engagement of stakeholders in biodiversity conservation.

3.2.2. Complementarity

VBC projects not only complement each other in terms of structure and management, but they also align with various treaties and regulations. These projects are in harmony with international agreements such as the Convention on Biological Diversity (CBD), the United Nations Conference on Biological Diversity (COP15), and the Post-2020 Global Biodiversity Framework. Additionally, they adhere to Colombian national agreements like Law 99 of 1993. Similarly, the PFM initiative is in accordance with conservation policies such

as the Forest and Wildlife Conservation and Development Proclamation (No. 192/1980), the Community-Based Natural Resource Management (CBNRM) Regulation (2006), and the Environmental Impact Assessment (EIA) Proclamation (Proc. No. 299/2002), amongst others, for Ethiopia. Consequently, the VBC mechanism is applicable to all three projects, thanks to its alignment with the aforementioned treaties and regulations.



Image 7. The Agama PFM is aligned with different protection figures such as the Kaffa Biosphere Reserve as well as other governmental frameworks.

3.2.3. Application of the Protocol's Differential Factors

As first aspect regarding the Protocol's and subsequently the VBC applicability rests on the complete availability of information for the projects located in Colombia and the absence of important informative aspects for the Agama PFM project. With that being said, it is important to highlight that for Aguadulce and El Globo, it was possible to fully apply the factor calculation methodology, while for Agama PFM, there are some considerations. On one hand, determining the level of ecosystem threat for Agama PFM was found to be problematic as the RLE-IUCN does not cover this territory. Although we used the Global 200 (Olson & Dinerstein, 2002) and literature review (Kefalew et al., 2022), this aspect revealed that the Protocol may impose an intrinsic limitation by restricting the assessment of ecosystem threat using only this tool. On one side, the Global 200 is a methodology applied at the eco-regional scale, while other assessments may use outdated information, different spatial and temporal resolutions, amongst other factors. Knowing that the RLE-IUCN assessment only covers the 40% of ecosystems globally, it may constraint the application of the Protocol and the development of a biodiversity project to the land areas covered by this assessment.

Another consideration lies in defining the areas designated for restoration and preservation activities. For Aguadulce and El Globo, zoning was carried out based on the respective registration documents issued to register the habitat banks with the environmental authority⁸. These documents outline specific actions to be taken in designated areas, allowing for adaptive management while ensuring a defined approach for each habitat bank. On the other hand, for Agama PFM, the focus is on protecting and sustainably exploiting the forest, but ecological restoration actions were only considered during the workshop. Additionally, the management plan is not yet updated.

Lastly, regarding the project's duration, it was defined for both Aguadulce and El Globo that the land use limitation for activities would be in place for a period of 30 years. For Agama PFM, on the other hand, the potential duration of the project has not been defined. Although the community involved in this PFM has experience with projects that restrict land use for over 20 years, it is essential to engage in discussions with all relevant stakeholders to establish the VBC project potential duration.

3.2.4. Habitat Banks and Participatory Forest Management figures

Habitat banking and participatory forest management are distinct approaches to biodiversity conservation, each with different mechanisms and areas of focus. The distinction is important to consider, especially as the Protocol's pilot involves a habitat bank. However, incorporating other protection measures is crucial to assess the applicability of VBC and identify potential limitations.

In essence, habitat banks are special areas that promote conservation and restoration (Bean et

al., 2008). They protect ecosystems and their connectivity, based on payment for results, which means payment is made only after the effectiveness of conservation, restoration, rehabilitation, and environmental recovery activities is demonstrated and validated (Del Valle, 2018). To establish a habitat bank, a suitable property and financial resources are needed, along with a transparent structure. They fulfill environmental obligations and can receive voluntary contributions (Del Valle, 2018; World Economic Forum, 2022). Funding can come

8. To access these documents, please contact: biodiversitycredits@terrasos.co

from the public or private sectors and international cooperation (Del Valle, 2018). Habitat banks require detailed information for registration, including conservation objectives and legal authorization for land use (Ministerio de Ambiente y Desarrollo Sostenible, 2017). Habitat banks are recognized in Colombia, by the Environment and Sustainable Development Ministry (MADS)⁹ as a mechanism to fulfill environmental compensation and forced investment obligations (Sarmiento et al., 2014). Thus, behind a habitat bank is a complete set of information already gathered, as well as base funding, aspect that eases the VBC incorporation, operation during the first phase of the project and definition of potential compliance milestones. The transparent structure that is mandatory to define a habitat bank, also eases the definition of the value chain and project governance.

Participatory Forest Management, on the other hand, is a community-based approach that involves collaboration between landowners, local communities, and stakeholders (Ameha et al., 2014; Ayana et al., 2017) and it is widespread across Africa and Asia (Schreckenberget al., 2006). It serves as a counter-response to the traditional

command-and-control models where natural resource management is typically centralized within an institution or authority (Ostrom, 1990). PFM acts as an alternative approach to promote sustainable forest conservation by embracing inclusive decision-making processes, integrating local knowledge, and addressing community needs and priorities through the establishment of management agreements. In fact, management agreements, according to Wily (2002), *represents the primary construct of the PFM*. PFM goes beyond habitat conservation, encompassing a range of activities such as sustainable harvesting, community-led initiatives, and traditional resource management practices (Gobeze et al., 2009; Lemenih et al., 2015).

In the 1990s, PFM was introduced in Ethiopia by FarmAfrica, supported by GIZ and the local NGO SoS Sahel (Gobeze et al., 2009). Its primary objective was to decentralize forest governance and address the growing deforestation rates by empowering communities to actively engage in forest protection alongside environmental authorities (Lemenih et al., 2015). While the initial focus was on safeguarding the forest, PFM gradually evolved to incorporate a social perspective aimed at improving the livelihoods and incomes of the PFM inhabitants, transforming them into beneficiaries. (Lemenih et al., 2015). Today, PFM is widely recognized as a strategy for decentralized governance¹⁰ (Lemenih et al., 2015). As a matter of fact, Agama PFM stands out as one of the early projects that successfully implemented this type of co-management and forest administration approach, showcasing its replicability (Gobeze et al., 2009). The current vision acknowledges forests as valuable assets capable of benefiting communities in various ways (Gobeze et al., 2009; Lemenih et al., 2015).

In essence, habitat banks are special areas that promote conservation and restoration. They protect ecosystems and their connectivity, based on payment for results.

9. [Resolution 1051 \(2017\)](#) through which the Habitat Banks are regulated.

10. The PFMs are recognized by Ethiopian Federal Government through the [Proclamation No. 542 \(2007\)](#).

PFM typically incorporates zonation, which is widely implemented in PFM areas. The first zone is the core area, where the pristine forest remains untouched. Through our experiences in Agama, we have come to understand that this area not only remains intact but also holds significant cultural and spiritual value. Given that nearly 50% of the Ethiopian population practices animism¹¹ (Gobeze et al., 2009), the protection of these areas is crucial, not only from an ecological perspective but also due to religious considerations. The second zone is the buffer area, characterized by an optimal forest condition, where communities are granted permission to sustainably utilize the forest. This utilization is primarily focused on the production and commercialization of Non-Timber Forest Products (NTFPs). It is within this buffer zone that the EWC project, in collaboration with GIZ and P4F, takes place. Lastly, the transition zone is included in PFM, allowing for agricultural and livestock practices as long as they are executed sustainably, without causing significant harm to the transition zone itself, as well as the buffer and core areas. Generally, the transition zone has a wider span compared to the other zones.

PFM acts as an alternative approach to promote sustainable forest conservation by embracing inclusive decision-making processes, integrating local knowledge, and addressing community needs and priorities through the establishment of management agreements.

Although PFM provides a robust structure for establishing VBC projects, its emphasis on community engagement and local perspectives for sustainable forest management, rather than creating a market for biodiversity credits and financial incentives for landowners, can pose a limitation. Furthermore, gathering comprehensive information such as biotic and abiotic baselines is often challenging for various PFMs, making it difficult to establish compliance milestones effectively. Additionally, the initial phases of PFM may lack a solid financial base to support a VBC plan.

3.2.5. Land ownership

One of the most noticeable findings reveals differences in land tenure/ownership between the projects being developed in Colombia and the Ethiopia case. In the Aguadulce and El Globo projects, the habitat banks are located and operating on privately owned land. To commence operations within the VBC framework in El Globo, a usufruct contract¹² was established. This contract allows Terrasos to develop the project by obtaining land rights from the property owners. Aguadulce, on the other hand, utilizes a contractual arrangement known as a joint venture agreement¹³. Both the usufruct and the joint venture agreement serve as tools and legal insurances that make the VBC even more robust in front of potential clients and environmental authorities.

11. Animists believe that spirits dwell inside the forests (Gobeze et al., 2009).

12. A usufruct is recognized as a legal right in Colombian Civil Law (Article 823) that grants individuals the privilege to enjoy and benefit from someone else's property without owning it. The purpose of usufruct is to allow the user to derive utility from the property while ensuring its preservation and integrity. However, it is important to note that certain circumstances, such as provisions in the constitution or specific laws, may modify or alter the conditions of the usufruct.

13. A joint venture agreement, defined in Article 507 of the Colombian Commercial Code, is a contract where two or more merchants collaborate in specific commercial transactions. One partner executes the transactions in their name and with personal credit, with the obligation to report and distribute profits or losses amongst the partners. The formation of a joint venture agreement does not require any specific formalities and can be established through a private document signed by the participants. They do not have a separate legal entity, and their formation, modification, dissolution, and liquidation can be proven through various means of evidence.

In contrast, Agama PFM follows a land tenure model that resembles more of a collective territory rather than private property. As previously mentioned, forest lands, including Ethiopian territories, are owned by the state. The Ethiopian government holds exclusive ownership of the land, but it grants usage rights to all its citizens without requiring payment for land use. This constitutional provision is outlined in Article 40 of the Ethiopian Federal Constitution¹⁴, which states:

"The right to ownership of rural and urban land, as well as all natural resources, is exclusively vested in the State and in the peoples of Ethiopia. Land is considered a common property of the Nations, Nationalities, and Peoples of Ethiopia and shall not be subject to sale or other means of exchange" (Sub-Article 3).

Although there is no concept of private property in the traditional sense, Agama PFM is home to 263 individuals and land usage rights are legally protected, particularly at the constitutional level. One crucial lesson learned is the necessity of defining how a land tenure system of this nature can influence the operation of a potential VBC project. Since VBC projects have a long operational lifespan of more than 20 years, individual interests may not always align with collective interests. Therefore, it is crucial to thoughtfully incorporate the community into the decision-making process regarding land tenure.

3.2.6. Project governance

In the VBC context, project governance becomes essential in order to ensure the success, scalability, and long-term sustainability for the projects, as well as to provide a high quality VBC (Nature Finance & Nature Markets, 2022). Even when the initial pilot projects might have well-defined roles and structures, implementing VBC projects in diverse contexts demands considering project governance to properly accommodate the specific needs and complexities of each situation.

Establishing clear mechanisms and processes for decision-making, stakeholder engagement, and accountability are necessary steps to effectively

set up the governance for a particular project. It involves defining the roles and responsibilities of various actors involved in the project, such as developers, structurers, verifiers, local communities, and other relevant organizations. By clarifying these roles, project governance provides a framework for coordination, collaboration, and communication amongst stakeholders.

In the case of Terrasos projects, there is a clear definition of actors within the project's value chain. Roles such as structurers, developers, verifiers, and other stakeholders are established. This clear definition of roles facilitates smoother project

¹⁴. The English version of the Ethiopian constitution can be found [here](#)

governance, as it allows for a deeper understanding of the involved actors and their respective responsibilities. Terrasos, as the developer and owner of the project, follows the established Protocol and manages the project's operational details behind the scenes. The centralized approach enables Terrasos to oversee critical aspects such as the registration platform, credit pricing, sales channels, and verification processes. Additionally, Terrasos' market expertise and connections contribute to effective project governance.

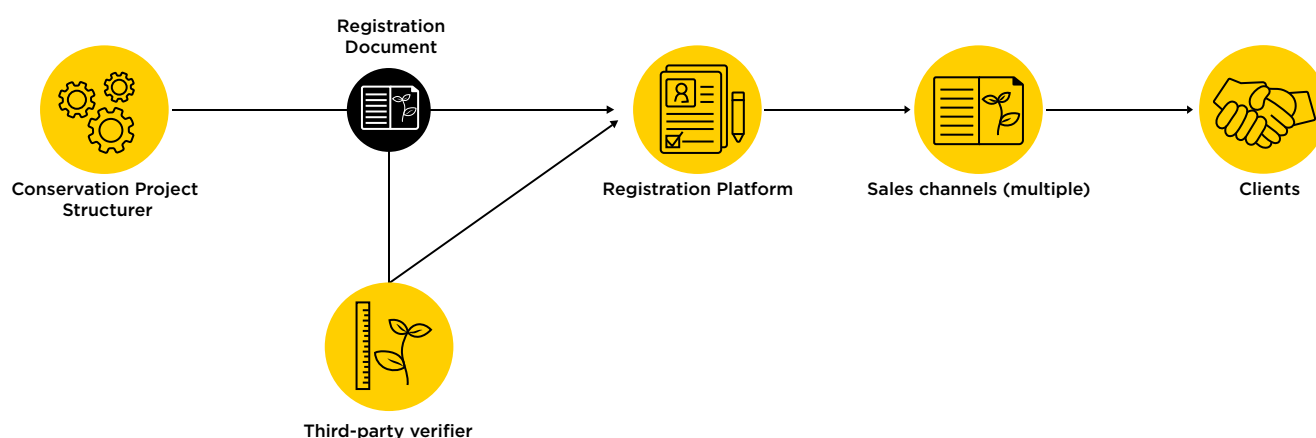


Image 8. Lean chain value of a VBC project showing the main actors involved.

In the context of Aguadulce, even though the project is still in the process of entering the market, there is already clarity regarding the roles of the structurer and developer. While the specific verifiers might not have been defined in the initial stages, the project's structural and conceptual similarities to previous projects, such as El Globo, help speed up the governance process.

However, Agama PFM faces unique challenges in terms of project governance. Unlike Terrasos projects, there is no subsidiary or local presence in Ethiopia to facilitate on-site activities, such as establishing project baselines and verifying compliance with registered actions. In such cases, collaboration with external organizations like GIZ becomes indispensable. GIZ's expertise and experience in the PFM and their involvement in the P4F's EWC project make them valuable partners for Agama PFM. Future discussions should be held to define the roles and responsibilities of GIZ within the project, as well as the involvement of the PFM committee.

It is essential to recognize that implementing VBC projects in different geographies and contexts presents unique governance considerations. Although the Terrasos Protocol serves as a valuable guide, careful deliberation is necessary to determine Terrasos' level of governance, involvement, and sponsorship in each project. This ensures that project governance is appropriately aligned with the project's specific requirements and takes into account the diverse range of stakeholders involved.

3.2.7. Financial feasibility and VBC market

Regarding the feasibility of the VBC, it is projected that El Globo will acquire approximately 6 million dollars over the 30-year duration of the project. Within this projection, the costs of project maintenance, monitoring processes, and employee payments, amongst others, are expected to be covered. It is worth noting that El Globo has private investors and also offers credits for the mandatory compensation market, ensuring that the financial safeguards protect, at least according to the projections, the functioning of the project. Furthermore, for El Globo some of the hectares are projected to be incorporated into the compliance market, increasing the potential income to maintain the project functioning. The design for Aguadulce-Río Sumapaz is conceptually similar to the El Globo project. It includes instruments such as trust accounts and medium to long-term fund management, which will start operating as soon as the project is activated. Nonetheless, selling credits for the compliance market in Aguadulce is not yet discussed.

On the other hand, Agama PFM is part of the Ethiopian Wild Coffee (EWC) project, managed by GIZ (German Corporation for International Cooperation). The aim of the project, funded by P4F, is to harmonize PFMs with ecosystem services payment schemes to incentivize biodiversity conservation. Under this project, Agama and its respective cooperatives were supported as part of the PFM initiative. With financial support from P4F, efforts were made to modify the wild coffee value chain and establish a platform called Technoservice for its direct marketing and engagement with potential stakeholders, eliminating intermediaries.

Agama is one of the PFMs operating in the Kaffa region. Thanks to P4F's intervention, around 1583 MT¹⁵ of coffee were exported during the project's

lifespan, not only within the domestic market but also to international buyers, particularly in Europe. Alongside wild coffee production, the cultivation of NTFPs such as cardamom, fennel, and wild bee honey has brought benefits to approximately 50,000 people in the region, including the 263 beneficiaries of Agama PFM. As part of the inherent economic organization within PFMs and the EWC project, all beneficiaries receive income from the sale of coffee and other commodities. Although the coffee being marketed is not yet considered premium, it still serves as an important income source. In this context, introducing VBC is not incompatible and could generate additional income to support the maintenance of the PFM and its beneficiaries. If a VBC project were to succeed and be established, it would be crucial to create additional financial mechanisms and project profit levels through conversations and agreements with the community.

VBC cannot replace the ongoing work within the Agama PFM project, but they can serve as complementary tools to enhance the outcomes achieved through the PFM. In the case of Aguadulce and El Globo, combining biodiversity credits with compliance market credits can be advantageous and an interesting lesson to be incorporated within the Protocol.

Although we see a financial prospect that can increase the flow of income for the habitat banks and the PFM, it is important to note that we are in a scenario of high uncertainty. Even though there is a niche and willingness from companies and other public and private actors to generate momentum for VBC in terms of scaling and diversification (World Economic Forum, 2022), the market is still emerging. This also means that regulation, including the role of stakeholders and the public sector, is in its early stages and not well defined (Nature Finance & Nature Markets, 2022).

15. MT= Metric Tonne

In this regard, it is crucial to establish both infrastructure and governance structures to ensure the success of VBC initiatives (Nature Finance & Nature Markets, 2022).

The above applies to all three projects studied. While El Globo is currently trading credits and Terrasos is undergoing a self-regulatory process, it remains to be seen how government entities and other regulatory bodies will play a role in market regulation.

It is crucial to establish both infrastructure and governance structures to ensure the success of VBC initiatives

3.2.8. Verification process

The verification process conducted by a third-party verifier is an essential step to establish trust, transparency, and traceability in the issuance, sale, and purchase of VBC. This process not only helps prevent practices like greenwashing but also enhances the quality of the product in an emergent market that lacks sufficient safeguards, necessitating self-regulation in these early stages.

Amongst the three projects studied, only El Globo has undergone the verification process to issue VBC. The firm KPMG verified the correct application of the Protocol to El Globo and ensured the fulfillment of milestones for credit release. The verification process followed the ISAE 3000 methodologies, ultimately allowing the first batch of credits to be released for commercialization.

It is crucial for both the additional two projects and others intending to generate VBC using the Terrasos Protocol to define these significant actors. By doing so, we set a precedent for the importance of conducting these processes. Additionally, thorough consideration should be given to the costs associated with this stage of releasing the initial batches of credits.

The verification process holds significance for several reasons. It provides an objective assessment of the project's compliance following

the Protocol guidelines, ensuring that the credits are not only legitimate but reliable and a high-quality product. This instills confidence in potential buyers and investors, who can trust the credibility of the VBC being offered. Furthermore, verification processes help prevent greenwashing, a practice where companies falsely claim environmental benefits without proper substantiation. By subjecting projects to rigorous verification, we can differentiate thoughtful efforts from mere marketing tactics, thus promoting transparency and accountability within the market.

Moreover, the verification process establishes a framework for traceability, enabling the tracking of credits back to their very origin. This traceability is crucial for buyers, who can be assured of the environmental impact associated with the purchased credits. It also contributes to the overall credibility and integrity of the VBC market, avoiding double counting and attracting more buyers at the same time. By emphasizing the importance of the verification process, we are not only ensuring the integrity of VBC but also building a culture of responsible business practices. Although there might be costs involved, these investments are necessary to build a robust foundation for the VBC market, instilling trust amongst stakeholders.

4. CONCLUSIONS AND RECOMMENDATIONS FOR SCALING VBC PROJECTS

The discussed VBC projects—El Globo, Aguadulce, and Agama PFM—demonstrate the efficacy of VBC in conserving biodiversity and promoting sustainable development. These projects protect critical habitats, provide ecosystem services, and address the negative impacts of human activities. By integrating financial incentives, VBC schemes like these bridge the gap between economic development and biodiversity conservation, showcasing a path towards a harmonious coexistence between humans and the environment. These examples highlight the need to expand the VBC market globally to achieve broader impact in biodiversity conservation and sustainable development.

The assessment of VBC applicability in the Habitat Banks and the PFM projects provides valuable insights for effective decision-making and sustainable biodiversity outcomes. The projects, although different in their mechanisms and focus, contribute to biodiversity conservation and ecosystem services in their respective contexts.

The projects exhibit strong additionality by actively addressing biodiversity conservation challenges, providing essential ecosystem services, and going beyond business-as-usual efforts. The VBC mechanism could be a valuable tool to enhance their additionality by providing additional financial resources to expand their activities and achieve greater impact. Furthermore, the projects and the VBC mechanism are in harmony with international agreements, national policies, and regulations, ensuring their alignment with global conservation objectives.

The evaluation of the Protocol's applicability highlighted some challenges in accessing complete information for the Ethiopian project. Nonetheless, the Protocol's framework provides a valuable tool for assessing ecosystem threat and connectivity, defining restoration and preservation areas, and determining project duration.

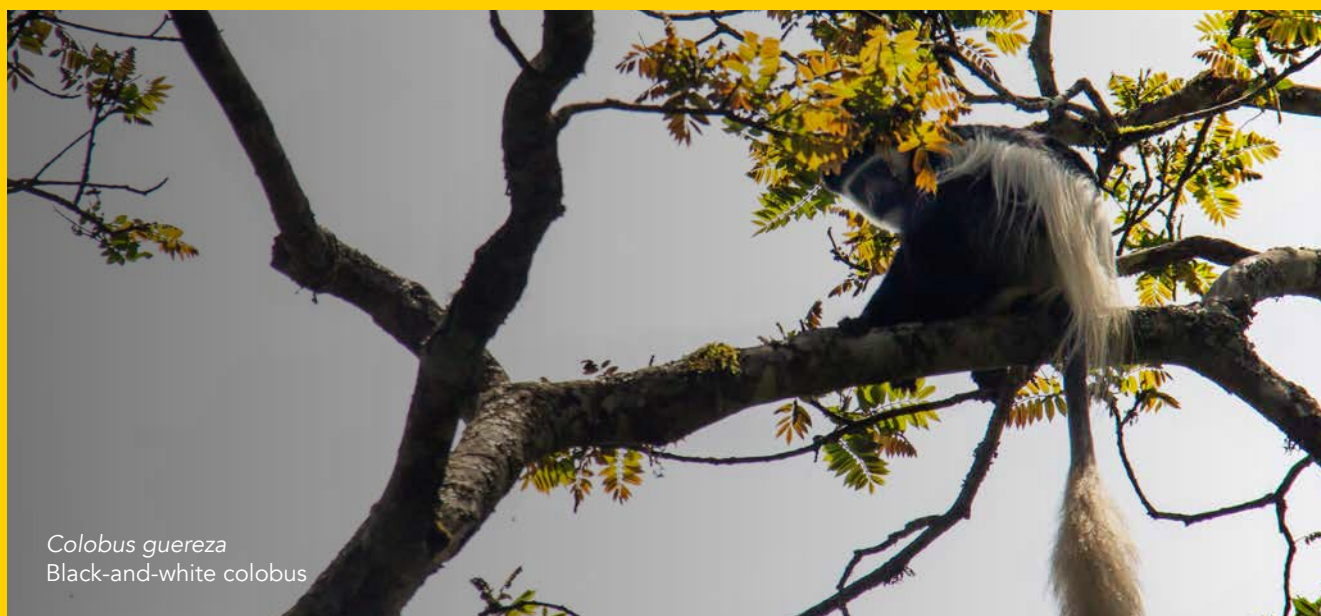
Moreover, the protection figures where the projects are taking place are different in nature and could hint challenges for the Protocol to be fully applied. On the one hand, habitat banks, through payment for results, promote conservation and restoration activities, protecting ecosystems and their connectivity. They require suitable properties, financial resources, and transparent structures. Habitat banks serve as mechanisms for fulfilling environmental obligations and can receive voluntary contributions. On the other hand, PFM embraces inclusive decision-making processes, community engagement, and traditional resource management practices. It goes beyond habitat conservation and promotes sustainable forest management while addressing community needs and priorities but is not as well engaged with creating a market and benefits for landowners like habitat banks do.

Another crucial aspect is enabling the projects to construct a proper project governance. This is crucial for the success, scalability, and long-term sustainability of VBC projects. Tailoring project governance to accommodate the specific needs and complexities of each project context is essential.

The financial feasibility overview revealed that the El Globo and Aguadulce projects have projected

income to cover their costs through the sale of credits in the voluntary and mandatory compensation markets. Agama PFM, as part of the Ethiopian Wild Coffee project, has already demonstrated economic benefits through the production and sale of wild coffee and other commodities. Introducing VBC as a complementary financial mechanism could further support the maintenance of the PFM and its beneficiaries. Nevertheless, is necessary to consider that the VBC market as well as other type of biodiversity credits' markets are still in emerging, making necessary to fully address the stakeholder structure, sales channels selection and instilling the best business practices such as submitting the projects to third-party verification.

Lastly, the assessment of VBC applicability in the Habitat Banks El Globo and Aguadulce and the Agama Participatory Forest Management projects highlights their potential as conservation strategies. It is true that are undergoing challenges that need to be overcome, however, by integrating the VBC mechanism, we acknowledge that these projects can enhance their outcomes, engage stakeholders, and contribute to the long-term preservation of biodiversity and ecosystem services in highly threatened and/or strategic ecosystems.



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