Cataruben®

A STRATEGIC APPROACH TO

BIODIVERSITY + CARBON & WATER

CONSERVATION IN COLOMBIA

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INDEX

AN OPEN SOURCE CODE FOR CONSERVATION

This document is a testament to the combined efforts of the Cataruben Foundation team—an interdisciplinary collective that, over a year, fostered the conditions necessary to understand and formulate a Biodiversity, Carbon, and Water Conservation Strategy for Colombia.

Colombia, a country blessed with unparalleled natural wealth and biodiversity, faces various challenges and threats. These require determined and strategic action to safeguard its natural heritage for the well-being of future generations.

In this regard, this document aims to serve as an invaluable resource for all stakeholders involved in biodiversity conservation, climate change mitigation, and water resource protection, directly or indirectly related to the activities of the Cataruben Foundation. The contents target researchers, decision-makers, landowners, and, in essence, all those invested in protecting and conserving Colombia's priceless natural heritage.

This technical report marks the culmination of a rigorous and meticulous process that lasted over a year. It provides a diagnosis and description of the current scenario. It offers a structured, participatory framework for planning and implementing conservation efforts on private Colombian lands. The application of the Open Standards for Conservation methodology throughout this process testifies to the robustness and transparency of the project. It is a prime example of collaboration producing effective, far-reaching solutions.

My deepest gratitude and admiration to the co-authors, the Cataruben Foundation, and all the collaborators who brought this important project to life; I hope this report will inspire more individuals to participate in conservation efforts and work together to build a sustainable future for Colombia and the world.

Eduwin Hincapié Peñaloza, April 2023.

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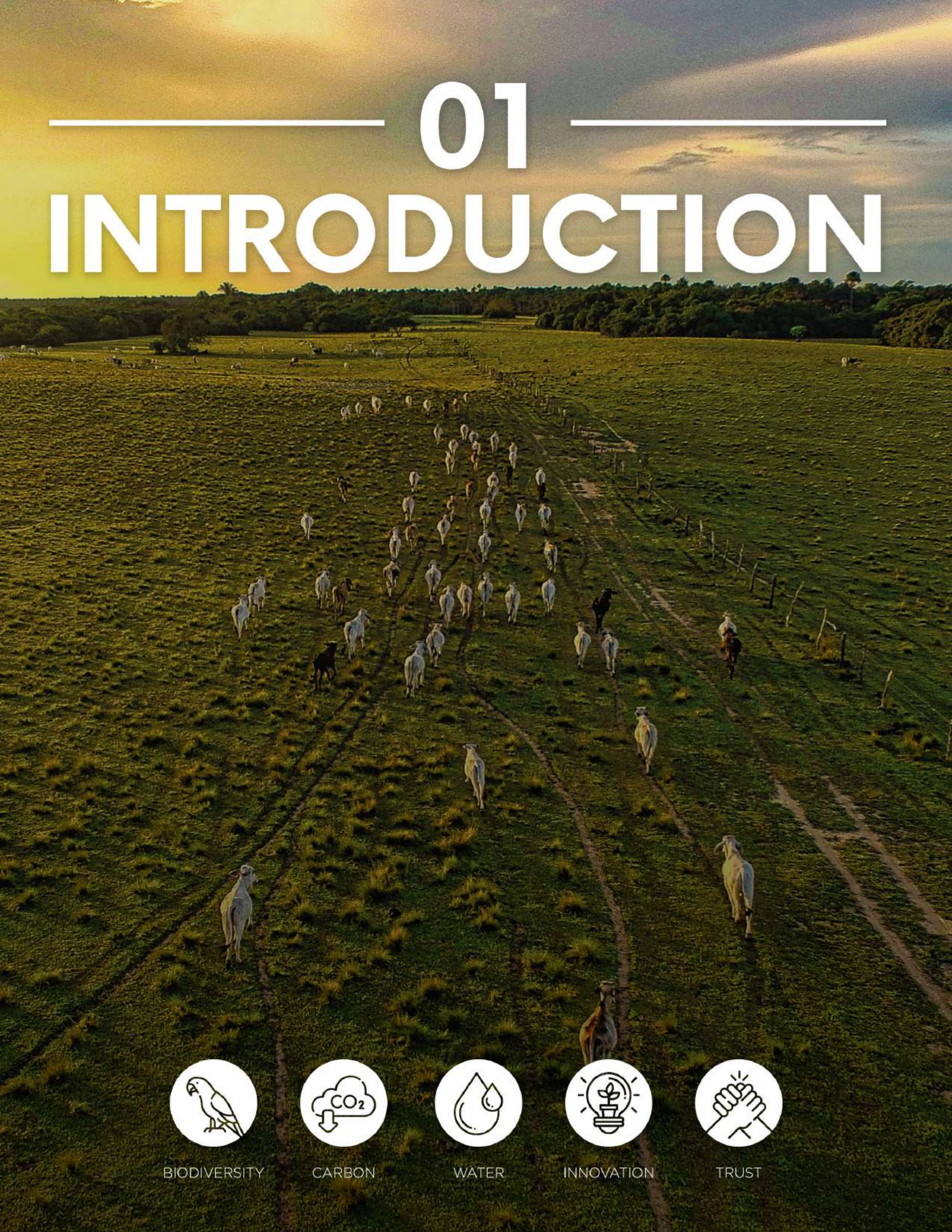
01 INTRODUCTION



1.1 THE GLOBAL CHALLENGE OF CONSERVING NATURAL RESOURCES

The 2019 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services report offers a damning indictment of global ecosystem degradation. Anthropogenic forces—such as land-use change, direct exploitation, climate change, pollution, and invasive species—are primarily responsible. Shockingly, 47% of our natural ecosystems are in decline, 25% of species are threatened, biotic integrity has declined by 23%, and wild mammal biomass has reduced by 82%. These numbers raise an urgent question: What measures are in place to halt the escalating degradation of ecosystems and prevent species extinction?

Simultaneously, the latest report from the United Nations-sponsored Intergovernmental Panel on Climate Change (IPCC) highlights a disturbing trend. Greenhouse gas emissions continue to rise, pushing us further from our goal of limiting global warming to 1.5°C above pre-industrial levels—a critical threshold to avoid catastrophic impacts. This raises another pressing question: What are we doing to mitigate the dramatic climate variability we see worldwide?

The United Nations World Water Development Report 2021 reveals that agriculture accounts for the most significant portion of the world's freshwater reserves—a staggering 69%. However, as cross-sector competition for water intensifies and scarcity worsens, the sustainability of water-intensive food production is under scrutiny. Combined with inefficient use in many regions, this has led to environmental degradation, such as the depletion of aquifers, reduction of stream flows, damage to wildlife habitats, and pollution. So, what steps are we taking as a species to reduce the water footprint of agriculture and other sectors?

As we grapple with natural resource scarcity and environmental degradation, global goals like the Sustainable Development Goals, the Aichi Targets, the Paris Agreement, and the newly formed Convention on Biological Diversity have led to several international commitments. These are primarily aimed at carbon management, drinking water supply, and biodiversity to reverse the rampant degradation of ecosystems.

The 2015 Paris Agreement, a binding treaty approved by 196 parties, sets the ambitious goal of limiting global warming to below 2 degrees Celsius and ideally to 1.5 degrees Celsius above pre-industrial levels. The agreement focuses on reducing greenhouse gas emissions and adapting to the impacts of climate change.

The global data collected paints a bleak picture and underscores the urgent need for proactive measures to mitigate ecosystem degradation, biodiversity loss, and natural resource scarcity. These issues are particularly pertinent on private lands in Colombia and require focused conservation efforts. The challenges of ecosystem degradation, climate change, and water scarcity are universal societal issues.

The Biodiversity + Carbon and Water strategy includes private lands critical to meeting international commitments on carbon management, drinking water, and biodiversity.

This strategy protects natural ecosystems and reduces the water footprint of food production while empowering landowners to actively participate in climate change mitigation, biodiversity conservation, and sustainable natural resource management. Implementing a robust conservation strategy on private lands in Colombia is essential to ensure a sustainable future for our planet and its diverse inhabitants.

1.2 THE CRUCIAL ROLE OF CONSERVATION PRIORITIZATION

Colombia is a treasure trove of biodiversity and critical ecosystems. It plays a crucial role in orchestrating the global climate and water cycle, as well as in preserving countless plant and animal species. The relentless degradation and loss of these ecosystems pose significant threats to species survival, as well as to the well-being and livelihoods of local communities.

Within Colombia, rural areas cover a substantial proportion of the land and contain a significant portion of the country's biodiversity, carbon, and water resources. Addressing these challenges necessitates the design and implementation of a comprehensive strategy on private lands.

Furthermore, recent evidence demonstrates the potential for mutually beneficial outcomes from biodiversity conservation, carbon sequestration, and water quality maintenance. This strategy recognizes and harnesses the synergies and interactions among these three conservation components.

The article "Areas of Global Importance for Conserving Terrestrial Biodiversity, Carbon, and Water" by Jung et al. provides an essential framework for global conservation strategies. Jung identifies the most critical areas for conservation on Earth and demonstrates that protecting 30% of the world's land can conserve 81.3% of the analyzed species. Moreover, if effectively managed, the top 10% of the land can meet conservation targets for 42.5% of all species, conserve 26% of global carbon, and 22.1% of clean water (Figure 1).

Much of Colombia falls within the top 30% of priority areas for conservation, a testament to its geological, climatic, and ecosystem diversity. Jung's study helps streamline conservation planning and resource allocation by focusing on areas of higher impact while minimizing the waste of resources in less effective areas. This spatial prioritization model identifies the most critical private lands for biodiversity, carbon, and water conservation in Colombia.

In summary, prioritizing areas for conservation helps organizations worldwide focus their efforts. This strategic approach facilitates efficient, targeted investments and minimizes the waste of resources. It's worth noting that Colombia's unique geographic and climatic characteristics place it in the top 30% of global conservation priority areas, highlighting the country's immense conservation potential.

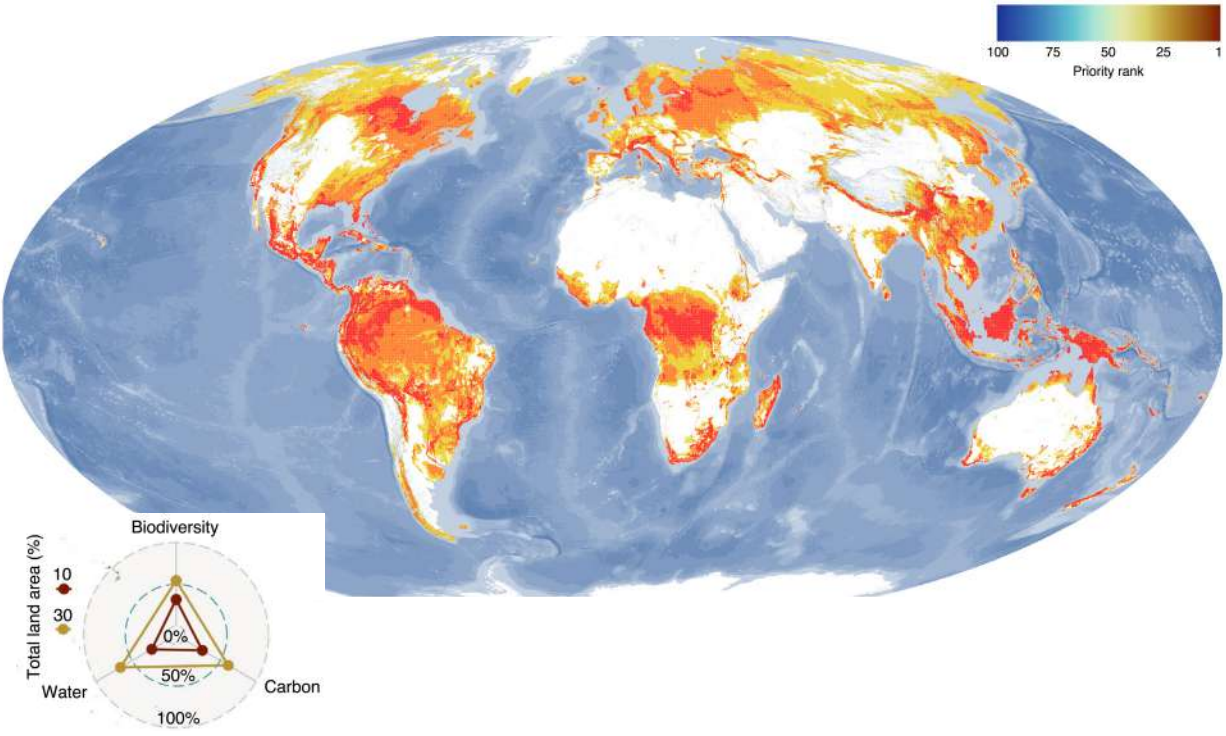


Figure 1. A. Areas of importance for global conservation of biodiversity, carbon, and water. B. Priority areas for conserving biodiversity, carbon, and water in Colombia. Source: (Jung et al., 2021).

1.3 IMPORTANCE OF USING PRESERVATION STANDARDS

Our conservation strategy adopts the Open Standards for the Practice of Conservation methodology, also known as Conservation Standards (CS) (Conservation Measures Partnership, 2020). This ensures the long-term conservation of biodiversity and the natural systems that support it. These standards provide a robust framework for designing, managing, and monitoring conservation projects that are strategic, effective, and respectful of the needs of local communities and the environment.

In our Biodiversity, Carbon, and Water Conservation Strategy, we have developed a comprehensive approach that considers both scientific and technical knowledge, as well as the perspectives and needs of local communities. We are committed to ensuring that our conservation efforts are well-informed, evidence-based, transparent, and have a lasting impact on biodiversity and the ecosystems that support it.

We are dedicated to collaborating with local communities, government agencies, and other stakeholders to advance conservation goals and promote sustainable development. By adhering to the Conservation Standards, we aim to ensure that our conservation efforts are well-coordinated, effective, and sustainable, thereby contributing to the long-term protection and conservation of biodiversity.

Figure 2. Diagram of the steps in the Open Standards for the Practice of Conservation, or Conservation Standards (CS) methodology. Source: (Conservation Measures Partnership, 2020)

This document pertains to the first and second steps-Asses and plan. The third, fourth, and fifth steps are part of an ongoing process that will be published in subsequent documents after the validation of the initial two steps.

In the first step, "Asses," we identify conservation needs, long-term goals, and assess risks and opportunities. This diagnosis allows us to set clear priorities and define key indicators for measuring our success in conserving biodiversity, carbon, and water.

In the second step, "Plan," we outline the specific actions needed to achieve our conservation goals and identify the resources required for implementation. We also take into account governance issues and the rights of local communities to ensure that our conservation efforts are both respectful and equitable.

Any thoughts?

02
ASSES PHASE

The Biodiversity, Carbon, and Water Conservation Strategy for private natural landscapes in Colombia began with an assessment of the context to define basic parameters. This phase included:

- Identifying the planning purpose
- Defining the project team
- Describing the geographic or thematic scope
- Articulating the vision
- Defining the conservation and human well-being objectives
- Identifying the key stakeholders influencing these objectives

This comprehensive assessment enhanced our understanding of the project context and provided a solid foundation for the planning process.

2.1 PURPOSE OF THE B+C&W CONSERVATION STRATEGY

The B+C&W strategy primarily promotes three environmental services: the conservation of endangered species and ecosystems, the protection of above and below-ground carbon storage, and sustainable water management. It does so in an innovative and replicable manner at the scale of biogeographic regions.

The strategy includes implementing targets and activities that demonstrate net gains in these three services. It integrates multi-institutional efforts and creates benefits at the private property scale. The ultimate goal is to reduce the number of threatened species, increase carbon storage, reduce carbon emissions, and minimize water footprints.

The strategy prioritizes biodiversity conservation, carbon sink protection, and sustainable water management through the restoration, preservation, and sustainable use of natural resources. It engages key stakeholders, including local communities, businesses, conservation organizations, and government agencies. The B+C&W strategy aims to foster collaboration to ensure the long-term sustainability of conservation efforts. The strategy applies the principles of evidence-based conservation, participatory and adaptive approaches, and the integration of conservation and human well-being objectives.

2.2 CONSERVATION STRATEGY TEAM

A robust multidisciplinary team with specialized expertise will develop the B+C&W Strategy. The team is segmented as follows: an initial team that acts as the promoter of the strategy, a core team responsible for solidifying the strategy, and a whole team tasked with carrying out the technical activities necessary to fulfill the strategy's objectives.

Table 1 identifies the individuals and their roles within each team segment. The team has a profound understanding of biodiversity and its associated threats, including climate change. They also have extensive experience in understanding the political, social, and economic contexts, as well as in managing stakeholders and addressing their concerns

NAME	ROLE	SKILLS
Private Landowner	Ecosystem Manager Natural Service Provider	Detailed knowledge of their property and the region it is located in Responsibility for exercising property ownership and possession Economic capacity to maintain the property fiscally, legally, and administratively Ability to learn, keep records, and collect evidence of activities carried out on the property
Property Management	Administrator and Executor of Conservation Actions	Carrying out basic maintenance activities on the properties. Conducting production activities on the properties. Ability to learn and follow instructions. Capacity to keep previously agreed-upon and trained records
Strategy Developers	Strategy Manager Carbon Leader Trust Leader Biodiversity Leader Water Leader Innovation Leader	Comprehensive knowledge of open standards methodology for conservation, knowledge in biology, biodiversity, engineering or administration, and conservation of ecosystems, landscapes, and species. Trained in the use of conservation standards, knowledgeable about auditing carbon, water, and biodiversity certification projects. Experience in executing

Table 1. Initial team for the B+C&W strategy.

2.3 POTENTIAL STAKEHOLDERS

The B+C&W strategy requires collaboration among multiple stakeholders to ensure the long-term success of the projects, as outlined in Table 2. These stakeholders play a critical role in the implementation and success of conservation and climate change mitigation projects. Initially, the team identified 36 potential stakeholders who have an interest in the natural resources within the strategy development area and could actively participate in its activities. These stakeholders are interested in collaborating on the joint development of the B+C&W Conservation Strategy and could make valuable contributions to its development.

STAKEHOLDER	ROLE
Land-owners with natural ecosystems in carbon project reference areas	Actors implementing conservation actions at the private property level
The Cataruben Foundation	Developer of climate change mitigation, water and biodiversity conservation initiatives
Commercial partners	Buyers of carbon, water, and biodiversity certificates
Climate Change Directorate, Ministry of Environment and Sustainable Development (MADS) - Colombia	Develops regulations for climate change initiatives
Certification standards	Technical parameters for quantification and certification of results
Private allies	Support for local socio-economic and environmental development, promotion of partnerships and assistance in the development of conservation actions. Local and regional agricultural production associations
International NGOs	National and international organizations that provide technical and financial capacity for the widespread development of projects throughout the country
Oil companies (exploration, production and transport)	Prominent private industrial actors in the region that have established environmental parameters and created a practical understanding of environmental management among other local actors
Regional NGOs	Established capacity builders in the strategy development region with extensive experience working with landowners on conservation projects

Educational institutions	Regional and national universities that facilitate technical capacity building. National Education Service (SENA)
Multilateral agencies	Promoting and financing projects for the conservation and protection of natural ecosystems and their ecosystem services
Operational actors (consulting services)	Entities that manage carbon and other mitigation projects, such as Asocarbono (national) and IETA (international)
Tourism companies	Companies that promote sustainable tourism activities in the region
Municipalities	Territorial authorities that finance local development projects and land-use planning (EOT, PBOT, POT)
Governorates	Territorial authorities that finance regional development projects
Regional Autonomous Corporations	Public environmental corporations responsible for environmental control and monitoring at the macro-watershed level
International research centers	Generating knowledge to make decisions for or against carbon capture projects
Regional Autonomous Corporations	Public environmental corporations responsible for environmental control and monitoring at the macro-watershed level
Research institutes	Generate scientific knowledge at the biological and social levels
National natural parks (decentralized units)	Environmental agencies that manage national parks
IDEAM	Generation of hydroclimatological information
Financial Institutions	Banks that provide access to credit for direct project beneficiaries
DIAN (National Directorate of Taxes and Customs)	Definition of economic mechanisms that may limit the development of carbon projects at the national level
Educational institutions	Regional and national universities that facilitate technical capacity building. National Education Service (SENA)

Multilateral agencies	Promoting and financing projects for the conservation and protection of natural ecosystems and their ecosystem services
Operational actors (consulting services)	Entities that manage carbon and other mitigation projects, such as Asocarbono (national) and IETA (international)
Tourism companies	Companies that promote sustainable tourism activities in the region
Community Action Boards	The minimum administrative community organization in Colombia
Departmental and local emergency committees	Landowner and family emergency response
Municipal Councils	Evaluation and approval of local development projects
Alexander von Humboldt Institute for Biological Research	Colombian institution focused on scientific research on biodiversity, including hydrobiological and genetic resources
USAID	U.S. agency responsible for distributing most non-military foreign aid, working with recipient countries in the economic, agricultural, health, political, and humanitarian fields
USDA (United States Department of Agriculture)	The executive branch of the U.S. federal government responsible for developing and implementing livestock, agriculture, and food policies, understanding the needs of producers, promoting agricultural trade and production, food security, protecting natural resources, improving rural communities, and ending hunger
Regional protected area systems	Conservation strategy for strategic ecosystems and protected areas within the jurisdiction, contributing to the strengthening of the Main Ecological Structure (MES) by identifying strategic ecosystems that provide ecosystem services

Table 2. Stakeholders potentially involved in B+C&W Construction. Source: Cataruben Foundation, 2023.

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2.4 SCOPE OF CONSERVATION STRATEGY

This strategy bases its methodology on protecting natural areas, such as civil nature reserves or private protected areas. The B+C&W strategy establishes specific goals and objectives, known as "area-based conservation objectives," which define the quantity and quality of ecosystems that must be maintained and protected in a given area to ensure the strategy's effectiveness.

Area-based conservation objectives offer several advantages that help prioritize resource allocation and efforts to conserve the most critical natural areas. These advantages include setting clear and quantifiable goals, identifying high-priority areas for conservation, and developing specific action plans to achieve them. Setting specific area goals also allows for the measurement of the progress and effectiveness of conservation efforts and establishes monitoring programs to assess whether goals are being met or if conservation efforts need adjustment.

However, there are also challenges associated with these objectives. For instance, setting specific targets in areas with limited information about biodiversity or ecosystem quality can require significant time and effort. Political and economic factors can also influence the strategy, affecting the ability to set ambitious targets.

Nevertheless, the inclusion of nationally registered private lands is essential for achieving Colombia's biodiversity, carbon, and water conservation goals. The land areas targeted for conservation in this strategy have been carefully selected to achieve the desired conservation objectives. This even considers the vital role of areas excluded from this strategy, such as indigenous reserves, Afro-descendant communities, national natural parks, and the country's urban centers.

B+C&W groups areas according to different criteria for each environmental service provided. For example, for the biodiversity strategy, ecosystems and species at high risk of extinction are the focus of conservation. In contrast, páramos, rivers, lagoons, wetlands, springs, lakes, and galleries, as well as fog and high Andean forests, are conservation targets for the water strategy due to their importance to the water cycle. Finally, for the carbon strategy, the conservation targets are forests, natural savannas, wetlands, páramos, and agroecosystems (see Figure 3).

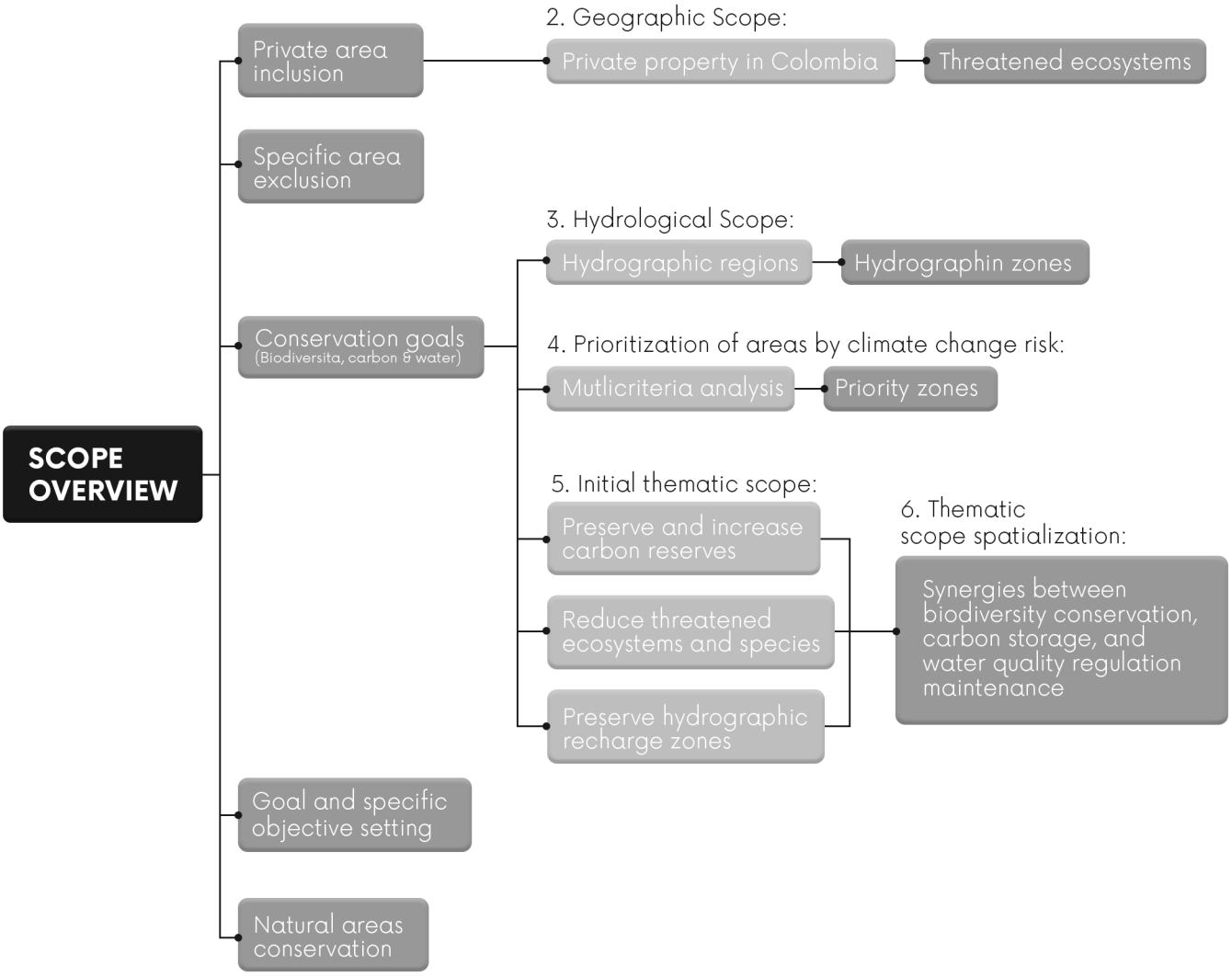


Figure 3. General diagram of scope delineation considerations. Source: Cataruben Foundation, 2023.

2.4.1. Initial Geographical Scope

The B+C&W strategy covers 57,515,781 hectares of privately-owned land in Colombia, representing 50.3% of the country's continental area, as shown in Figure 4. These areas include threatened ecosystems such as forests, wetlands, grasslands, high mountain ecosystems, and agroforestry systems.
Areas with special management and where successful conservation strategies already exist—such as national natural parks (14,379,200 hectares), Indigenous reserves (33,024,600 hectares), and Afro-descendant community territories (5,698,400 hectares)—fall outside the scope of this strategy.
Involving private landowners in conservation efforts is essential. Area-based conservation targets must consider the needs and concerns of farmers, be achievable, scientifically grounded, and designed to incentivize conservation. These targets must also take into account the economic and social interests of private landowners and be sensitive to the concerns and needs of local communities.

The strategy employs a participatory approach, involving local communities and landowners in decision-making processes to achieve area-based conservation goals on private farmland in Colombia. Effective and sustainable long-term area-based conservation targets will require active collaboration between the scientific community, policymakers, civil society organizations, and other key stakeholders.

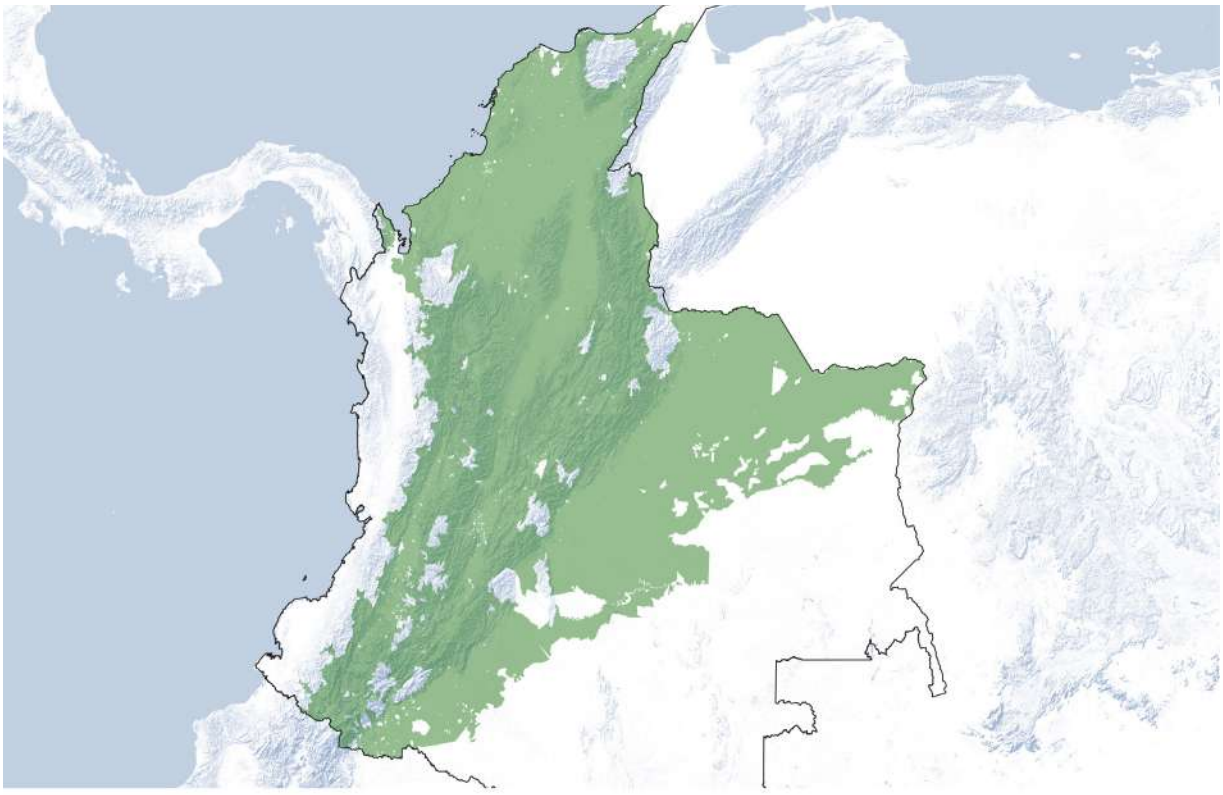


Figure 4. Scope of the B+C&W strategy. Source: (IGAC, 2022) layers, The Cataruben Foundation

2.4.2. Hydrological Scope

The Hydrological Scope of this Strategy encompasses Colombia's five main hydrographic regions: Caribbean, Magdalena-Cauca, Pacific, Orinoco, and Amazon, which comprise 31 hydrographic zones running from north to south (as shown in Figure 6). These zones encompass a variety of landscape features associated with water cycles, including rivers, wetlands, lakes, lagoons, páramos, and aquifers. Water resources extend across a vast and diverse area, forming a fundamental component of Colombia's biodiversity conservation efforts.

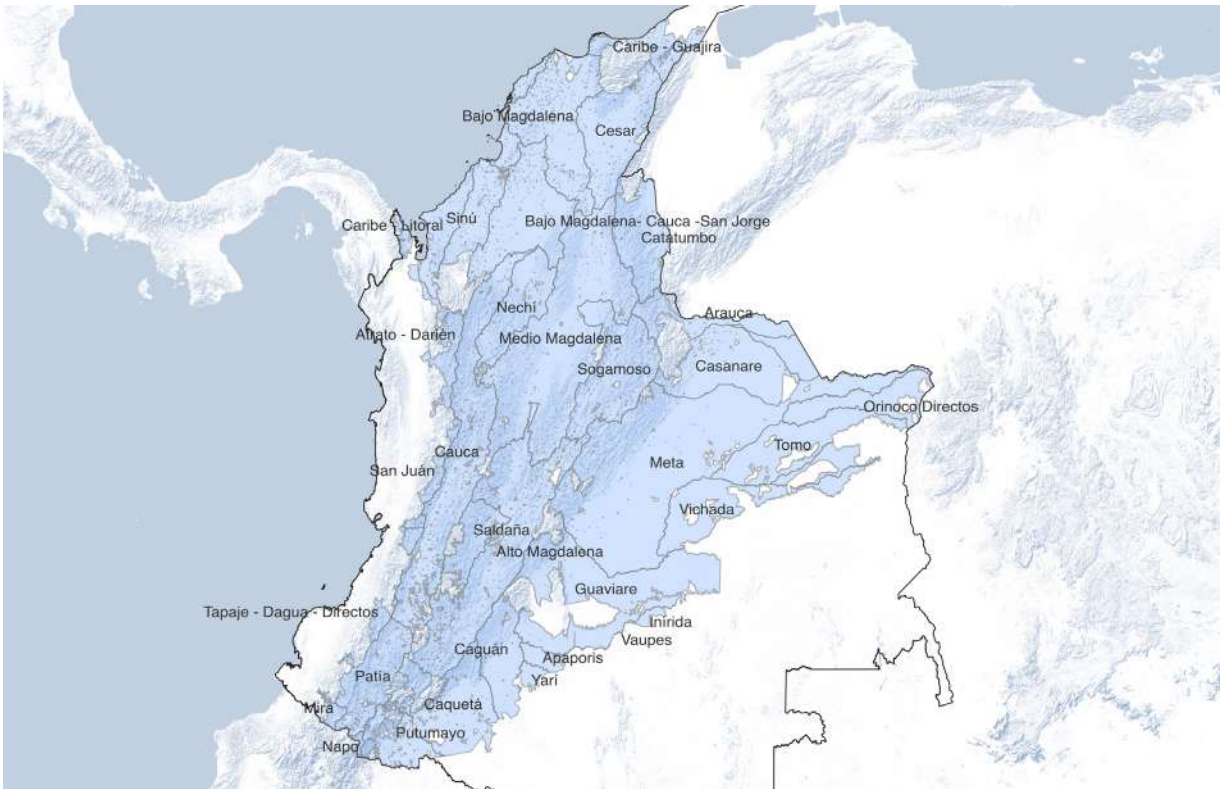


Figure 5. Map of hydrographic zones in which the B+C&W conservation strategy is implemented. Source: layers from (SIAC, 2022), The Cataruben Foundation.

2.4.3. Prioritization of areas by Climate change Risk

The B+C&W team conducted a multicriteria analysis, evaluating 13 climate change layers with projections from 2011 to 2040, sourced from the National Water Study (2015). The outcome was a heat map illustrating areas most susceptible to climate change impacts, categorized from 1 to 5. In this scale, red indicates a more significant impact, while blue signifies a lesser one.

As a result, ten priority areas with higher impact levels were identified (refer to Figure 6). The hydrographic subzones expected to experience severe effects include the Magdalena River Basin, Cauca River, Guayuriba River, Metica River, Cusiana River, Cravo Sur River, Pauto River, Casanare River, Chicamocha River, Bogotá River, Sogamoso River, Zulia River, Cesar River, Ranchería River, Sinú River, and direct micro-basins in the Caribbean region. It is crucial to concentrate conservation strategy efforts in these critical areas to mitigate the repercussions of climate change.

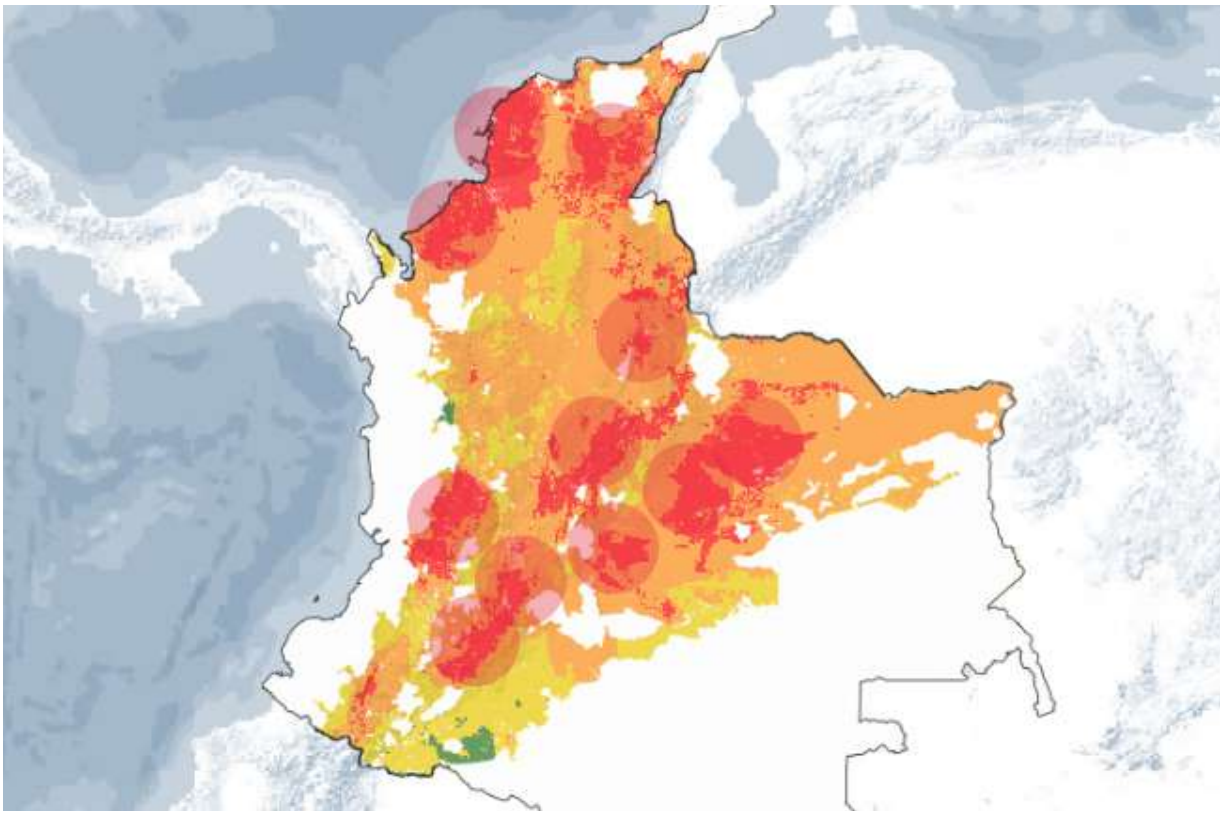


Figure 6. Multi-criteria analysis map of possible impacts of climate change (2011 - 2040). Source: Layer Analysis of the National Environmental System (IDEAM, 2015), Cataruben Foundation

2.4.4. Preliminary Thematic Focus

The B+C&W strategy revolves around three core themes: strengthening carbon stocks, mitigating threats to ecosystems and species, and safeguarding water resource recharge zones within hydrographic subzones. Biodiversity takes precedence in our conservation strategy due to its inherent value to humanity and the imminent threats it faces.

Despite falling short of the global biodiversity targets set for 2020, the world is on the verge of unlocking the full potential of nature-based solutions to combat climate change. In 2022, the Convention on Biological Diversity anticipates introducing a new global framework for biodiversity, coinciding with increasing calls to integrate nature-based solutions into climate change mitigation strategies.

Our conservation strategy places a strong emphasis on regulating water quality and carbon storage due to their pivotal roles in global conservation. We establish specific targets for particular areas, concentrating on safeguarding and preserving regions that are vital for biodiversity and its contributions to human well-being.
Conservation management employs a range of site-based actions to uphold the inherent value of these areas, taking into account their unique conservation characteristics. In essence, the strategy centers on biodiversity, given its significance to humanity and the threats it faces, while concentrating on specific areas and nature-based solutions for its protection and conservation.

Furthermore, water, the lifeblood of Earth's biogeochemical cycles, plays a central role in maintaining climate stability and biodiversity. It permeates most life processes on Earth, including atmospheric phenomena and biological processes. Water remains integral to the development of biodiversity and carbon storage.

Water bodies, such as oceans, rivers, lakes, and lagoons, are essential for photosynthesis and the transfer of carbon from the atmosphere to the soil, serving as significant carbon reservoirs. The vitality of life and human activities hinges on water availability, making water a fundamental pillar of conservation.
However, there is a need for broader global understanding and appreciation of the significance of water and how human activities jeopardize major freshwater sources. Therefore, a comprehensive water conservation strategy is crucial to address the degradation of ecosystem services, identify critical areas, and ensure water sustainability. This strategy encompasses paramos, wetlands, rivers, snow-capped mountains, aquifers, peatlands, forests, and other elements involved in regulating the hydrological cycle and atmospheric processes.

Concerning carbon, land-use changes significantly contribute to carbon dioxide (CO2) emissions. Disruptions to natural land use, such as deforestation for development or forest-to-agriculture conversion, disrupt the natural carbon cycle, releasing previously sequestered carbon into the atmosphere and exacerbating global warming.
Hence, curbing land-use changes is vital to reduce CO2 emissions and mitigate climate change. The conservation of ecosystems on private lands is pivotal, both for their intrinsic value as natural heritage and their potential to store carbon and combat climate change. Moreover, it can yield economic benefits through forest conservation and restoration programs, sustainable agriculture, and ecotourism.
Incorporating mitigation of land-use changes into a private land ecosystem conservation strategy is essential for climate change mitigation and biodiversity conservation. However, private land ecosystem conservation may encounter challenges, such as the need for economic incentives and pressures for land-use changes.

Implementing this holistic strategy on any property will yield a positive carbon balance, increased net profits, positive impacts on biodiversity, and reduced green, blue, and gray water footprints. These assets can be integrated into the property's real estate portfolio, facilitating economic exchanges with products, companies, or services that require carbon footprint offsetting, protection of threatened ecosystems, or compensation for water footprints. This promotes climate change initiatives that incentivize activities reducing greenhouse gas (GHG) emissions.

2.4.5. Geographic Mapping of Biodiversity, Carbon, and Water Issues

Considering Jung et al.'s (2020-2021) findings, significant synergies exist between biodiversity conservation, carbon storage, and water quality regulation in land management. Focusing management efforts on the top 10% of globally ranked areas has the potential to meet conservation targets for 42.5% of all species considered, including approximately 33.7% of all documented plant species.

These areas in the top 10% are deemed to have the highest priority for achieving biodiversity, carbon, and water conservation objectives simultaneously (Fig. 1 and extended data from Fig. 1). They could also preserve 26% of the world's total carbon and 22.1% of its potential clean water. Colombia boasts 28,784,673 hectares of these crucial top 10% ranked areas. These hectares represent 50% of all private land in the country and 25.2% of the country's total land area (Figure 7, A).
On a broader scale, the management of the top 30% of globally ranked areas has the potential to achieve the conservation target for 60.7% of carbon, 66% of water, and 57.9% of species. In the Colombian context, this translates into 43,508,453 hectares, representing 75.6% of all private land and 38.1% of the country's total land area (Figure 7, B).

Taking this a step further, strategic management of the top 50% of the world's land could achieve conservation targets for an impressive 85.3% of carbon, 89.8% of water, and 79% of species. In Colombia, this representative area comprises 53,439,013 hectares, representing 93% of all private land and 46.8% of the country's total land area (Figure 7, C).

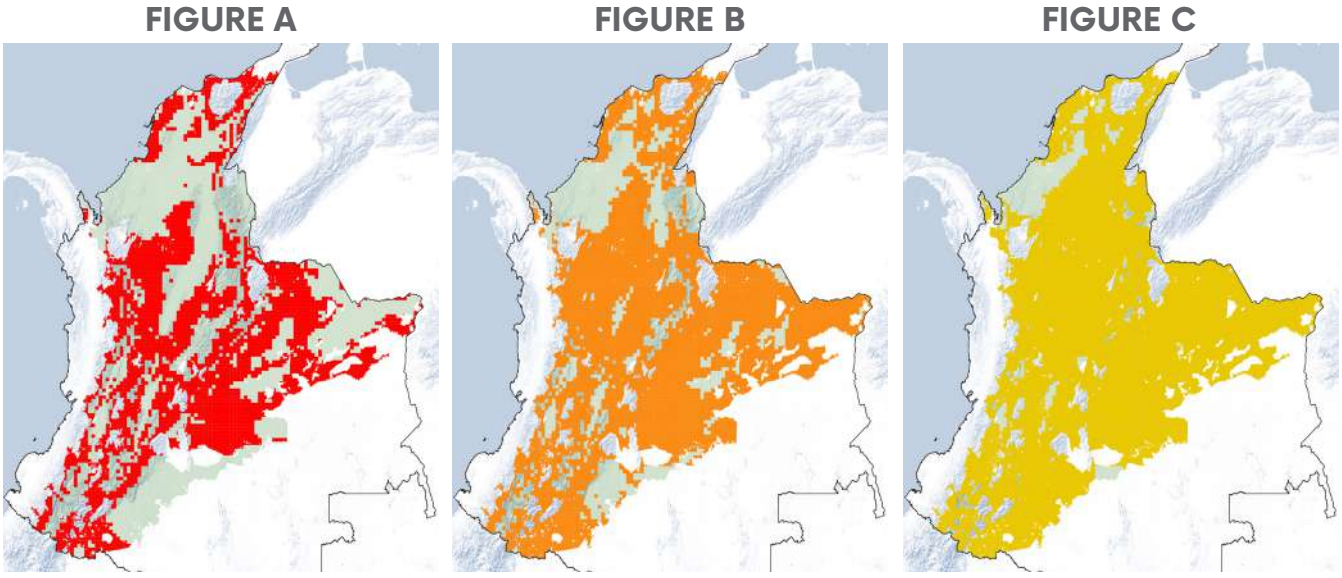


Figure 7. Carbon Initiative properties in areas of high biodiversity, carbon, and water conservation importance.
Source: Raster layer analysis (Jung, 2021), Cataruben Foundation.

2.5 MISION OF THE B+C&W CONSERVATION STRATEGY

In an era where the stark realities of environmental degradation and climate change are increasingly evident, the need for innovative strategies and solutions to effectively address these pressing challenges has never been more critical. It is with this recognition that we propose an integrated approach to biodiversity, carbon, and water conservation on privately-owned lands within our national territory.

Harnessing the potential of nature-based solutions and leveraging technological advancements, the B+C&W strategy seeks to accomplish several interconnected objectives. These include reducing greenhouse gas emissions, enhancing biodiversity, and diminishing the water footprint within priority areas. Through these efforts, the strategy aims to promote sustainable development, striking a harmonious balance between environmental preservation, economic growth, and social well-being.

At its core, the mission of this strategy revolves around the development of nature-based solutions driven by science, technology, and innovation. Its overarching goals encompass the prevention and sequestration of greenhouse gas emissions, achieving net gains in biodiversity, and the reduction of water footprints in designated priority areas. By pursuing these objectives, the strategy contributes significantly to the global pursuit of Sustainable Development Goals.

2.6 CONSERVATION OBJECTS OF THE STRATEGY

Area-based conservation objectives are a fundamental tool in conservation planning and management, providing a clear framework for guiding actions and assessing progress toward conservation goals. This Strategy encompasses conservation objectives that span biodiversity, carbon, and water conservation.

As a result, the areas targeted by this Strategy for conservation encompass a wide range of habitats and ecosystems. These include habitats of threatened species, ecosystems dependent on forests, endangered ecosystems, forests themselves, high mountain páramos, agroforestry systems, natural savannas, wetlands, critical sites for rhizosphere conservation, vital areas for river and other lotic system preservation, and regions influenced by lakes and lagoons.

By establishing specific conservation targets within each designated area, we can more effectively evaluate the success of conservation efforts. Additionally, area-based conservation targets ensure that conservation actions are finely tuned to address the unique needs of each area, avoiding a one-size-fits-all approach.

2.6.1. Biodiversity Conservation Objects

The distribution of endangered species refers to the geographical areas where plant or animal species face varying degrees of threat. The International Union for Conservation of Nature (IUCN) has established specific criteria for assessing a species' conservation status. These criteria take into account factors like population size, rate of decline, geographic distribution, habitat fragmentation, the number of mature individuals, and other factors crucial for a species' survival.

The threat categories this Conservation Strategy focuses on include Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), and Least Concern (LC). The diagram below illustrates the projected distribution of species in these categories (refer to Figure 8).

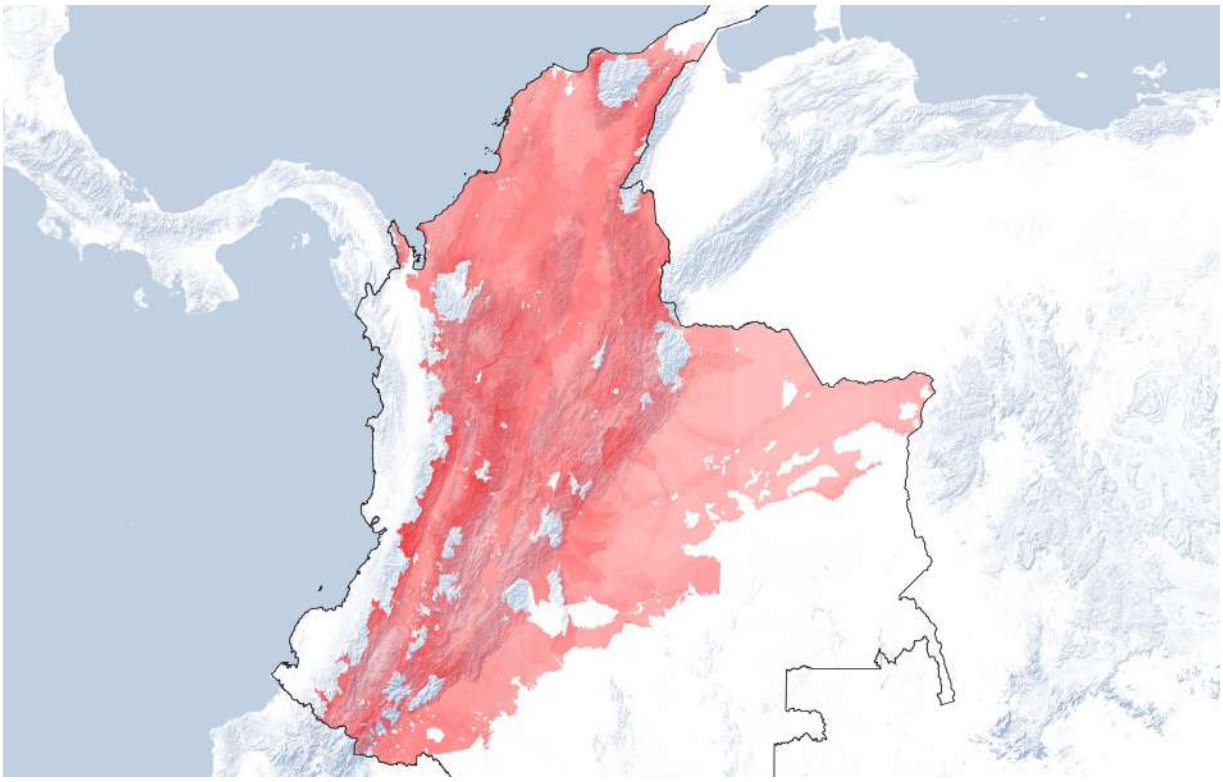


Figure 8. Distribution of High Threat Species (CR, EN, VU) in the B+C&W Strategy. Source: Shifts from IUCN (2022), Cataruben Foundation.

Colombia's threatened ecosystems, categorized as Critical (CR), Endangered (EN), and Vulnerable (VU), are a significant area of emphasis in our conservation efforts. These ecosystems make up 48% of our operational territory and are the primary beneficiaries of projects under this strategy. A detailed breakdown reveals that 124,215 hectares (1%) of ecosystems are critically threatened, 3,388,818 hectares (21%) are endangered, and 4,254,287 hectares (26%) are vulnerable. You can visually explore these classifications in the distribution map of threatened ecosystems (see Figure 9).
By recognizing these threatened ecosystems as conservation units within Colombian territory, we can concentrate our efforts on safeguarding significant hubs of

biodiversity. This strategy is supported by an information infrastructure that facilitates the management of ecosystems and their services, as acknowledged by the IUCN Red List of Ecosystems (RLE) and Key Biodiversity Areas (KBA).

Applying an integrated ecosystem approach to carbon, water, or biodiversity projects enables us to assess the level of threat priority, comprehend the characteristics of the areas where we operate, and evaluate the actions taken—whether conservation or restoration—and their long-term sustainability.

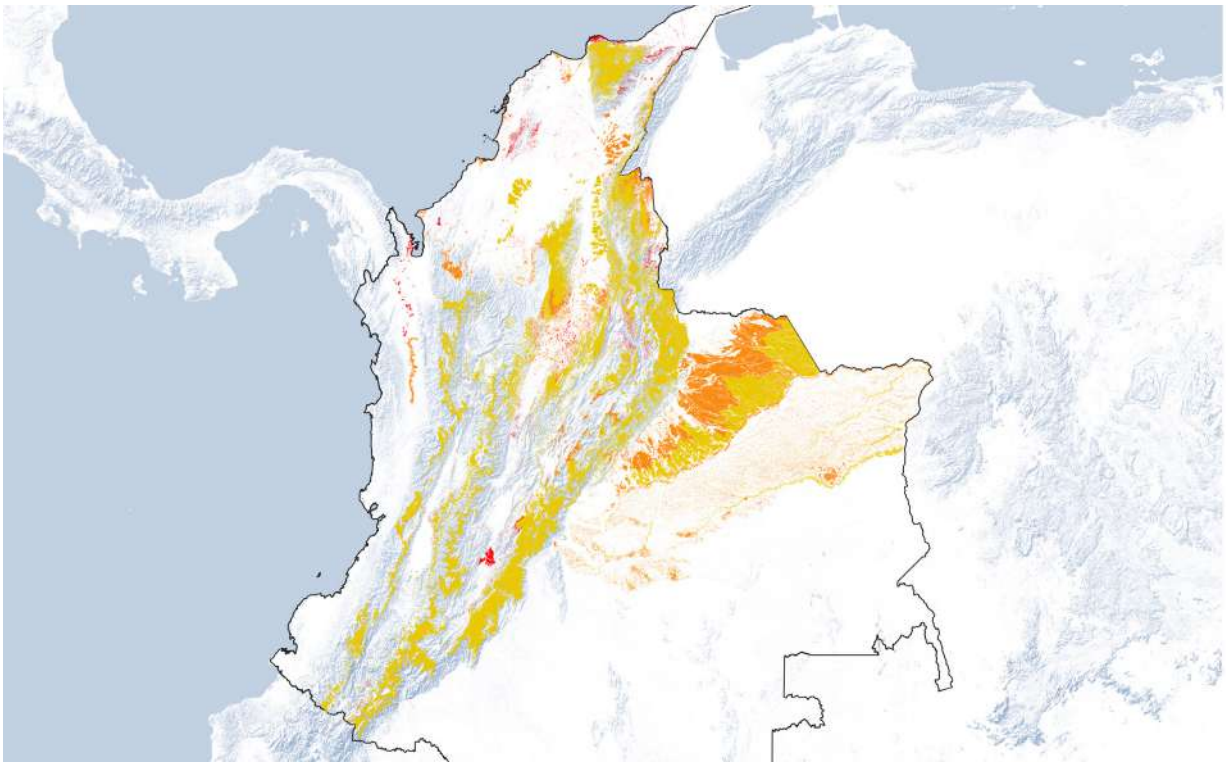


Figure 9. Map showing the distribution of threatened ecosystems in the geographic focus of the B+C&W strategy. Source: Layers from Etter (2018), Cataruben Foundation.

2.6.2. Carbon Conservation Objects

Our carbon conservation efforts focus on the identification of potential carbon sinks, with an emphasis on their quantifiability for target setting. The conservation units for this initiative are rootedz in different types of natural cover, chosen for their importance in storing carbon and maintaining natural land use. These include natural forests, savannas, bogs, wetlands, and agroecosystems. These areas are at the heart of our greenhouse gas mitigation efforts (See figure 10)

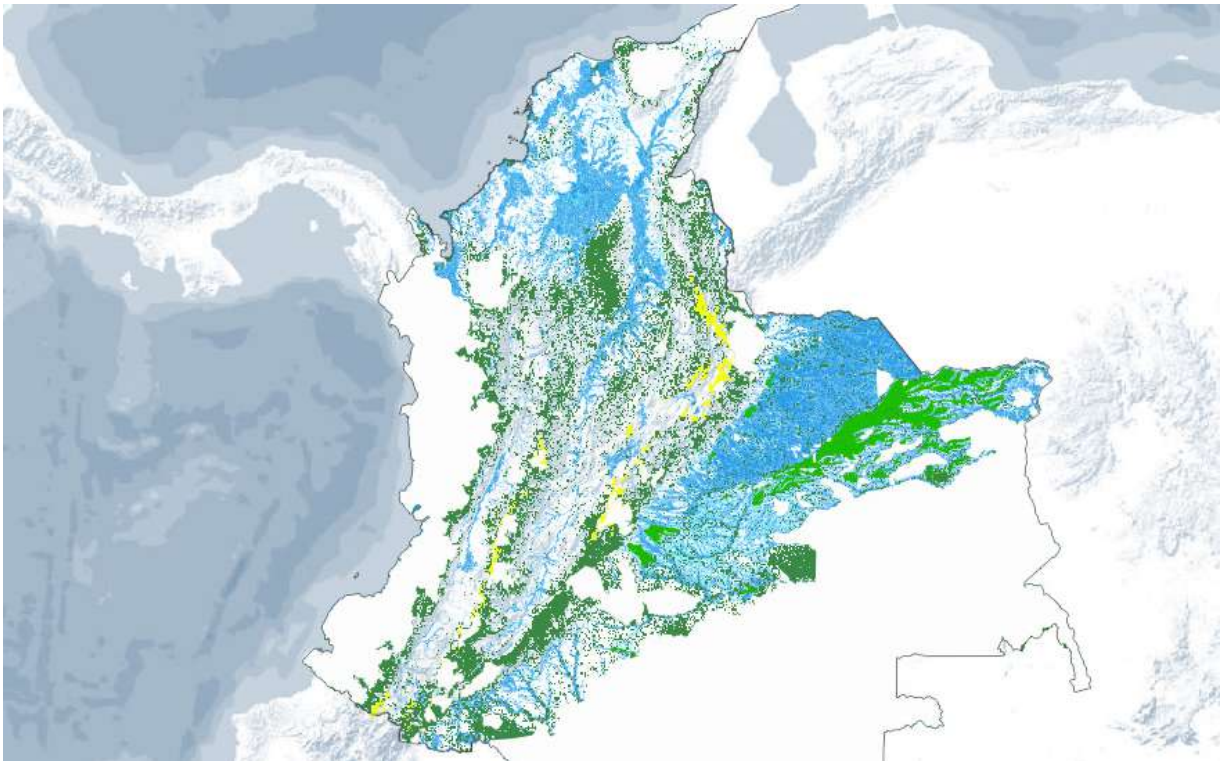


Figure 10. Distribution of conservation targets prioritized for carbon strategy (CR, EN, VU). Source: Layers from (IDEAM, 2015) (IGAC, 2022) (SIAC, 2022), Cataruben Foundation

2.6.3. Water Conservation Objects

The conservation units associated with water management are closely linked to the dynamics of the water cycle within watersheds. They encompass the intricate interactions between various elements, including water recharge areas (such as precipitation, vegetation moisture capture, and groundwater headwaters), runoff areas (comprising rivers and streams), infiltration areas (encompassing wetlands, estuaries, marshes, and peatlands), and sources of evapotranspiration (including lagoons, lakes, and vegetation).

For the Water Strategy, the water conservation units are defined based on hydrological interaction zones within watersheds, with a focus on priority areas (refer to Figure 11):

- Wetlands, Swamps, and Estuaries: These areas play a critical role in recharging aquifers and serve as vital habitats for numerous species.
- Aquifers: These units represent essential water sources for both short-term and long-term human consumption.

- Rivers: Serving as the primary conduits for water sustainability within watersheds, rivers facilitate the distribution and delivery of ecosystem water.
- High Andean Forests: These forests contribute significantly to the hydrological recharge of water bodies.
- Tropical Forests: Considered crucial allies of the "flying rivers," tropical forests provide the essential moisture required to maintain the hydrological sustainability of a watershed.

This delineation of water conservation units within the Water Strategy helps us focus our efforts on safeguarding these critical areas and their contributions to the overall health of watersheds.

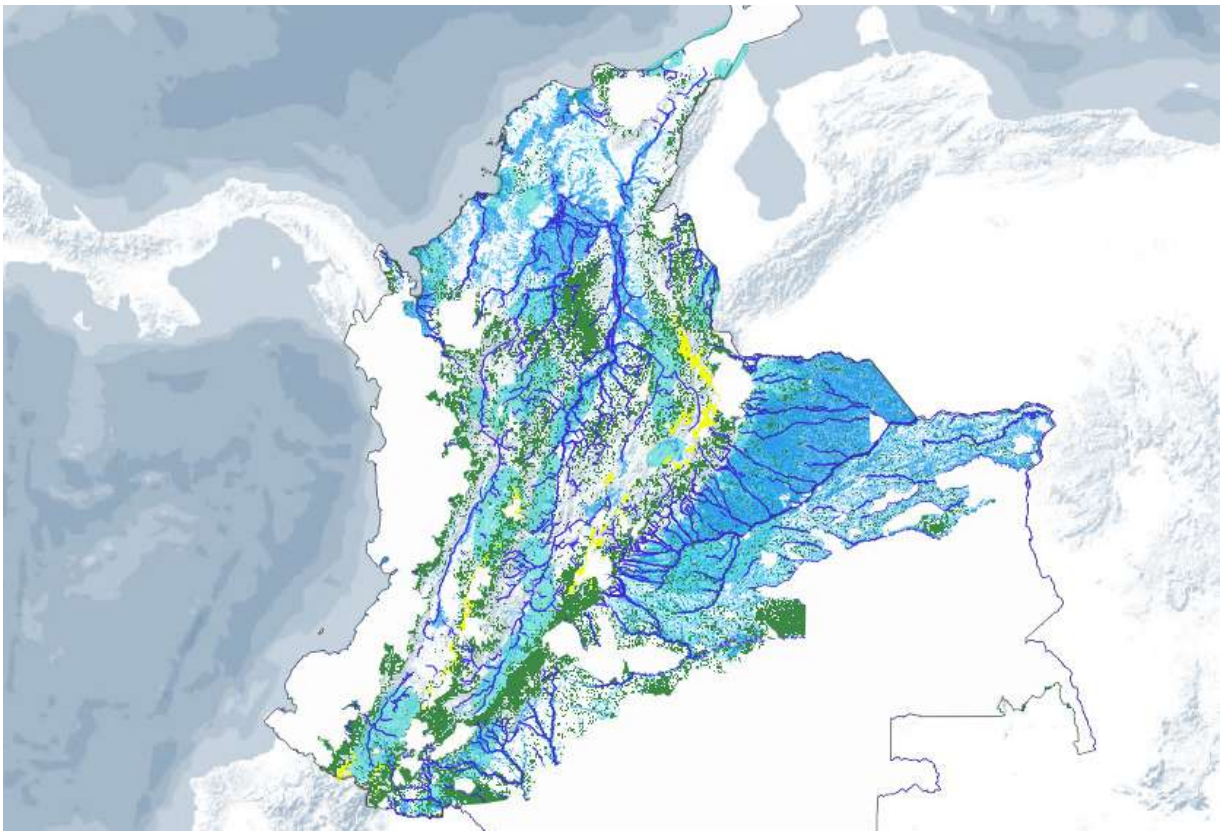


Figure 11. Geographic location of water conservation facilities. Source: Layers from SIAC (2022), IGAC (2022), IDEAM (2015), Cataruben Foundation.

2.7 ECOSYSTEM AND HUMAN SERVICES

In the context of the B+C&W strategy, we have identified specific ecosystem and human services offered by natural forests, natural savannas, páramos (high mountain ecosystems), agro-ecosystems, natural ecosystems, endangered species, and water bodies located on private lands as the primary conservation targets. These services can be categorized into four main types: cultural, regulating, provisioning, and supporting services.

Table 3 below illustrates the alignment of each conservation target with the most relevant ecosystem services. It's essential to emphasize that the ecosystem services listed in the "Ecosystem Services" column apply universally to all objects, given that various ecosystems can provide these services to varying extents.

These ecosystem services play a pivotal role in contributing to the advantages derived from the conservation, restoration, and preservation of ecosystems and endangered species. Moreover, they enhance the quality of human life and productive processes by enhancing and regulating environmental conditions that are critical for development. These conditions include aspects such as soil quality, water availability, air quality, habitat preservation, soil fertility, forest resources, and more.

The conservation objects outlined above encompass a diverse array of vital ecosystem and human services, ensuring the well-being of both human communities and the conservation of biodiversity. The key ecosystem services that we aim to preserve through initiatives focused on climate change mitigation and the sustainable management of natural resources are as follows:

CONSERVATION TARGET	ECOSYSTEM AND HUMAN SERVICES
Natural Forests	Improve water quality reduce natural erosion from runoff capture moisture from the environment water supply through transpiration conservation of biodiversity biological corridors climate regulation (CO2 sequestration and O2 production) strengthening the rhizosphere prevention of soil degradation and desertification carbon sequestration
Endangered species (CR, EN, VU)	Bioindicators of ecosystem health control of other species pollination, seed dispersal food and medicinal use regulation of biogeochemical cycles pollutant degradation and assimilation environmental resilience through biodiversity vocabulary and classification system, recreation and inspiration, and spirituality
Paramos	Contribution of minerals water supply regulation of annual water cycle Inclusion of environmental moisture improvement of water quality preventing natural erosion by water flow regulation of excess flow groundwater recharge
Wetlands and springs	Groundwater recharge regulation of the annual hydrologic cycle mineral contribution habitat for species water input to basins
Natural savannas	Groundwater recharge species habitat reduction of erosion through cover genetic resources wildlife grazing

Rivers and streams, lagoons and lakes	Water supply assimilation and degradation of pollutants through water aeration nutrient dispersion groundwater recharge water for biodiversity species habitat reduction of erosion through cover genetic resources wildlife grazing
Aquifers	Enhancement of water quality Water supply by springs - subsurface flow Groundwater for human consumption

Table 3. Ecosystem and human services provided by each of the conservation targets.

2.8 DEFINITION OF KEY ECOLOGICAL ATTRIBUTES AND THEIR INDICATORS

Evaluating the feasibility of conservation objects entails a systematic process, which includes:

- Identification of their key ecological attributes.
- Definition of an indicator for each attribute.
- Establishment of an acceptable range of variation.
- Determination of both the present state and the desired future state for each indicator.

In alignment with the Biodiversity, Carbon, and Water Strategy, our team has chosen to monitor the status of the following conservation objects. This monitoring allows us to gauge any improvements or deteriorations in each object's condition.

2.8.1. Selection of ecological attributes for biodiversity conservation objects

The B+C&W strategy chooses two approaches for the key ecological attributes of biodiversity conservation objects. First, the conservation attributes of endangered ecosystems were selected by the extent of conserved hectares, with the indicator being hectares/year. Second, B+C&W takes the conservation approach of endangered species, aiming not to descend from the current biodiversity of endangered species and using an indicator of the percentage of 100% of conserved species that currently have a high threat category (Table 4).

Conservation Target	Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) Ecosystems	Protected areas with endangered ecosystems	Hectares/ year	10%	30%	50%	>50%
	Restored areas with critically endangered ecosystems		10%	30%	50%	>50%
	Actions to improve ecosystem management		10%	30%	50%	>50%
Endangered Species (CR, EN, VU)	Critically endangered, Endangered and Vulnerable species protected in the project area	Auditory recording of critically endangered species within the project soundscape	70% of the baseline is preserved	80% of the baseline is preserved	90% of the baseline is preserved	100% of the baseline is preserved

Table 4. Description of key ecological attributes for biodiversity conservation objects.

2.8.2. Selection of key ecological attributes for carbon conservation objects

The key ecological attributes for carbon conservation objects were selected primarily based on two types of indicators: the number of target hectares to be included in different carbon projects and the amount of CO2e tons removed from the atmosphere and the amount of CO2e tons avoided, depending on the type of carbon project. The values for these indicators, depending on the conservation target, are shown below (Table 5).

Conservation Target	Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Agroecosystems	Hectares under SAF projects	Hectares of SAF	<5000	5000,01 - 10000	10000,01 - 15000	>20000
	Tons of CO2e removed in SAF	tCO2eq/ha	<3	3 -12	12 - 21	>21
Caribbean coastal forests	Tons of CO2e avoided (NREF)	tCO2eq/ha	<20	20,01 - 100	100,01 - 180	180,01 - 224
Andean forests	Tons of CO2e avoided (NREF)	tCO2eq/ha	<20	20,01 - 100	100,01 - 180	180,01 - 265
Orinoco forests	Tons of CO2e avoided (NREF)	tCO2eq/ha	<20	20,01 - 60	60,01 - 100	100,01 - 148
Paramo and highland ecosystem	Tons of CO2e avoided (NREF)	tCO2eq/ha	<50	50,01 - 100	100,01 - 200	200,01- 281
	Hectares of paramo ecosystem conserved	Hectares of paramo ecosystem	<5000	5000,01 - 10000	10000,01 - 15000	15000,01 - 20000
Wetlands	Tons of CO2e avoided	tCO2eq/ha	<10	10-30	30,01 - 60	60,01 - 75
	Hectares of wetland ecosystems conserved	Hectares of wetland ecosystems	<100000	100000,01 - 200000	200000,01 - 400000	400000,01 - 500000
Natural savannahs	Tons of CO2e avoided	tCO2eq/ha	<10	10 - 20	20,01 - 30	30,01- 50
	Hectares of natural savanna ecosystems conserved	Hectares of savanna ecosystems	<100000	100000,01 - 200000	200000,01 - 300000	300000,01 - 400000

Table 5. Description of key ecological attributes for carbon mitigation targets. Source: Cataruben Foundation.

2.8.3. Selection of key ecological attributes for water conservation objects

Regarding key ecological attributes for water preservation objects, B+C&W uses a watershed-based approach, considering precipitation, surface runoff, soil moisture, water quality, and infiltration. These are key components in determining the water stress of a watershed. The methodology uses The IDEAM indicators to have a national reference for quantifying these indices and indicators of water quantity. The values of these indices are shown in the table below (Table 6).

Conservation Target	Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Atmospheric Systems	Precipitation probability for any time scale based on historical precipitation data	Hectares of SAF	<5000	5000,01 - 10000	10000,01 - 15000	>20000
	Tons of CO2e removed in SAF	tCO2eq/ha	<3	3 -12	12 - 21	>21
Caribbean coastal forests	Tons of CO2e avoided (NREF)	tCO2eq/ha	<20	20,01 - 100	100,01 - 180	180,01 - 224
Andean forests	Tons of CO2e avoided (NREF)	tCO2eq/ha	<20	20,01 - 100	100,01 - 180	180,01 - 265
Orinoco forests	Tons of CO2e avoided (NREF)	tCO2eq/ha	<20	20,01 - 60	60,01 - 100	100,01 - 148
Paramo and highland ecosystem	Tons of CO2e avoided (NREF)	tCO2eq/ha	<50	50,01 - 100	100,01 - 200	200,01- 281
	Hectares of paramo ecosystem conserved	Hectares of paramo ecosystem	<5000	5000,01 - 10000	10000,01 - 15000	15000,01 - 20000

Table 6. Description of key ecological attributes for carbon mitigation targets. Source: Cataruben Foundation.

2.9 DIRECT THREAT IDENTIFICATION AND PRIORITIZATION

We identified and analyzed the direct threats affecting each of our priority conservation objects, as well as the actors behind these threats. These threats include human activities such as unsustainable fishing and hunting, deforestation, pollution, and the introduction of invasive species. They also include natural phenomena altered by human activities, such as climate change and extreme events.

Understanding how these threats and their drivers affect the conservation of these priority targets is critical to developing effective and sustainable strategies that ensure the protection and preservation of these ecosystems and species in an uncertain future. However, it's essential to understand that this situation forms the basis of our conservation strategy.

Our priority biodiversity conservation objects, which include threatened species, forest-dependent species, and endangered ecosystems, face several immediate threats weakening biodiversity and populations worldwide (see Figure 13). To address these challenges in our biodiversity conservation strategy, we will consider the following ten threats:

1. Unsustainable fishing.
2. Hunting.
3. Climate change.
4. Water pollution.
5. Deforestation.
6. Overuse of water resources.
7. Ecosystem degradation.
8. Land-use change.
9. Species disturbance.
10. The trade of exotic species.

These threats, shown in Figure 12, are the focus of the analysis of the underlying problem of biodiversity loss.

Our water-related conservation targets, such as lakes and lagoons, rivers, aquifers, wetlands, and natural forests, face various threats that degrade the provision of the ecosystem and human services they provide (see Figure 13).

These threats include:

- Land use changes that cause erosion and degradation of ecosystems strategic for water storage.
- Climate change altering the regularity of the water cycle.
- Water pollution from human productive activities.
- Pollution of aquifers.
- Excessive demand for water resources which causes water stress that limits the necessary ecological flow.
- Deforestation of forests that store moisture and generate evapotranspiration.
- Erosion and sedimentation of water bodies.
- The general loss of cover that helps regulate the water cycle in watersheds.

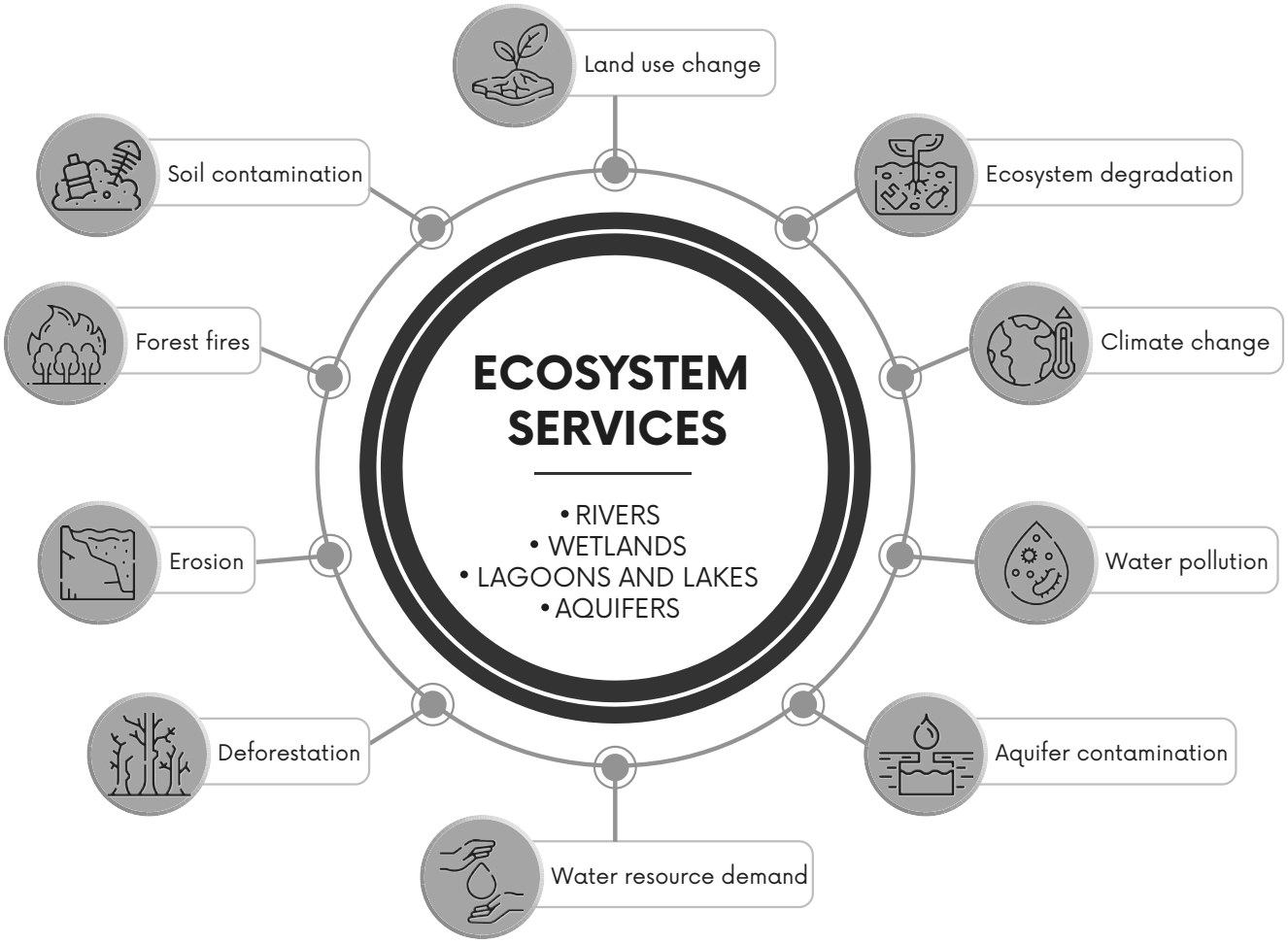


Figure 12. Interaction of general threats to biodiversity conservation targets. Source: Cataruben Foundation.

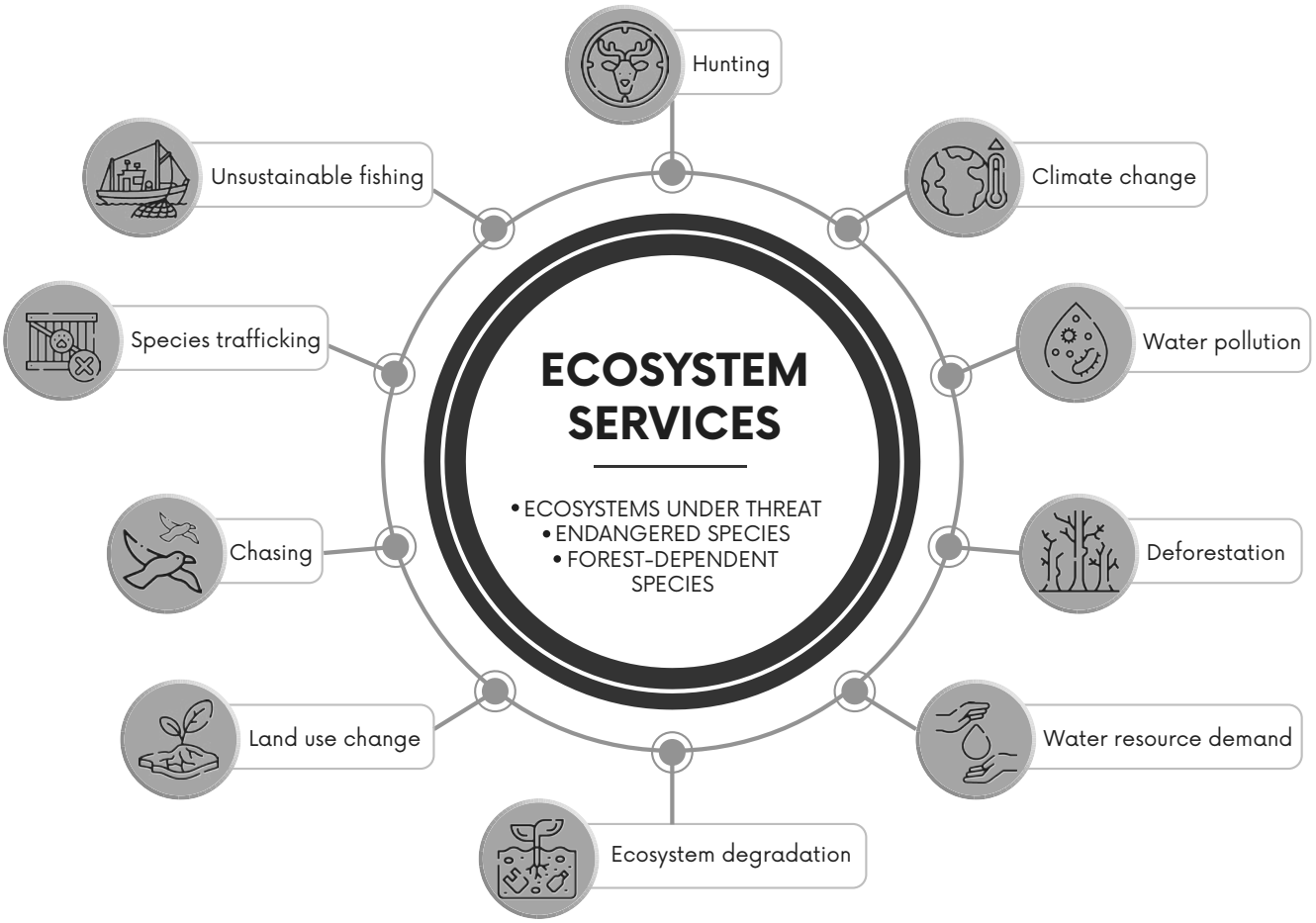


Figure 13. Interaction of common threats with carbon conservation targets. Source: Cataruben Foundation.

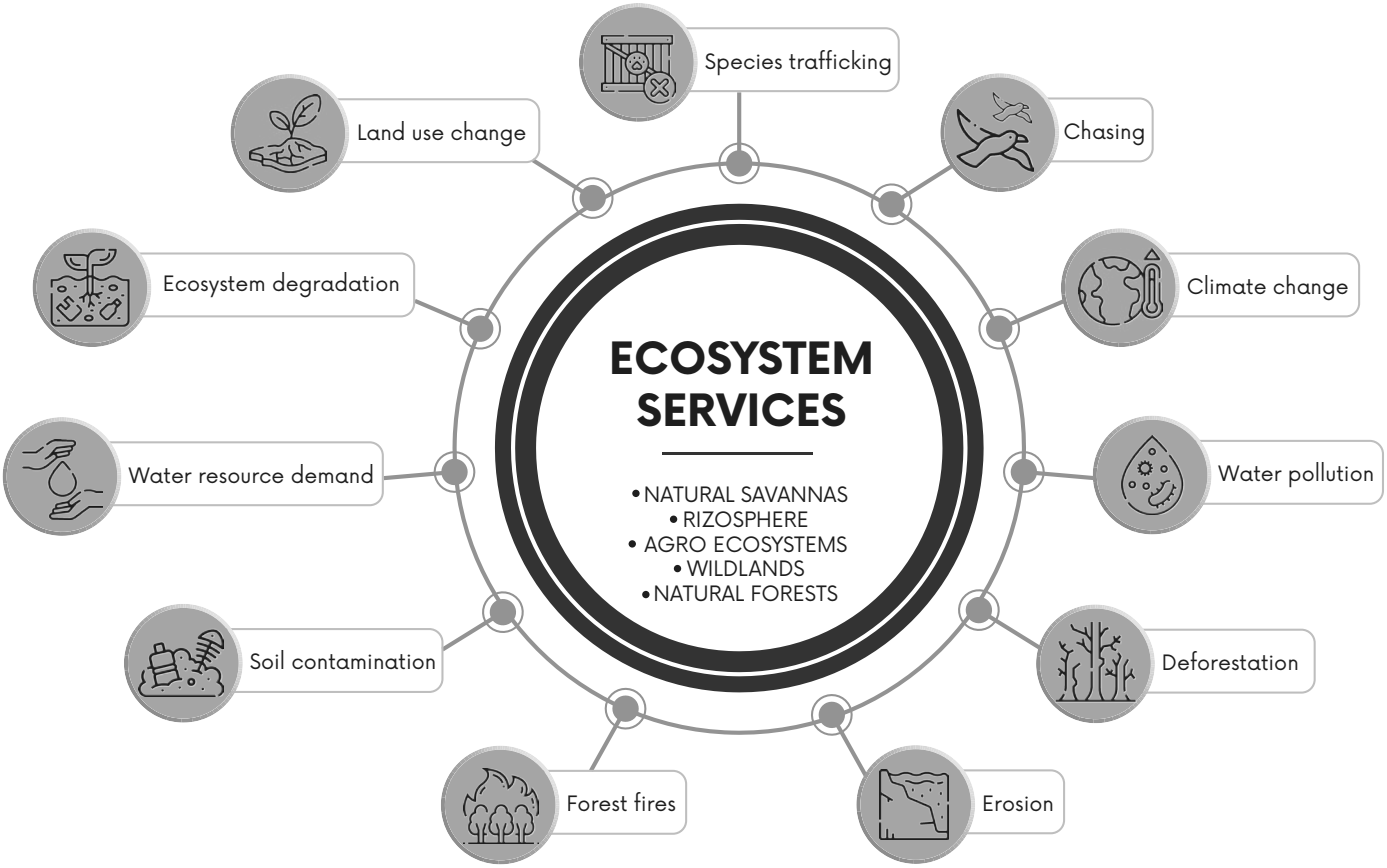


Figure 14. Interaction of general threats to water conservation targets. Source: Cataruben Foundation.

In this context, these threats need to be quantified to identify where the most significant threats lie and to recognize the priority and distribution of environmental impacts. The table below shows the quantification of the threats.

As seen in the previous assessment, the most significant overall impacts causing damage and degradation of conservation targets are land use change, deforestation, pollution, fires, erosion, climate change, and poor water resource management. In addition, the most affected conservation targets are threatened ecosystems and species, forests, savannas, paramos, wetlands, rivers, and lagoons.

2.10 ANALYSIS OF INDIRECT THREATS AND OPPORTUNITIES

The threats previously identified and assessed are attributable to human-caused factors. These factors, through various productive activities, generate negative impacts on biodiversity, carbon reserves, carbon-capturing ecosystems, and water resources.

Additionally, these activities arise from the demand for services and consumer goods, which serve as indirect threats. To address these issues, it is essential to explore sustainable production alternatives that can mitigate the identified risks. The table below outlines opportunities identified for altering the root causes of these adverse impacts.

To spatialize the information from the initial phase of the strategy, a flowchart has been designed. This flowchart includes conservation objectives for both ecosystemic and human services, as well as direct and indirect threats, opportunities for improvement, and strategies to address these environmental and ecosystemic threats and impacts.

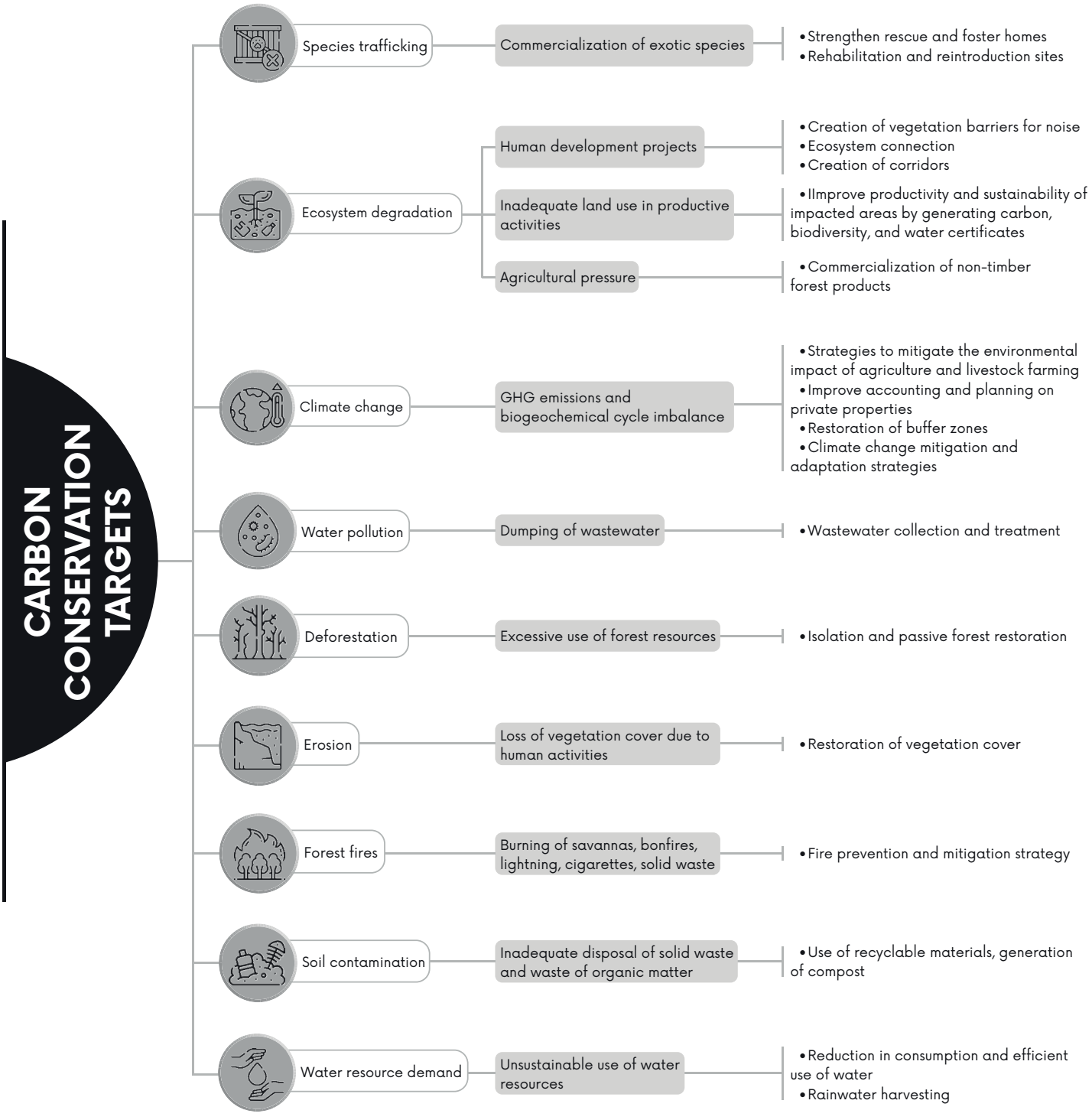


Figure 15. Interaction of carbon conservation targets threats and opportunities for improvement. Source: Cataruben Foundation.

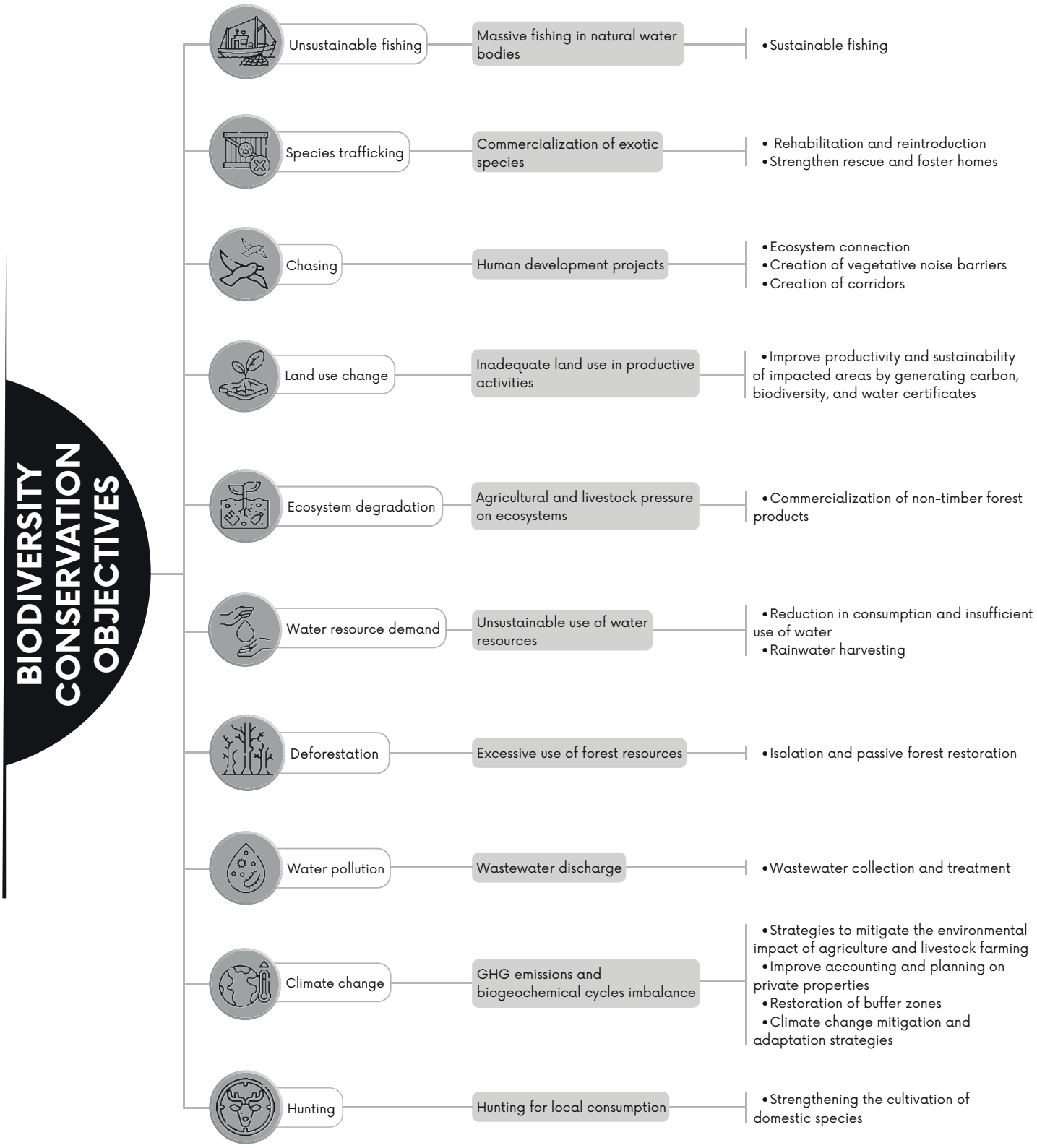


Figure 16. Interaction of threats of biodiversity conservation targets and opportunities for improvement. Source: Cataruben Foundation.

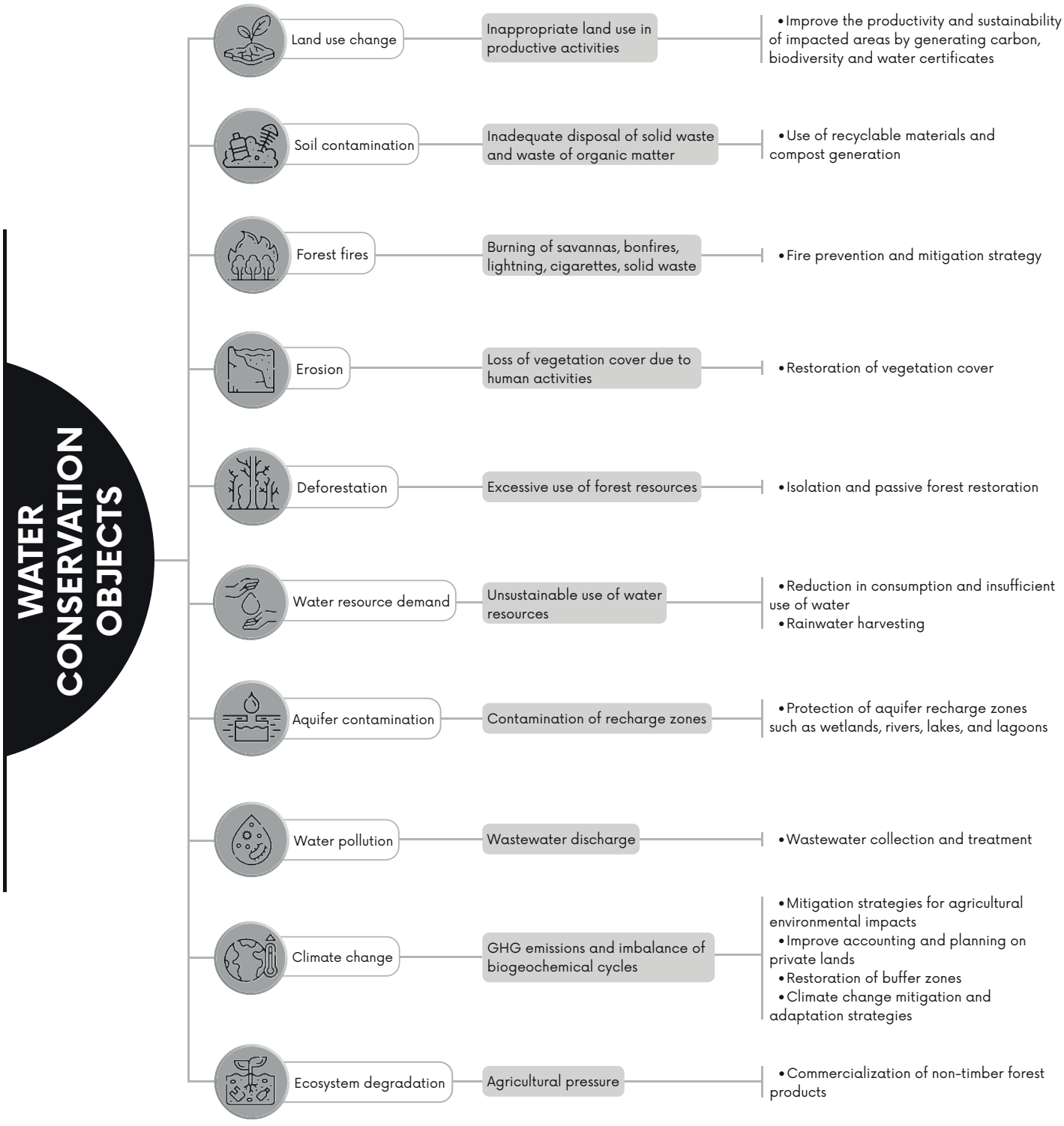
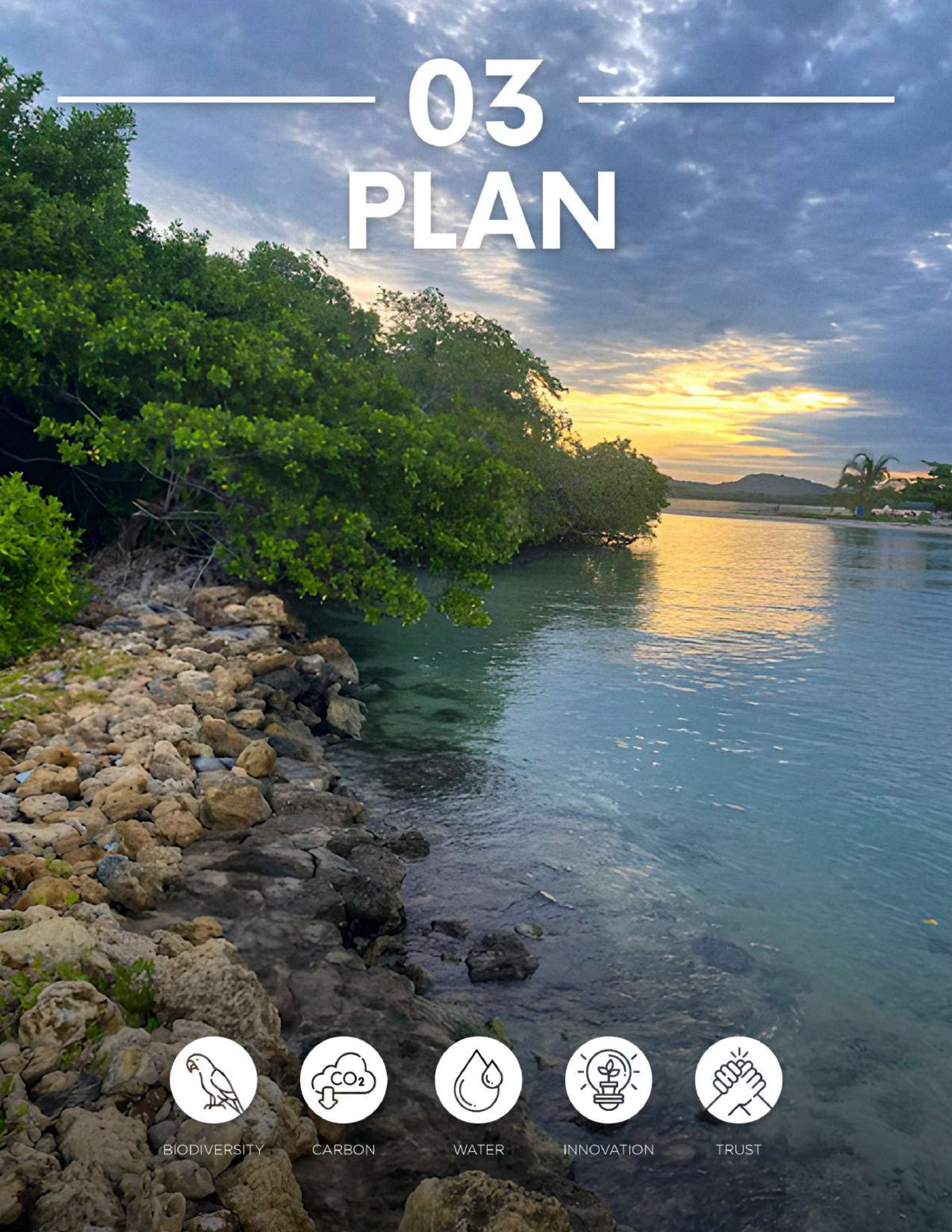


Figure 17. Interaction of threats of water conservation targets and opportunities for improvement. Source: Cataruben Foundation.

03 PLAN



The second step in creating the Strategy for the Conservation of Biodiversity, Carbon, and Water in Colombia's Natural Landscapes is the development of an Action Plan, a Monitoring Plan, and an Operational Plan.

The Action Plan outlines the project's goals, strategies, theory of change, and specific objectives. On the other hand, the monitoring plan develops the audiences, information needs, and materials that will help communicate what the project will do and why, indicators, methods, and responsibilities. Finally, the operational plan includes an analysis of funding needs, capabilities, skills, responsibilities, risk assessment and mitigation measures, estimated project duration, and exit strategy.

By completing these steps, we have developed a comprehensive plan to guide our conservation efforts and established a framework for monitoring and evaluating the progress of the B+C&W strategy.

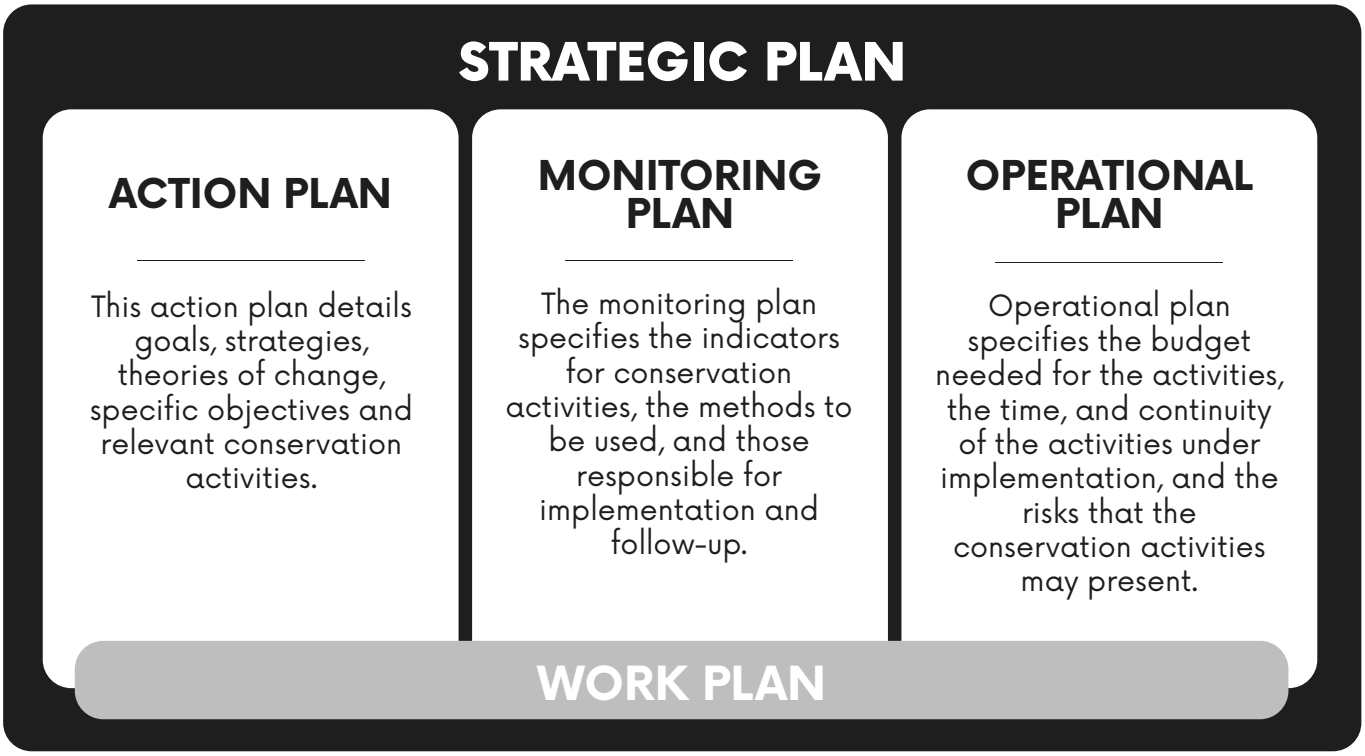


Figure 18. Strategic plan overview. Source: Cataruben Foundation

3.1 ACTION PLAN

The logical line to develop the Biodiversity, Carbon, and Water Strategy Action Plan included considering opportunities to reduce threats. For example, in the case of land use change, it was determined that avoiding this change in private Colombian territory was an opportunity, but only in the context of a climate change mitigation strategy (preserving natural cover reduces greenhouse gas emissions), generating carbon credits for the owners. With the money from these credits, actions such as the implementation of activities and satellite monitoring can be carried out

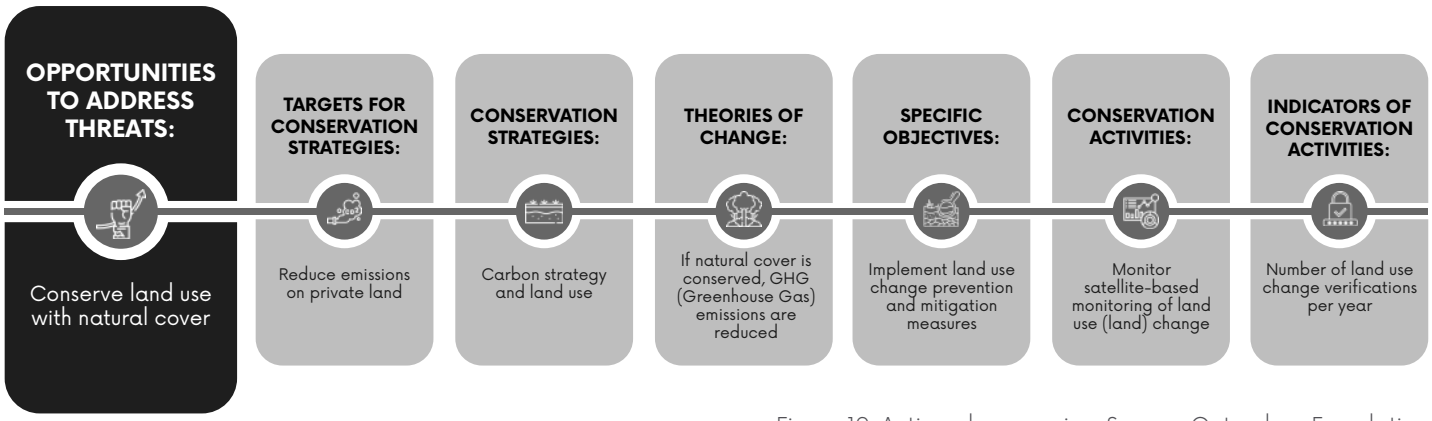


Figure 19. Action plan overview Source: Cataruben Foundation

3.1.1. Goals

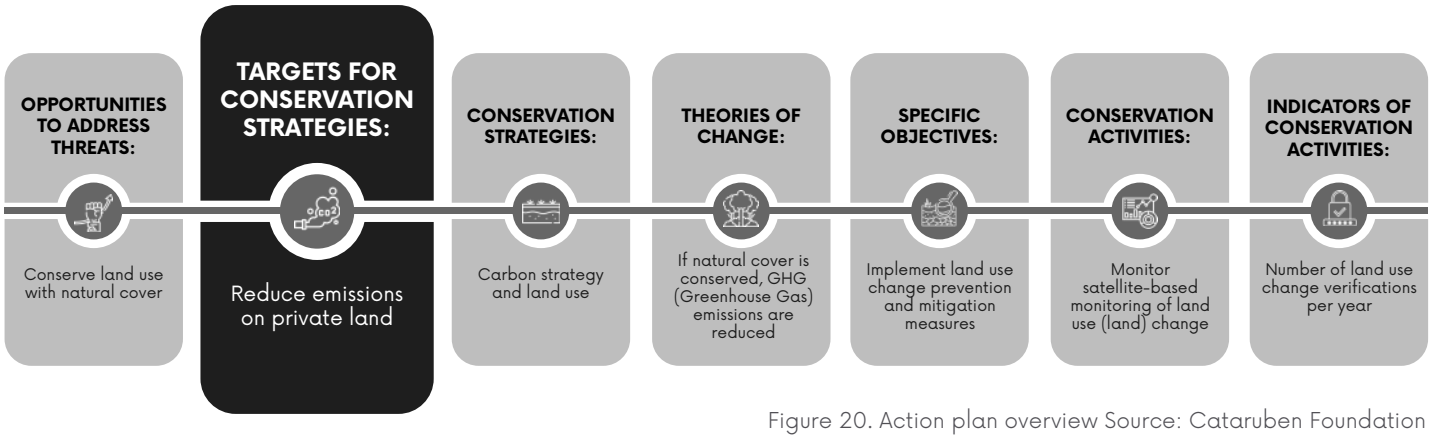


Figure 20. Action plan overview Source: Cataruben Foundation

This strategy aims to conserve biodiversity, carbon, and water on private lands in Colombia, thereby increasing environmental sustainability. To do this, we develop future desirable goals for the identified conservation objects:

A Manage the conservation of threatened ecosystems on private lands in the strategic area and preserve at least 80% of threatened species through community training, GIS monitoring, participatory species monitoring, implementation of landscape management tools, and conservation, sustainable use, and restoration actions.

B Implement management and mitigation measures for agricultural and forestry activities demonstrating CO2 removal in areas prioritized for AR projects, reaching 100% of target hectares over the next 20 years.
C Implement emission reduction activities from sustainable property management, forest management, and land use monitoring of REDD+ projects, reaching 100% of the target hectares over the next 20 years.
D Protect areas of importance for water resources, such as watersheds and water bodies in the strategic region, by implementing protection activities on properties eligible for the Basic Water Credit Initiative during the 20 years of project development.
E Develop nine innovative products that contribute to biodiversity, carbon, and water conservation through the Technology Readiness Level (TRL), Business Readiness Level (BRL), and Customer Readiness Level (CRL) to expand the long-term product portfolio of environmental benefits related to carbon, biodiversity, water, and non-timber forest products to ensure monetization over the next 30 years.
F Improve the viability of 12 conservation objects managed by conservation areas, monetize USD 150,000,000 in environmental services that allow the development of the conservation activities proposed in the Strategy, reach a level of awareness of 150,000,000 people, generate 15,000 contractual commitments for conservation, create transparency and sustainability in the management of resources from 10 financial leverage funds, and generate 30 high-impact business alliances that guarantee the development of strategies to conserve biodiversity, carbon, and water in the scope area over the next 30 years.

3.1.2. Strategies

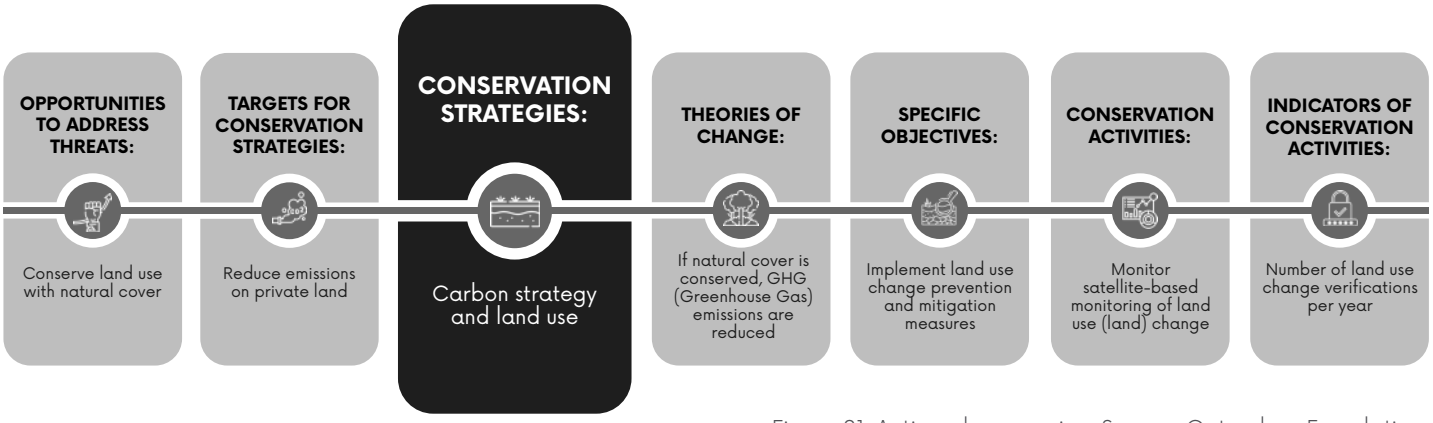


Figure 21. Action plan overview Source: Cataruben Foundation

It is necessary to generate conservation strategies to prevent, control, reduce, restore, and mitigate the environmental impacts caused by human productive activities on biodiversity, carbon, and water conservation objects.

These strategies provide nature-based solutions to problems that cause the deterioration of strategic ecosystems and natural resources associated with the sustainability of life, as well as essential ecosystem and human services for the future of biodiversity and

sustainable human development. Below are the five strategies created to generate net gains in environmental sustainability on the properties within the strategic scope of the Cataruben Foundation.

Action strategies seek to find solutions to the threats to the conservation objects. In this sense, Catruben's team identified five main strategies to mitigate the threats and address the possible opportunities for conserving the twelve properties. It was necessary to research existing strategies and analyze successful cases, conduct a situational analysis considering opportunities, limitations, and risks, and select the optimal strategies by evaluating their impact, feasibility, and suitability to the context to ensure success.

3.1.2.1. Biodiversity Strategy

To effectively address the conservation of threatened ecosystems on private lands, it is essential to implement a series of strategies and activities that involve the community and landowners. These include:

- Community education: Through workshops and courses that raise awareness of the importance of conservation.
- GIS and participatory monitoring: To assess the health of ecosystems and populations of threatened species.
- The implementation of landscape management tools through management and conservation plans made in collaboration with owners.
- The implementation of conservation, sustainable use, and restoration actions that promote ecologically responsible practices
- The establishment of alliances with local, national, and international organizations to ensure a unified approach as well as technical and financial support.

These strategies and activities, applied in an integrated manner, can significantly contribute to the improvement and conservation of threatened ecosystems and endangered species present on private lands.

It is essential to identify and address key drivers of intervention to significantly impact the conservation of threatened ecosystems on private lands. These include:

- Promoting public policies and legal frameworks that support conservation on private lands.
- Increasing public awareness and community support through communication and education campaigns.
- Implementing economic and financial incentives to motivate owners to adopt conservation and sustainable management practices.
- Promoting research and scientific monitoring to inform decision-making and adapt conservation strategies over time.

By addressing these key factors, more effective and efficient interventions can be designed to conserve threatened ecosystems and species, ensuring a holistic approach that considers both socio-economic and ecological aspects in managing private properties..

3.1.2.2. Carbon and Land Use Strategy

The Carbon and Land Use Strategy addresses threats to above- and below-ground carbon stocks in protected ecosystems and the transformation of natural land use by providing incentives for conserving natural cover and optimal carbon management.

The Carbon and Land use strategy will generate activities for protecting carbon stocks and planning to restore vegetation cover and soil regeneration affected by human production. It will do so through promoting actions such as living fences, biological corridors, bioremediation, agroforestry systems, silvopastoral systems, restoration of buffer zones, mitigation of agricultural impacts, monitoring and mitigation of fires, water harvesting, among other activities in the short, medium and long term in the strategic scope.

3.1.2.3. Water Strategy

The Water Strategy mitigates the impact of water resource degradation threats to water bodies through efficient management and sustainable use of water in household and productive processes on private properties.

This strategy promotes actions such as collection and treatment of domestic wastewater; reforestation and restoration of natural cover that contributes flow and moisture to the water cycle; water harvesting to reduce the green water footprint and treatment; direct rainwater harvesting at home; protection of water recharge areas such as wetlands, streams, rivers, and peatlands; and water purification to improve the quality of human life in homes through water conservation and efficient water use plans.

The strategy also implements education and training on the topics mentioned above, as well as wastewater management and treatment. It aims to implement water resource conservation activities in the development of climate change mitigation initiatives that reduce the blue, green, and gray water footprints in the short, medium, and long term within the strategic scope.

3.1.2.4. Innovation and Productivity Strategy

The Innovation and Productivity Strategy aims to find nature-based solutions to the threats facing the 12 conservation objects of biodiversity, carbon, and water through research, development, and innovation in new products, technically and financially validated through the development of Technological Readiness Levels (TRLS) and Business Readiness Levels (BRLS). The development of these maturity levels begins with the development of 9 high-potential ideas for research, development, and innovation of new products.

The development of technological maturity levels (TRLS) and business maturity levels (BRLS) will be first carried out on the following innovation products:

- Nature certificates to contribute to Sustainable Development Goal 15: Conserving Life on Earth.
- Water certificates to offset the corporate water footprint in sub-basins within the strategic scope.
- Carbon certificates in coastal ecosystems, including mangroves, wetlands, and tropical dry forests in the Colombian Caribbean.
- Carbon certificates in cocoa crops and permanent complementary crops within the strategic scope.
- "CQTX," The platform for collecting and analyzing environmental data from climate change mitigation initiatives.
- "Geoportal," The platform for visualizing and analyzing geospatial information from climate change mitigation initiatives, among other information sources.
- A knowledge transfer model for the democratization of climate change mitigation initiatives at the strategic level.

- Non-timber forest products: A product from the transformation of honey from the beekeeping activities of the beneficiaries of climate change mitigation initiatives.
- Non-timber forest products: A product from the transformation of the oleoresin of the copaiba tree extracted on the properties of climate change mitigation initiatives.

3.1.2.5. Trust Strategy

The trust strategy involves addressing the challenges of monetizing environmental services and improving the viability of the 12 conservation targets in selected areas, monetizing USS150 million to directly and indirectly benefit 150 million people through the implementation of projects and/or products for the conservation of biodiversity, carbon and water. it also seeks to reach contractual commitments for conservation with landowners, establishing resources in 10 financial leverage funds in the area of scope over the next 30 years.

However, the first obstacle identified is the need for more awareness and recognition of the importance of conservation objects. An effective communication strategy involving the general public is necessary to overcome this challenge. Various dissemination tools, such as advertising campaigns, social networks, events, and educational programs, could be used. It is essential to adapt this strategy to the culture and habits of the population according to the region where the projects are developed; this will allow the information to spread more effectively.

Another obstacle to overcome is the need for contractual commitments for conservation. Establishing long-term agreements with the natural and legal persons who own the land on which the initiatives carry out conservation activities is essential. A clear example of this is all the legal certificates, which have strengthened the governance of this type of asset. A legal commitment is achieved by creating clear responsibilities and economic rewards for their fulfillment. Monitoring and evaluation mechanisms are also necessary to verify compliance with contractual obligations.

Up-front financing is another major challenge. A need for confidence in the sustainability of projects and transparency in resource management are the main barriers to financing conservation projects. Initiatives must develop clear accountability and transparency mechanisms in resource management that give donors and sponsors confidence in conservation projects' sustainability. There is also a need to manage financial leverage funds to maximize the impact of resources and ensure the continuity of projects.

Finally, long-term commercial alliances that allow companies and organizations to collaborate in developing conservation projects are fundamental. These alliances must be based on shared goals and be mutually beneficial to all parties involved. Incentives may be created for companies participating in conservation, such as intangible and tangible products that strengthen their corporate sustainability strategies and other economic benefits.

3.1.3. Theories of Change

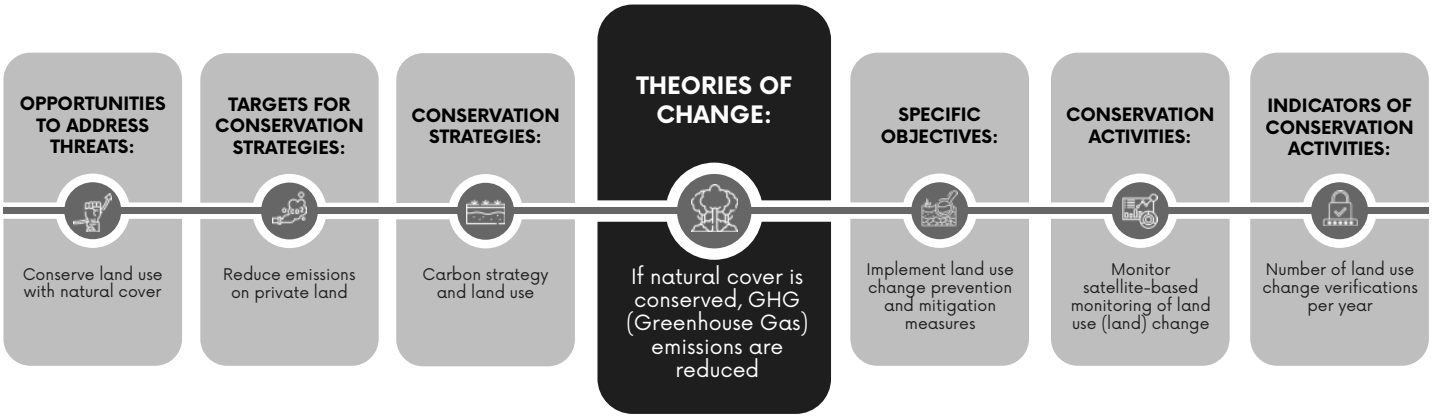


Figure 22. Action plan overview Source: Cataruben Foundation

3.1.3.1. Biodiversity Strategy Theory of Change

Key assumptions:

The proposed theory of change is based on the assumption that implementation of the above will lead to a series of intermediate outcomes that will ultimately result in the long-term conservationw of ecosystem biodiversity and human well-being.

Any thoughts?

Causal relationships:

IF STAKEHOLDERS ARE EDUCATED, THEN:

- The adoption of sustainable management practices will increase.
- Informed decisions about ecosystem conservation and restoration will improve.

WHEN OWNERS HAVE ACCESS TO INFORMATION AND RESOURCES, THEN:

- Implement sustainable practices more efficiently.
- Ensure the long-term sustainability of threatened ecosystems.

WHEN CHANGES IN LAND USE AND HABITAT QUALITY ARE MONITORED AND TRACKED, THEN:

- Facilitate land-use planning and optimization.
- Priority areas for conservation and restoration can be identified.

WHEN MULTI-STAKEHOLDER PARTNERSHIPS ARE ESTABLISHED, THEN:

- Knowledge and resources are shared.
- Conservation policies and strategies at local and regional levels will be improved.

WHEN AWARENESS AND EDUCATION ABOUT ECOSYSTEM CONSERVATION ARE PROMOTED, THEN:

- The adoption of values of stewardship and responsibility is encouraged.
- Environmental challenges will be addressed in an integrated and collaborative manner.

Expected intermediate outcomes:

- Increased adoption of sustainable management practices.
- Improved informed decision-making for conservation and restoration.
- Identification of priority areas for conservation and restoration.
- Improve local and regional conservation policies and strategies.
- Promote the adoption of values of stewardship and responsibility.

Expected long-term results:

- Effective conservation and restoration of ecosystem biodiversity.
- Long-term sustainability of ecosystems and improved human well-being.

Key activities:

Key activities for successfully implementing this biodiversity strategy include organizing and coordinating workshops and training programs, creating knowledge platforms and resources, establishing partnerships with relevant actors, and spreading information and education at the community level.

3.1.3.2. Carbon and Land Use Strategy Theory of Change

Key assumptions:

The theory of change for the Carbon and Land Use Strategy aims to improve the conditions for the fixation, storage, and conservation of carbon reserves in the properties by implementing activities to prevent, mitigate, and control agents that transform the vegetative cover.

Causal relationships:

IF LAND USE CHANGE IS PREVENTED, THEN:

- Greenhouse gas emissions are avoided.
- Biodiversity habitats are conserved.
- The wildlife on the property will be preserved.
- Water recharge zones are conserved.
- Ecosystem services are sustained.

IF THE DEGRADED COVER IS RESTORED, THEN:

- Greenhouse gas emissions are eliminated.
- Soil erosion will be reduced.
- Landscape and ecosystem connectivity will be improved.
- Ecological niches are expanded.
- Ecosystem services will be enhanced.
- Water use on the property will increase.

IF COMMON AND HAZARDOUS SOLID WASTE IS MANAGED ON THE PROPERTY, THEN:

- Exposure to dangerous substances will be reduced.
- Organic fertilizer production will increase.
- Water and soil pollution will be reduced.
- The spread of forest fires will be reduced.
- Animal welfare will be improved.

WHEN HOTSPOTS AND FIRE-PRONE AREAS ARE PREVENTED AND CONTROLLED, THEN:

- Greenhouse gas emissions will be avoided.
- The permanence of climate change mitigation initiatives is ensured.
- Habitats and ecosystems will be protected.
- Biodiversity on the property is conserved.

Expected interim results:

- Avoidance of greenhouse gas emissions.
- Preservation of habitats for biodiversity.
- Conservation of fauna on land.
- Protection of water recharge zones.
- Sustainability of ecosystem services.

Expected long-term results:

- Improved conditions for carbon fixation, storage, and conservation.
- Effective prevention, mitigation, and control of agents that alter vegetative cover.

Key activities:

Preventing land use change, restoring degraded cover, managing solid waste on the property, and preventing and controlling hotspots and fire-prone areas.

3.1.3.3. Water Strategy Theory of Change

Key assumptions:

The theory of change for the Water Strategy focuses on the possible changes that may occur due to implementing activities to conserve water resources and water bodies.

Causal relationships:

IF BENEFICIARIES ARE TRAINED ON CLEAN WATER, EFFICIENT USE, AND WATER CONSERVATION, THEN:

- Implementation of water conservation and efficient use plans will improve.
- The blue water footprint will be reduced.
- Household sanitation will improve.
- Diseases associated with water consumption will be reduced.

IF THE PROPOSED WATER RESOURCE MANAGEMENT PLANS ARE IMPLEMENTED:

- Blue, green, and gray water footprints will be reduced.
- The quality of life of the beneficiaries will improve.
- Exposure to diseases associated with the consumption of contaminated water will be reduced.
- Vector breeding sites associated with poor sanitation will be reduced.
- Rainwater harvesting and animal health will improve.
- Water sources are protected.
- Biodiversity will be preserved.
- Aquifer recharge zones are protected.
- Carbon reserves are conserved.
- Water quality will improve due to reduced erosion.

IF DOMESTIC WASTEWATER IS TREATED, THEN:

- Diseases associated with sewage will be reduced.
- Pollution of water bodies will be reduced.
- Pollution of aquifers is diminished.
- The spread of disease vectors will be reduced.

Expected intermediate results:

- Improved implementation of water conservation and efficient use plans.
- Reduction in blue water footprint.
- Improvement in household sanitation.
- Reduction in water-related diseases.

Expected long-term results:

- Conservation of water resources and water bodies.
- Reduced exposure to diseases associated with the consumption of contaminated water.

Key activities:

Education on clean water, efficient water use and conservation, implementation of proposed water resource management plans, protection of onsite water sources, and treatment of domestic wastewater.

3.1.3.4. Innovation and Productivity Strategy Theory of Change

Key assumptions:

The theory of change for the Innovation and Productivity Strategy assumes that research and development of new nature-based products will contribute to the conservation of biodiversity, carbon, and water.

Causal relationships:

IF INNOVATIVE NATURE-BASED PRODUCTS ARE IDENTIFIED AND DEVELOPED, THEN:

- Threats to biodiversity, carbon, and water conservation objects will be addressed.
- New products are developed and validated through the levels of technological readiness (TRL), business readiness (BRL), and customer readiness (CRL), ensuring that the products are technically and financially viable.
- As innovative products mature in TRL, BRL, and CRL, the long-term environmental benefits in carbon, biodiversity, water, and non-timber forest products will be expanded.
- The monetization of environmental benefits over the next thirty years will ensure the financial sustainability of innovative products and allow investment in research, development, and innovation of new products.
- The successful implementation of innovative products in the market will contribute to conserving biodiversity, carbon, and water while generating income to finance future initiatives.

Expected intermediate outcomes:

- Development of innovative nature-based products.
- Progress in technology readiness level (TRL), business readiness level (BRL),

and customer readiness level (CRL) for each innovative product.
- Expand the long-term product portfolio with environmental benefits.
- Expected long-term results:
- Conservation of biodiversity, carbon and water.
- Generate revenue to fund future initiatives.

Key activities:

Identifying and developing innovative nature-based products, developing and validating new products through the Technology Readiness Level (TRL), Business Readiness Level (BRL), and Customer Readiness Level (CRL), and monetizing environmental benefits.

3.1.3.5. Trust Strategy Theory of Change

Key assumptions:

The theory of change for the trust strategy is based on the assumption that monetizing environmental services will enable the financing of long-term conservation activities.

Causal relationships:

IF ENVIRONMENTAL SERVICES ARE MONETIZED, THEN:

☑ Resources will be generated to fund the conservation activities proposed in the strategy.

IF AN EFFECTIVE COMMUNICATION AND DISSEMINATION STRATEGY IS IMPLEMENTED, THEN:

☑ Awareness and recognition of the importance of conservation objects among the general population and landowners will be increased.

IF CONTRACTUAL OBLIGATIONS FOR CONSERVATION ARE ESTABLISHED WITH LANDOWNERS, THEN:

☑ Clear responsibilities and economic rewards for their fulfillment are ensured, enabling the implementation of the conservation activities proposed in the strategy.

IF CLEAR MECHANISMS FOR ACCOUNTABILITY AND TRANSPARENCY IN RESOURCE MANAGEMENT ARE IMPLEMENTED, THEN:

- Increase the confidence of donors, sponsors, and other stakeholders in the sustainability and viability of conservation projects.

WHEN HIGH-IMPACT BUSINESS PARTNERSHIPS ARE ESTABLISHED:

- Collaboration and support for long-term conservation projects will be encouraged.

Expected intermediate outcomes:

- Monetization of environmental services.
- Increased awareness and recognition of the importance of conservation assets.
- Establishment of contractual conservation commitments with landowners.
- Establish clear mechanisms for accountability and transparency in resource management.
- Establish high-impact business partnerships.

Expected long-term results:

- Funding for long-term conservation activities.
- Increased confidence of donors, sponsors, and other stakeholders in the sustainability and viability of conservation projects.

Key activities:

Monetizing environmental services, implementing an effective communication and dissemination strategy, establishing contractual commitments for conservation with landowners, implementing clear mechanisms for accountability and transparency in resource management, and establishing high-impact business partnerships.

3.1.4. Specific objectives

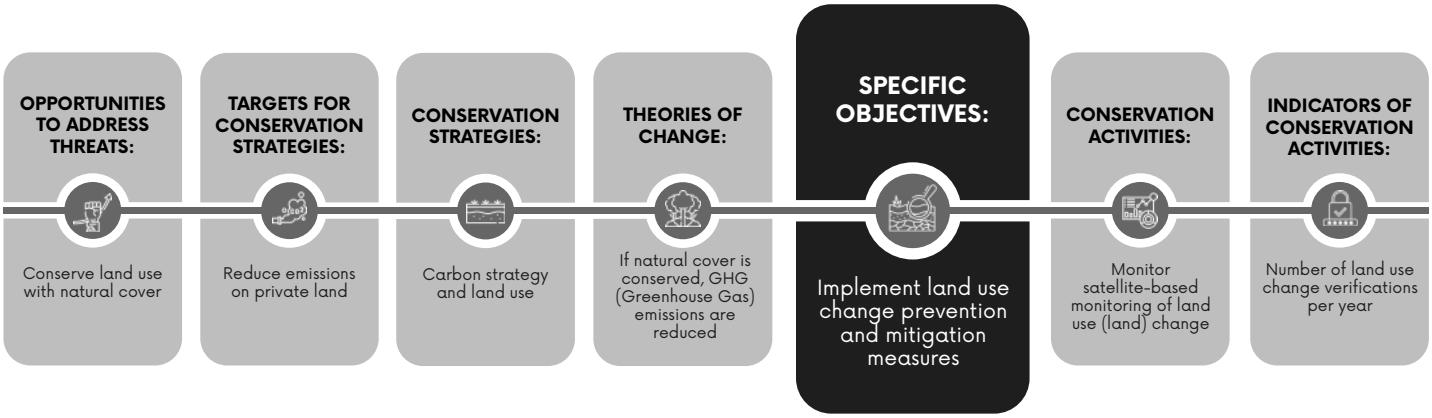


Figure 23. Action plan overview Source: Cataruben Foundation

To develop the five strategies previously explained, it is necessary to define specific objectives that will lead to the success of the proposed goals for each strategy. This section addresses the specific objectives for each of the conservation strategies.

3.1.4.1. Specific Objectives for the Biodiversity Conservation Strategy

The objectives are listed below according to the SMART criteria (Specific, Measurable, Achievable, Relevant, and Time-bound). Seven specific targets were identified to address the significant threats to species and threatened ecosystems, taking into account the GOAL, STRATEGY, and THEORY OF CHANGE:

1. Train 100% of the owners of private properties associated with the strategy initiatives on sustainable management practices and conservation of threatened ecosystems, protection of endangered species, rescue and reintroduction of species removed from their habitat, and discourage hunting of wildlife and overexploitation of forest resources while promoting sustainable fishing, with periodic reviews over the next 30 years to adjust activities based on the results obtained.
2. Implement GIS and participatory monitoring systems in 100% of the private properties associated with the Cataruben Foundation's initiatives in the strategic area by 2050, allowing data updating and tracking ecosystems and endangered species annually to adapt conservation strategies based on the results obtained.
3. Develop and implement management, conservation, and landscape management plans in collaboration with 100% of the owners of private properties in the strategic area integrated into Cataruben projects by 2050, with periodic reviews to adapt conservation strategies based on the results obtained.
4. Improve ecosystem connectivity through the restoration of strategic ecosystems present in the private lands of Cataruben initiatives,

implementing conservation, sustainable use, and restoration actions over the next 30 years.

5. Establish formal partnerships with at least 30 local, national, and international organizations relevant to conserving threatened ecosystems and species on private lands by 2050.
6. At least 50% of local and regional public authorities in the Strategic Area adopt public policies and regulatory frameworks that support the conservation, restoration, and sustainable management of private lands.
7. Establish at least ten research projects on topics such as wildlife deterrence and others that link participatory monitoring in the Strategic Area to inform decision-making and adapt conservation strategies over time, with preliminary results available every five years.

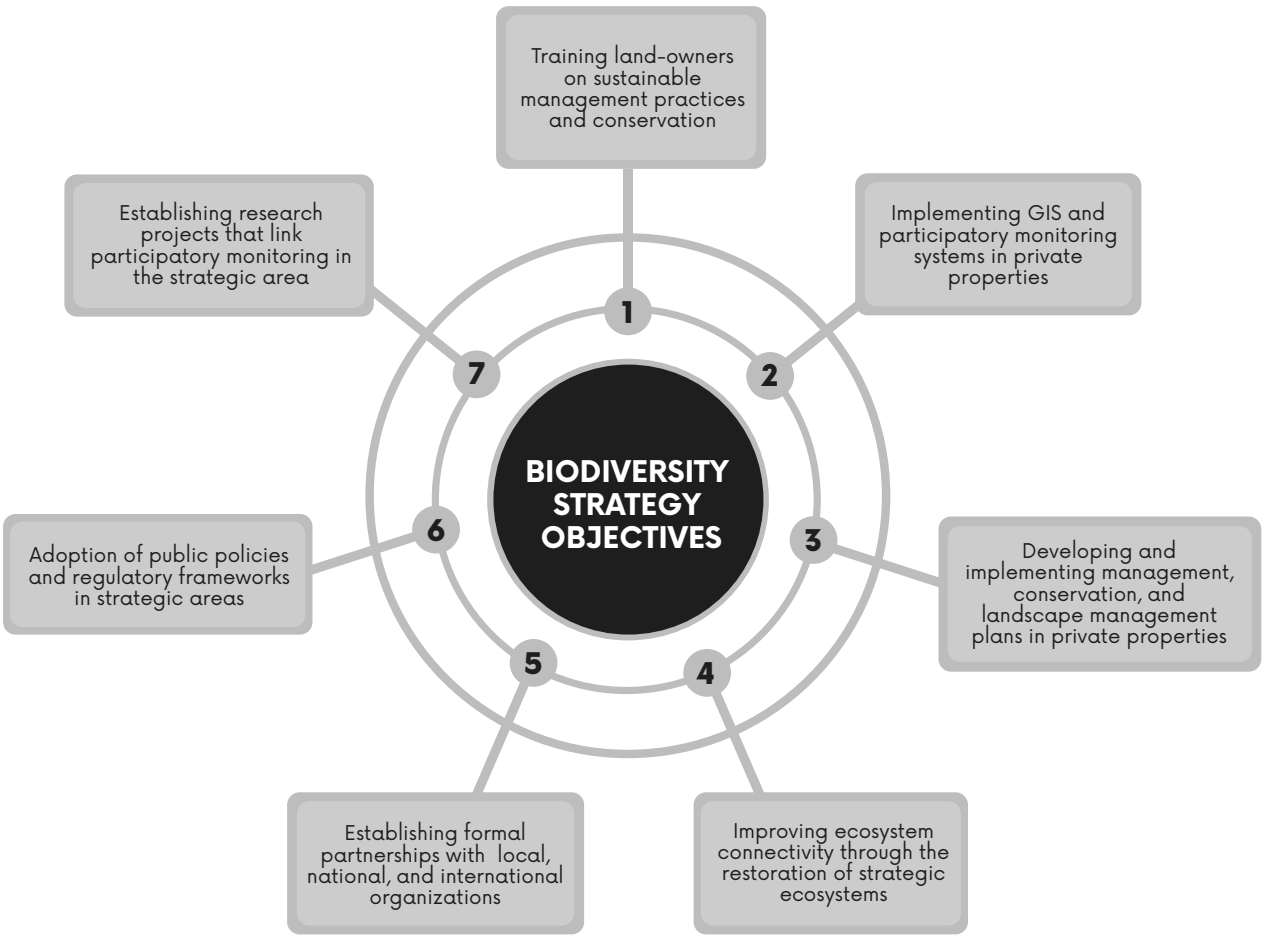


Figure 24: Biodiversity strategy objectives

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3.1.4.2. Specific objectives for the carbon conservation strategy and avoidance of land use change

To address threats to natural ecosystems of interest for the conservation of carbon stocks and the ecosystem service of greenhouse gas sequestration and removal, such as land-use change, conversion and degradation of ecosystems, the introduction of contaminants into soils, and loss of forest cover due to forest fires, the following specific objectives aim to mitigate these threats:

1. Implement measures to prevent land use changes in natural ecosystems, reduce their degradation, and thus prevent the release of carbon stored above and below ground on private lands in the strategic area over the next 30 years.
2. Implement restoration measures for natural cover and ecosystems degraded by human activities through restoration plans that allow for a net gain in greenhouse gas removal from the atmosphere on properties within the strategic scope over the next 30 years.
3. Implementing comprehensive waste management measures that promote waste separation and recovery of organic waste to avoid disposal in natural covers on private properties within the strategic scope over the next 30 years.
4. Implement forest fire prevention, control, and mitigation measures to prevent the release of greenhouse gas emissions on private lands within the strategic scope over the next 30 years.

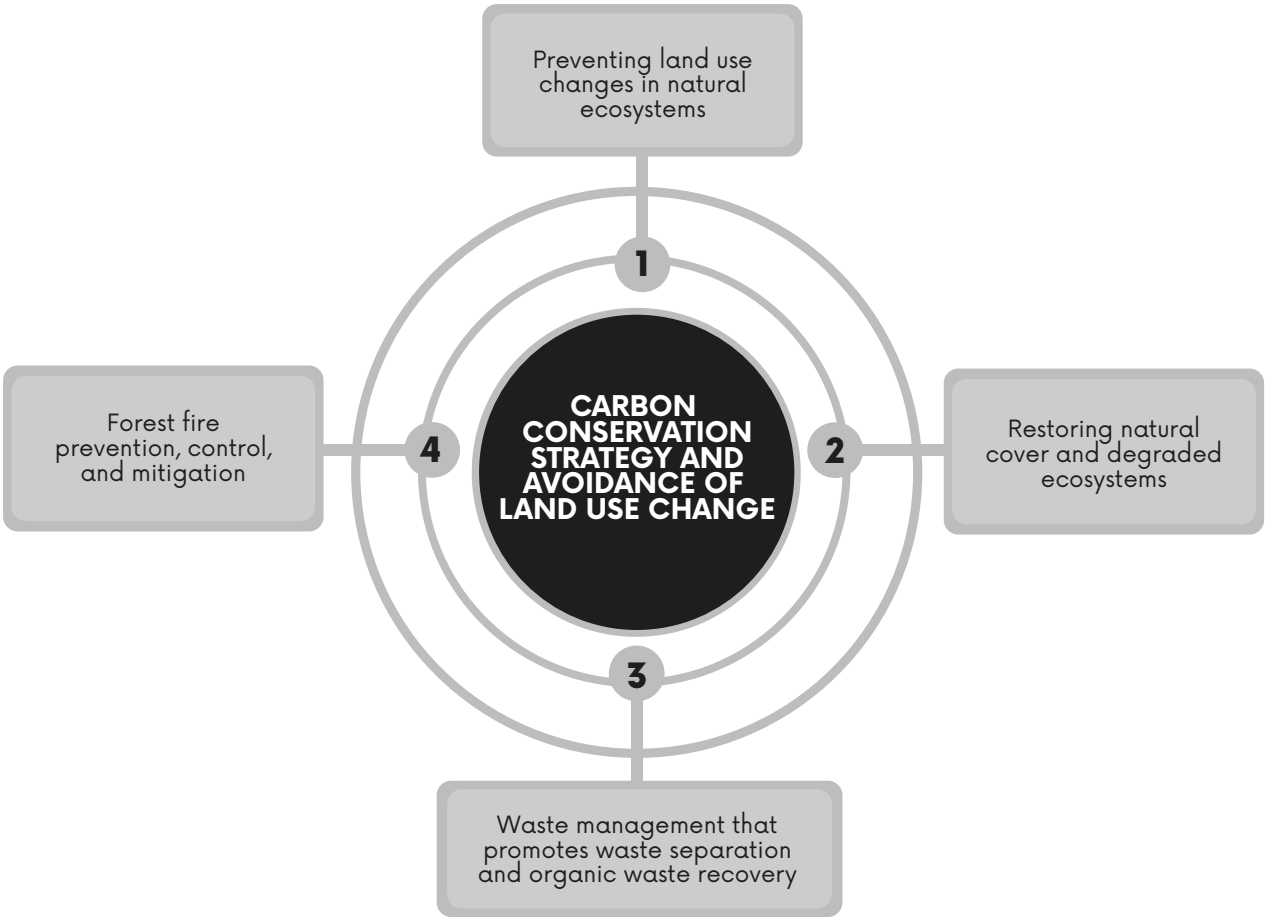

Figure 25. Carbon and Land use change strategy objectives. Source: The Cataruben Foundation

3.1.4.3. Specific objectives for the water protection strategy

To address threats to water conservation objects such as rivers, wetlands, lagoons, lakes, estuaries, paramos, high Andean forests, etc., such as inefficient and excessive use of water resources, discharge of wastewater into water bodies, high water footprint due to surface and groundwater extraction, degradation of ecosystems that are a fundamental part of the water cycle, the following specific objectives are established to prevent, mitigate and control these threats:

1. To design and implement measures to reduce consumption and manage water resources efficiently on the properties within the strategic scope to reduce the blue water footprint due to the productive activities of the beneficiaries over the next 20 years.
2. To design and implement measures for the treatment of domestic wastewater, the disposal of treated water, and good agricultural practices to reduce the gray water footprint on the properties of climate change mitigation initiatives within the strategic scope over the next 20 years.
3. To design and implement measures for rainwater harvesting and green water harvesting to reduce the green water footprint in the productive processes of the properties of climate change mitigation initiatives within the strategic scope over the next 20 years.

4. To design and implement measures to protect, conserve, and/or restore natural covers essential for the sustainability of water resources in the hydrographic subzones within the properties of the strategic scope over the next 20 years.

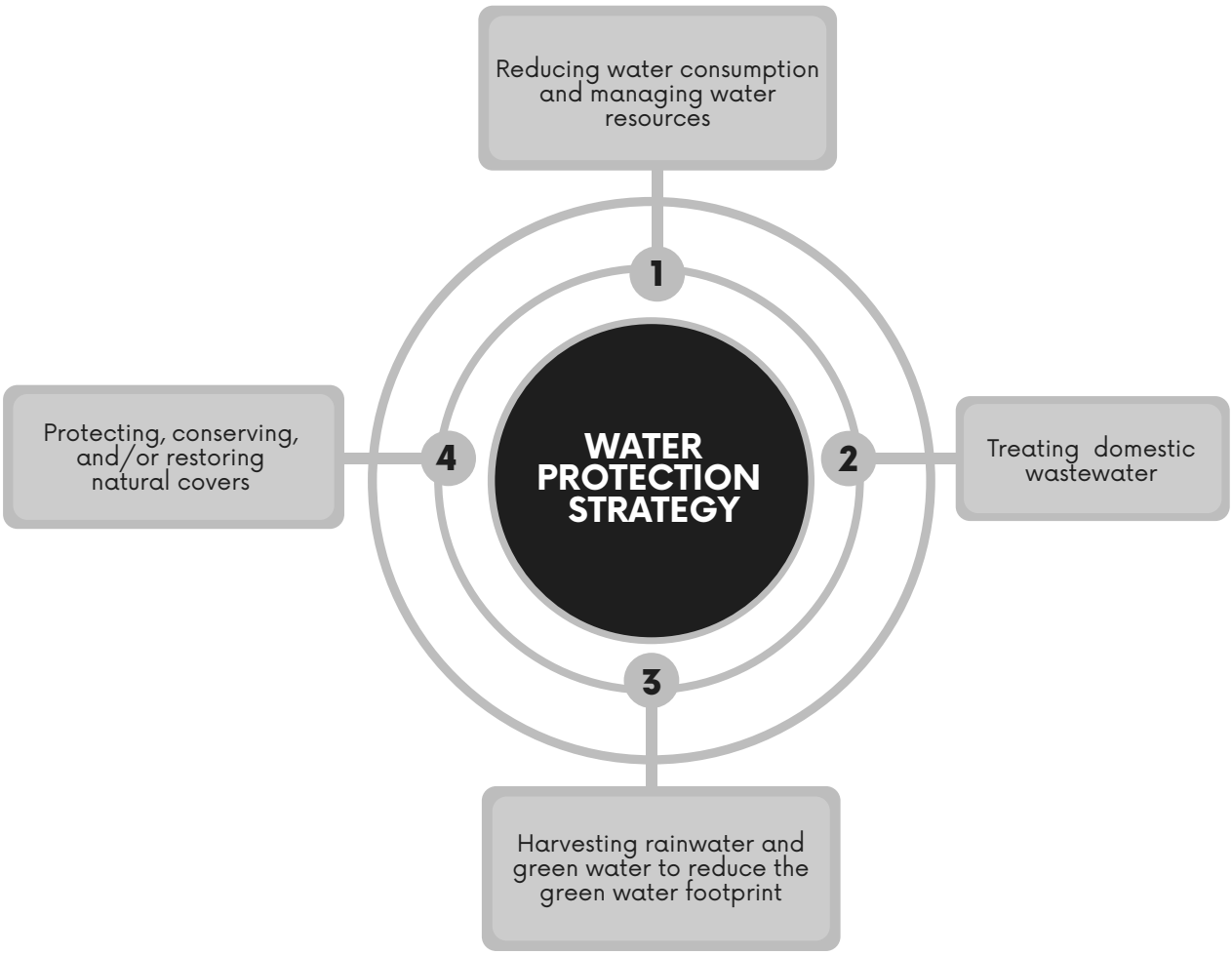

Figure 26. Water strategy objectives. Source: The Cataruben Foundation

3.1.4.4. Specific objectives for the innovation and productivity strategy

The following are the specific objectives according to the SMART criteria (Specific, Measurable, Achievable, Relevant, and Time-bound) that will allow the B+C&W Strategy to innovate over time and generate nature-based productivity:

1. To formulate and develop research, development, and innovation projects for the seven new products to validate them at the appropriate levels of technological and business maturity to achieve concrete results in environmental protection.
2. To establish cooperation agreements that will allow the financing of the development of the seven new products, as well as the execution of pilot tests for their validation and the achievement of minimum viable products in the medium and long term. This will ensure an effective approach to conservation and a sustainable future.
3. To generate at least ten published scientific products from the research, development, and innovation of new products, which will allow to demonstrate the progress and advances of the research development of the Innovation and Productivity Center in the field of environmental protection.
4. To create and consolidate a certified Innovation and Productivity Center that implements the breakthrough ideas generated in the organization to strengthen investigative development and innovation in the short, medium, and long term. This will ensure a comprehensive approach to conservation and sustainable impact in the future.
5. To develop innovative products for payment for environmental services and non-timber forest product sales to increase income alternatives for conserving strategic ecosystems for biodiversity, carbon, and water. This will ensure a sustainable future while protecting and preserving the environment.

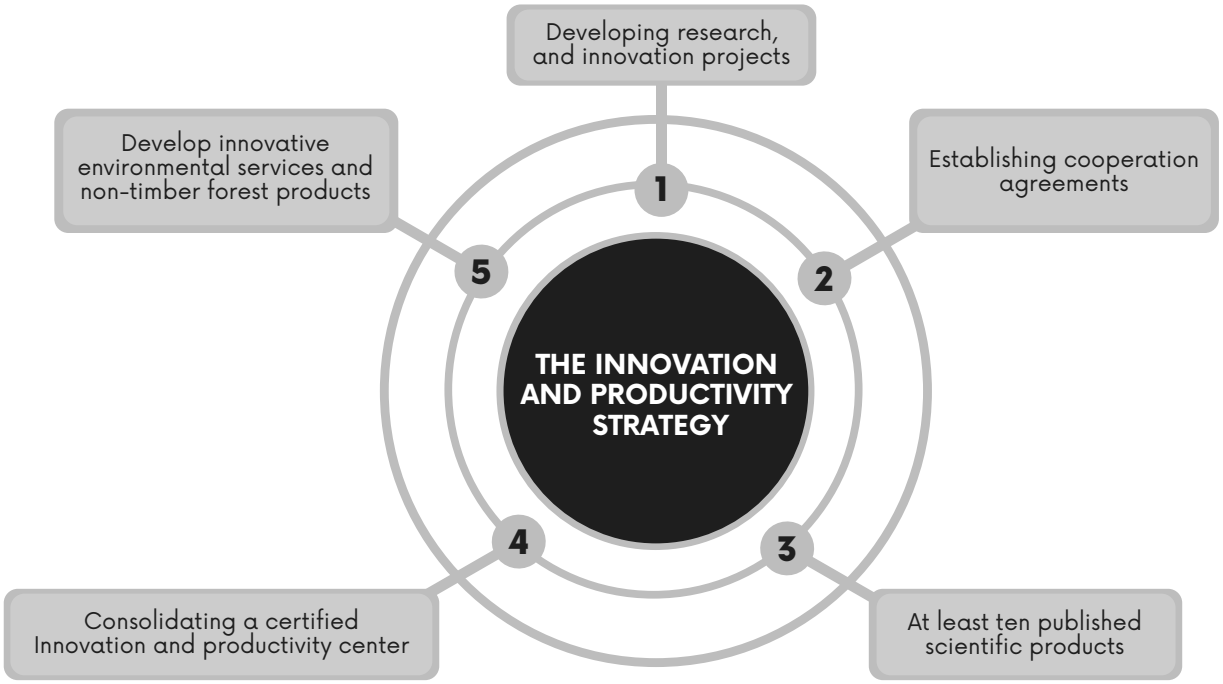

Figure 27. Innovation strategy objectives. Source: The Cataruben Foundation

3.1.4.5. Specific Trust Strategy Objectives

Considering the GOAL, STRATEGY, and THEORY OF CHANGE of the Trust Strategy, the following objectives adhere to the SMART criteria. Four distinct objectives have been identified to address the major threats that the B+C&W strategy may face during its development:

1. To Raise Public Awareness about the importance of conserving biodiversity, carbon, and water resources on private lands in Colombia. A comprehensive communication strategy will be developed, tailored to different actors and audiences worldwide, with the goal of reaching 150 million people over the next 30 years.
2. To Increase Owner Responsibility for natural ecosystems by creating contractual obligations. These will include incentives for the management of ecosystem services, aiming to generate a sustainable and achievable commitment from 30,000 beneficiaries in the area impacted by the B+C&W strategy over the next 30 years.
3. To Manage Financial Leverage Resources: The goal is to establish a culture that consolidates nature-based solutions. This will enable the formulation and presentation of sustainable proposals/projects and facilitate applications for resource management calls. The objective is to build confidence in financial leverage funds and/or cooperating entities regarding the sustainability, transparency, and impact of these types of projects over the next 30 years.
4. To Manage Long-term Commercial Alliances and consolidate value-generating commercial proposals and to participate in and develop high-impact events. This will expand the involvement of local companies and organizations, allowing for the monetization of 150 million dollars for the conservation of environmental services. It will also encourage private property owners to mitigate the degradation of ecosystems and natural resources in the area affected by the B+C&W strategy over the next 30 years.

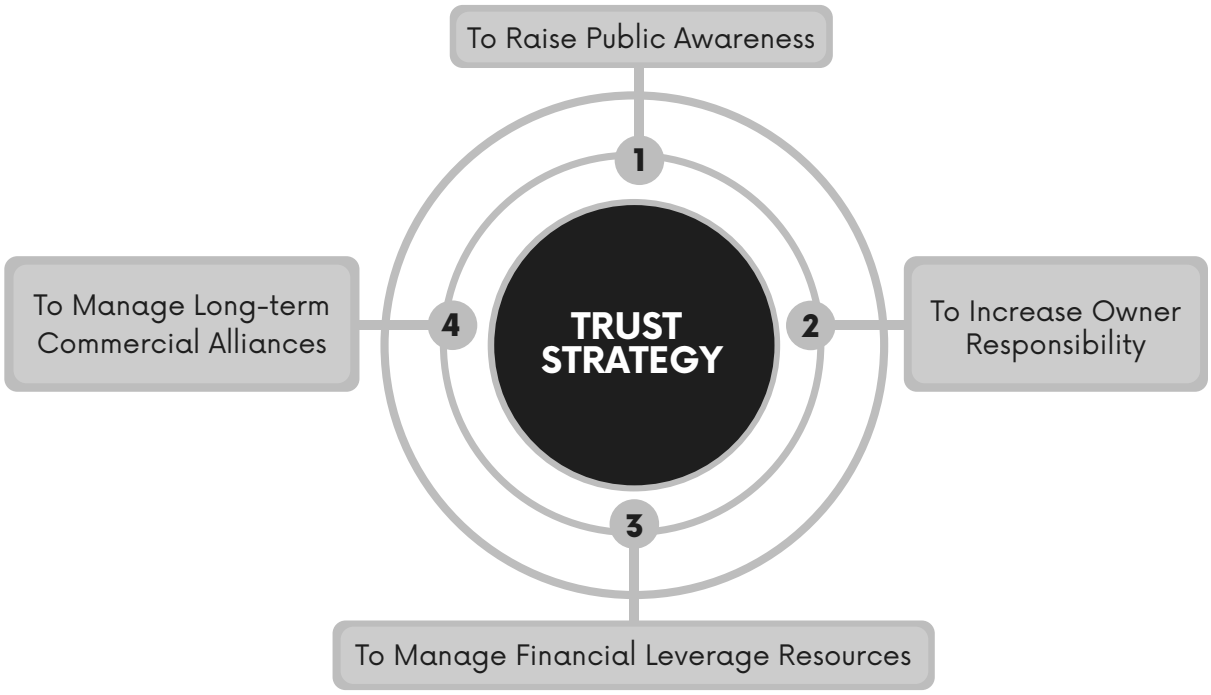

Figure 28. Trust Strategy Objectives. Source: The Cataruben Foundation.

3.1.5. Development of Objective Activities and Objective indicators

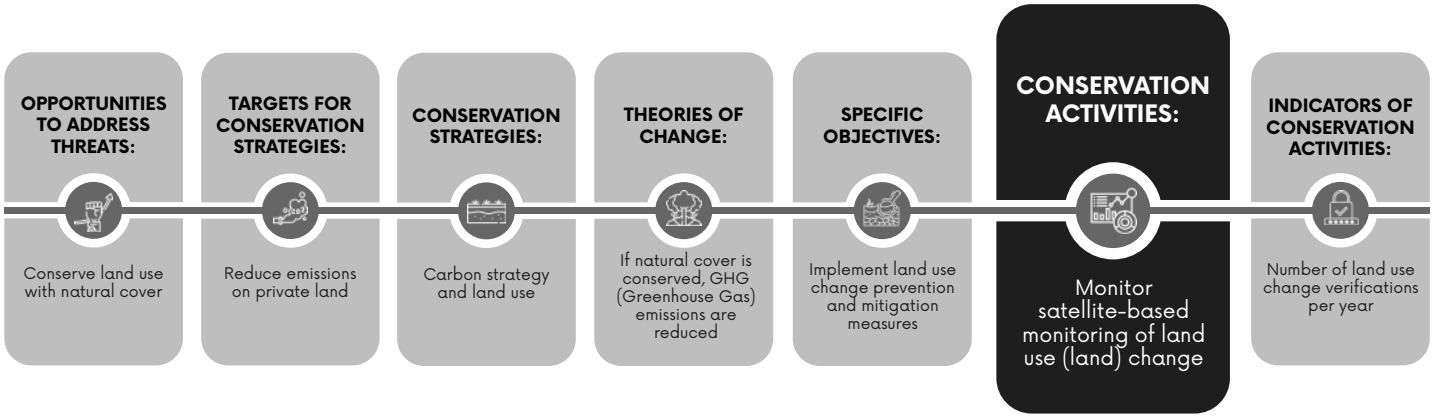

Figure 29. Action plan overview Source: Cataruben Foundation

Considering the target groups, indicators have been established to provide information on the progress and evolution of the strategy. During the development of the indicators, it was necessary to create the methods with which we will verify that they are met. It is worth highlighting that they are cost-effective and reliable for data collection. In some cases, they were designed to take them with secondary information, and a wide battery was made to iterate and validate as the B+C&W Strategy progresses.

The following are all objective activities and their corresponding indicators designed per strategy:

BIODIVERSITY CONSERVATION STRATEGY ACTIVITIES AND INDICATORS		
Activity	Indicator	Data Collection Method
PHASE 1: PLANNING AND RESEARCH		
Identify relevant local and regional public agencies and establish dialogues and collaborations	Number of relevant agencies identified and engaged	Conduct desktop research to create a database of agencies and document the level of engagement with each through surveys or interviews
Identify priority research topics	List of identified priority research topics	Organize workshops and focus group discussions with stakeholders to identify and list priority topics
Identify priority areas for ecosystem restoration	Number and extent of priority areas identified	GIS mapping and analysis of available secondary data on local ecosystems
PHASE 2: CAPACITY BUILDING AND SKILLS DEVELOPMENT		
Train private landowners in the use of Geographic Information Systems (GIS)	Number of landowners trained in GIS	Track attendance and conduct pre- and post-training assessments to evaluate knowledge acquisition
Conduct sustainable management and conservation workshops	Number of workshops conducted and participant satisfaction	Feedback forms and attendance sheets during workshops
Facilitate workshops and meetings to develop management and conservation plans	Number of workshops facilitated and management plans developed	Documentation of workshop outcomes and evaluation through participant feedback
PHASE 3: POLICY DEVELOPMENT AND FINANCING		
Provide technical advice to public agencies in the development of regulatory frameworks	Number of agencies advised and level of satisfaction with advice provided	Interviews and feedback surveys with agency representatives
Develop a long-term funding plan for conservation initiatives	Existence of a comprehensive long-term financing plan	Review of financing plan documents and stakeholder consultations
Identify and apply for local, national and international funding sources such as grants, donations and investment funds	Number of funding sources identified and applied for	Maintain a log of all funding applications made and their status
PHASE 4: COMMUNICATION AND AWARENESS RAISING		
Develop communications and public awareness campaigns	Number of campaigns developed and reach	Media monitoring and analysis to assess campaign reach and effectiveness

Conduct outreach and education activities	Number of outreach activities conducted and level of participant engagement	Attendance sheets and feedback forms for each activity
Establish collaborations with local and regional media to disseminate conservation messages	Number of collaborations established and reach of messages disseminated	Media tracking and analysis of audience engagement with disseminated content
PHASE 5: IMPLEMENTATION AND ACTION		
Create economic incentives to discourage wildlife hunting	Number of incentives created and reduction in wildlife hunting incidents	Official reports and community surveys to track changes in hunting incidents
Implement ecosystem restoration on private lands	Number and area of restoration projects undertaken	Field surveys and GIS mapping to monitor project implementation
Establish ecological corridors to facilitate the movement and dispersal of endangered species	Number and length of corridors established	GIS analysis and field surveys to map and monitor corridors
Establish on-land monitoring stations to gather information on ecosystems and endangered	Number of monitoring stations established and operational	Regular field reports and GIS data from monitoring stations
PHASE 6: COLLABORATION AND PARTNERSHIPS		
Foster communication and cooperation between landowners and conservation organizations	Number of communication platforms established and active participants	Monitoring of platforms and feedback surveys to assess participation
Identify and contact local, national and international organizations relevant to conservation and establish cooperation and collaboration agreements	Number of organizations contacted and agreements reached	Maintaining a database of contacts and agreements
Organize regular events and meetings to strengthen alliances and evaluate progress	Number of events organized and satisfaction of participants	Post-event feedback surveys and participant tracking
PHASE 7: MONITORING, EVALUATION AND ADJUSTMENT		
Establish a system for periodic review and follow-up	Establishment of a periodic review system	Review of documentation and reports generated by the review system
Establish an annual reporting system to share monitoring data	Annual reports generated	Review of annual reports and stakeholder feedback on reporting system
Monitor and evaluate the effectiveness of restoration and ecosystem connectivity activities	Reports produced on the effectiveness of activities	Field surveys, interviews, and data analysis to generate reports

Monitor and evaluate the implementation of public policies and regulatory frameworks in the strategic scope area	Number of policy assessments conducted	Analysis of policy documents and interviews with stakeholders for evaluation
PHASE 8: ONGOING RESEARCH AND IMPROVEMENT		
Phase 8: Ongoing research and improvement	Number of collaborative research projects initiated	Documentation of research agreements and projects initiated
Share preliminary and final research results with stakeholders and use them to inform and adapt conservation strategies over time	Number of stakeholder meetings organized to share research results	Documentation of meetings and feedback surveys to assess stakeholder engagement and
Adapt conservation strategies over time taking into account context, monitoring reports and stakeholder feedback	Number of strategies adjusted based on research findings	Analysis of strategy documents before and after adaptation and stakeholder feedback on changes

Table 7: Biodiversity strategy activities and indicators. Source: The Cataruben Foundation.

Any thoughts?

CARBON CONSERVATION STRATEGY AND LAND USE CHANGE PREVENTION OBJECTIVE ACTIVITIES AND INDICATORS

Activity	Indicator	Data Collection Method
PHASE 1: INITIAL ASSESSMENT AND PLANNING		
Diagnose the drivers of land use in private properties and their areas eligible for climate change mitigation initiatives	Detailed report identifying land use drivers and areas eligible for climate initiatives	Desk research and field surveys to compile a comprehensive report on land use drivers and eligible areas
Diagnose the reference ecosystem, the ecosystem to restore, and species to use in passive and/or active restoration, as applicable	Comprehensive report identifying reference ecosystems, ecosystems to be restored, and potential species for restoration activities	Literature reviews, expert consultations, and field assessments to prepare the report
Create sustainable land management and silviculture plans tailored to each property	Number of personalized sustainable land management and silviculture plans prepared	Consultations with landowners and expert assessments to develop personalized plans
PHASE 2: CAPACITY BUILDING AND TRAINING		
Train property owners in carbon conservation and land use	Number of property owners trained	Training attendance records and post-training evaluations
Train in solid waste separation to mitigate soil and water pollution	Number of people trained and rate of successful waste separation after training	Training attendance records and post-training surveys
Train in the management and disposal of hazardous waste, including agricultural, veterinary, and fuel waste	Number of individuals trained and improvement in hazardous waste	Training attendance records and follow-up surveys
Train in the correct disposal of recyclable materials	Number of individuals trained and increase in proper disposal practices after training	Training attendance records and follow-up surveys
PHASE 3: DESIGN AND IMPLEMENTATION		
Plan and design agroforestry systems for vegetation restoration, increased agricultural productivity, and diversified income	Number of agroforestry systems planned and designed	Document analysis and field visits to assess plans and designs prepared
Plan and design silvopastoral systems to improve nutritional capacity and animal welfare	Number of silvopastoral systems planned and designed	Document analysis and field visits to evaluate the plans and designs produced
Plan passive and/or active restoration of vegetation cover, as applicable	Number of vegetation cover restoration plans prepared	Document analysis to verify plans prepared

Plan Waste Management and Resource Optimization for the use of organic waste on farms	Number of organic waste management plans created for farms	Document analysis to verify plans created
PHASE 4: COMMUNITY ENGAGEMENT AND GOVERNANCE		
Strengthen governance structures in the territory to improve economic activity on individual properties and within communities	Degree of strengthening of governance structures	Surveys and interviews to assess the impact of strengthening processes
Promote community participation in vegetation cover restoration plans	Degree of community participation in restoration plans	Community meetings and feedback forms to measure participation
Encourage the registration and recognition of Natural Private Reserves for farms participating in climate change mitigation initiatives	Number of farms registered and recognized as private natural reserves	Records of registration and recognition as natural private reserves
Create a communication plan with property owners and authorities for timely action on forest fires	Existence and effectiveness of a communication plan	Document analysis of the plan and stakeholder feedback on its effectiveness
PHASE 5: MONITORING, EVALUATION, AND DATA COLLECTION		
Satellite monitoring of land use changes to prevent harmful transformations to natural covers	Number of satellite monitoring cases and identification of harmful transformations	Analysis of satellite data and monitoring reports
Identify risk zones for cover and/or agroforestry systems due to natural factors	Number of risk zones identified	Satellite data analysis and field assessments to identify risk zones
Issue satellite alerts for terrestrial heat spots in eligible areas for climate change mitigation and monitor emissions from the combustion of woody biomass	Level of emissions from woody biomass burning	Analysis of emission data from monitoring stations
Identify the impact of forest fires in eligible areas and calculate leakages	Detailed report on forest fire impacts and spills	Post-fire field surveys and analysis of satellite imagery data to produce
Quantify and verify the reduction in consumption and disposal of solid waste in order to optimize waste management and resource usage	Verified amount of reduction in solid waste consumption and disposal	Analysis of waste management records and verification through site visits

Tabla 8: Carbon Strategy activities and indicators.

WATER STRATEGY INDICATORS		
Activity	Indicator	Data Collection Method
PHASE 1: DIAGNOSIS AND PLANNING		
Diagnosis of water supply sources for property consumption	Comprehensive report on the state and sources of water supply in the properties	Surveys and field inspections to collect detailed information on water supply sources
Diagnose access to plumbing and sanitation infrastructure in the homes of the properties involved in the climate change mitigation initiatives	Comprehensive report on access to plumbing infrastructure in the properties	Surveys and home inspections to assess the current status of plumbing infrastructure
Diagnose wastewater management at the property level from kitchens, sanitary units, and basic sanitation areas	Comprehensive report detailing current wastewater management practices at the property level	Surveys and home inspections to detail existing sanitation systems
Diagnose water harvesting activities carried out on the properties of the climate change mitigation initiatives	Comprehensive report of existing water harvesting activities	Surveys and site inspections to document existing water harvesting activities
Develop a plan for efficient water use in the home that contributes to Sustainable Development Goal 6: Access to safe water and basic sanitation	Household water use efficiency plan developed	Community workshops and expert consultations to develop a sustainable water use plan
Plan for basic gray water treatment at the property level, taking into account available budgets and priority of activities	Developed plan for basic gray water treatment at property level	Community workshops and expert consultations to develop the gray water treatment plan
Plan water harvesting activities for: • Livestock pastures to reduce pressure on water bodies and stream ecosystems • Silvopastoral systems to improve the survival of planted species • Agroforestry crops to reduce water demand for irrigation in afforestation/reforestation initiatives to mitigate climate change	Water harvesting plan developed for Livestock/Silvopastoral systems/Agroforestry systems	Community workshops and expert consultations to formulate a water harvesting plan
Plan and design restoration of cloud forests, gallery forests, high Andean forests, and other water catchment areas	Restoration plan for cloud forests, riparian vegetation, and buffer zones	Field assessments and expert consultations for plan development

Plan and design wetland and peatland conservation activities	Conservation and restoration plan for wetlands and peatlands	Field assessments and expert consultations for plan development
Design and plan the implementation of livestock aqueducts	Implementation plan for livestock water troughs	Field assessments and community consultations for plan development
Delineate and mark springs within the property	Marked and documented springs within the property	Field surveys and mapping
Delineate and mark lentic and lotic water bodies	Marked and documented lentic and lotic water bodies within the property	Field surveys and mapping
PHASE 2: TRAINING AND EDUCATION		
Training on the importance of access to clean water for human health	Number of people trained	Training attendance records and post-training evaluations
Train in the installation of basic water purification procedures and the prevention of diseases	Number of people trained in water purification procedures	Training attendance records and post-training evaluations
Training on the importance of access to sanitation infrastructure for the human health of beneficiaries of climate change mitigation initiatives	Number of individuals trained on the importance of sanitation infrastructure	Attendance records and feedback surveys from training sessions
Training on the biological treatment of gray water from each property, using economic means that are easy to implement on the properties	Number of individuals trained on biological treatment of gray water	Attendance records and feedback surveys from training sessions
Training on the proper disposal of treated wastewater for possible reuse	Number of individuals trained on proper wastewater disposal	Attendance records and feedback surveys from training sessions
Train the beneficiaries of the climate change mitigation initiatives on water harvesting issues	Number of individuals trained and increase in proper disposal practices after training	Training attendance records and follow-up surveys
PHASE 3: IMPLEMENTATION AND OPTIMIZATION		
Optimize crop irrigation by changing the type of irrigation and reducing the blue water footprint	Reduction of blue water footprint through irrigation optimization	Analysis of water use data before and after implementation of optimization strategies

PHASE 4: QUANTIFICATION AND VERIFICATION		
Quantify the reduction in the property's blue water footprint due to reduced household consumption and productive activities	Quantified reduction in blue water footprint	Analysis of pre- and post-implementation water use data to quantify blue water footprint reduction
Quantify the reduction of the gray water footprint due to implemented wastewater treatment activities	Quantified reduction in gray water footprint	Analysis of pre- and post-implementation wastewater treatment data to quantify reduction
Quantify the reduction of the green water footprint	Quantified reduction in green water footprint, reported in cubic meters	Monitoring of water usage data and calculation of green water footprint reduction

Tabla 9. Water strategy activities and indicators. Source: The Cataruben Foundation.

INNOVATION AND PRODUCTIVITY STRATEGY		
Activity	Indicator	Data Collection Method
PHASE 1: MARKET RESEARCH AND PRODUCT DEVELOPMENT		
Conduct market research to determine current market needs and potential demand for new products	Number of market research reports conducted	Count the number of market research reports conducted
Identify non-timber forest products with the highest market potential	List of identified non-timber forest products with market potential	Maintain a list of identified non-timber forest products
Establish a research and development team to formulate and design new products	Formation of an R&D team	Document the formation of the R&D team
Establish clear and specific goals for each product based on research and market analysis	Clarity of product goals	Evaluate the clarity of product goals based on research and analysis
Define technical and quality requirements for products in accordance with national and international standards	Defined technical and quality requirements	Document the defined technical and quality requirements
Conduct tests and prototypes to validate product feasibility at appropriate technological and business maturity levels	Number of product tests and prototypes conducted	Count the number of tests and prototypes conducted
Develop a marketing and distribution plan for the products, consistent with environmental protection goals	Marketing and distribution plan developed	Document the development of the marketing and distribution plan
Establish a product monitoring and tracking plan to identify opportunities for improvement and necessary adjustments	Product monitoring and tracking plan in place	Confirm the existence of a product monitoring and tracking plan
Train personnel in the production and marketing of the new products	Number of personnel trained in production and marketing of new products	Count the number of personnel trained
Establish partnerships with other companies and organizations for joint product marketing to expand reach	Number of partnerships established for joint product marketing	Count the number of partnerships established
PHASE 2: FINANCIAL PLANNING & MANAGEMENT		
Identify available funding sources, including donors, government agencies, foundations, and other international organizations	List of identified funding sources	Maintain a list of identified funding sources

Develop funding proposals and present them to donors and financial institutions for funding	Number of funding proposals developed and presented	Count the number of funding proposals developed and presented
Define a plan for the use of financial resources to ensure that they're used effectively and in accordance with conservation objectives	Financial resource utilization plan developed	Document the development of the resource utilization plan
Develop a risk management plan for the project, including how to deal with potential financial contingencies	Risk management plan in place	Confirm the existence of a risk management plan
Establish a project management team to ensure effective project implementation	Formation of a project management team	Document the formation of the project management team
Develop a plan to monitor and track project progress based on established goals	Monitoring and tracking plan for project progress	Document the development of the monitoring and tracking plan
Establish an accountability and progress reporting system for donors and funding agencies	Accountability and progress reporting system in place	Confirm the existence of an accountability and progress reporting system
Train staff in financial resource management and effective project implementation	Number of staff members trained in financial resource management and project implementation	Count the number of staff members trained
Establish an effective communication system with donors and funding agencies to keep them informed of project progress	Effective communication system with donors and funding agencies in place	Confirm the existence of an effective communication system
PHASE 3: SCIENTIFIC RESEARCH & PUBLICATION		
Establish a research and development team to research new products	Formation of an R&D team	Document the formation of the R&D team
Define necessary research topics to develop scientific products	List of defined research topics	Maintain a list of defined research topics
Conduct field studies and collect data for research	Number of field studies conducted and data collected	Count the number of field studies conducted and data collected
Analyze collected data and define research conclusions and findings	Research conclusions and findings documented	Document the research conclusions and findings
Develop scientific products, including research papers, theses, and publications in scientific journals	Number of scientific products developed and published	Count the number of scientific products developed and published

Review and edit scientific products to ensure quality and relevance	Quality and relevance of scientific products reviewed and improved	Evaluate the quality and relevance of scientific products
Present scientific products at relevant scientific conferences and events	Participation in scientific conferences and events	Document participation in scientific conferences and events
Establish partnerships with other scientific institutions to broaden the dissemination of scientific products	Number of partnerships established for scientific product dissemination	Count the number of partnerships established
Establish a system for monitoring and tracking scientific publications	Scientific publication monitoring and tracking system in place	Confirm the existence of a monitoring and tracking system
Train staff in researching and publishing scientific products	Number of staff members trained in scientific research and publishing	Count the number of staff members trained
PHASE 4: CENTER FOR INNOVATION AND PRODUCTIVITY		
Define the organizational structure of the center for innovation and productivity	Organizational structure of the center defined	Document the definition of the organizational structure
Establish policies and procedures for center operations, including project management and human resource management	Policies and procedures for center operations established	Document the establishment of policies and procedures
Develop a strategic plan for the center that defines long-term goals and objectives	Strategic plan for the center developed	Document the development of the strategic plan
Identify priority research and development areas that align with environmental goals	Priority research and development areas identified	Maintain a list of identified priority areas
Establish partnerships with other institutions and organizations to share knowledge and experience	Number of partnerships established for knowledge sharing	Count the number of partnerships established
Define a training plan for center staff to enhance their skills and knowledge	Training plan for center staff developed	Document the development of the training plan
Establish a system to monitor and track center projects and progress	Monitoring and tracking system for center projects in place	Confirm the existence of a monitoring and tracking system
Establish an evaluation and accountability system for the center	Evaluation and accountability system for the center in place	Confirm the existence of an evaluation and accountability system

Develop a communication strategy for the center to ensure its visibility and relevance	Communication strategy for the center developed	Document the development of the communication strategy
Establish a funding system for the center, including obtaining funding from donors,government agencies, and other relevant organizations	Funding system for the center established	Confirm the establishment of a funding system
Establish partnerships with companies and organizations interested in supporting the project	Number of partnerships established with supporting companies and organizations	Count the number of partnerships established
Establish partnerships with local communities and other relevant stakeholders to identify opportunities for payment for environmental services	Number of partnerships established with local communities and stakeholders	Count the number of partnerships established

Table 10: Innovation strategy activities and indicators. Source: The Cataruben Foundation.

TRUST STRATEGY INDICATORS		
Activity	Indicator	Data Collection Method
Develop a social media advertising campaign highlighting the importance of conserving biodiversity, carbon, and water on private lands in Colombia	Reach of the social media advertising campaign	Analysis of metrics provided by social media
Conduct lectures and talks in universities and schools to raise awareness among young people about the importance of conserving biodiversity, carbon, and water	Number of lectures and talks held at universities and schools	Review of event records and surveys to participants
Create a television or radio program that broadcasts information about the importance of conserving biodiversity, carbon, and water	Audience of the television or radio program	Analysis of audience metrics and surveys to the audience
Organize a photo exhibit showcasing the beauty and importance of biodiversity on private property in Colombia	Number of attendees at the photo exhibition	Review of visitor records and surveys to attendees
Publish articles in newspapers and magazines about the importance of conserving biodiversity, carbon, and water on private Colombian lands	Number of articles published in newspapers and magazines	-
Create a website with detailed information about biodiversity, carbon, and water on private Colombian lands	Number of visits to the website	Analysis of data provided by web analytics tools
Organize a drawing contest for children and youth on the importance of biodiversity, carbon, and water conservation	Number of participants in the drawing contest	Review of participation records and evaluation of the drawings by a jury
Establish a network of volunteers to help conserve biodiversity, carbon, and water on private lands in Colombia	Number of volunteers in the conservation network	Review of volunteer records and surveys to participants
Launch an advertising campaign in print and digital media to promote conservation	Reach of the advertising campaign in print and digital media	Analysis of metrics provided by advertising platforms
Develop a reward program for natural ecosystem owners who conserve biodiversity, carbon, and water on their properties	Number of owners receiving incentives	Review of beneficiary records and surveys to owners

Establish contractual agreements with natural ecosystem owners to ensure conservation	Number of contractual agreements established with owners	Review of contract records and interviews
Develop a monitoring and tracking system to ensure compliance with contractual agreements	Compliance with contractual agreements	Monitoring and tracking of agreements, owner reports, and field visits
Identify leverage funds or cooperating entities that can be partners in managing financial resources for sustainable projects	Number of leverage funds and cooperating entities identified	Review of records and market research
Develop a network of strategic alliances with other organizations working on sustainable projects	Number of strategic alliances established	Review of alliance records and surveys to involved organizations
Identify local businesses and organizations as potential commercial partners for the conservation of environmental services	Number of local businesses and organizations allied	Review of alliance records and surveys to companies

Table 11: Trust Strategy activities and indicators. Source: The Cataruben Foundation.

3.2 MONITORING, EVALUATION, AND LEARNING PLAN

3.2.1. Audiences and Necessary Information

The Cataruben Foundation is committed to preserving threatened ecosystems, protecting endangered species, mitigating climate change, and promoting sustainable practices on private lands. To achieve these goals, engaging with different audiences and addressing their specific informational needs is essential.

- **Project Team and Partners:** They need to be informed about the implementation of activities, the achievement of objectives, the validation of assumptions, and the identification of strategy improvements. For biodiversity, achieving objectives 1, 3, and 4 is critical. These objectives include educating private landowners, developing management and conservation plans, and improving ecosystem connectivity. For carbon conservation, it's important to validate assumptions and identify improvements in strategies aimed at preventing land-use change, restoring degraded ecosystems, managing solid waste, and implementing forest fire prevention and control measures.
- **Donors:** They require information on the implementation of activities, the achievement of objectives, and the validation of project assumptions. This is crucial for ensuring transparency and efficiency in the use of funds allocated for objectives such as implementing participatory monitoring systems, establishing formal alliances, and incorporating public policies that support conservation on private lands. It will also improve the validation of the assumptions of the B+C&W strategy to ensure that commitments are met and funds are used effectively.
- **Communities and Stakeholders:** They must be informed about the implementation of activities and their impacts on the community. This is essential for encouraging community participation and ensuring the success of objectives focused on training, monitoring, and ecosystem restoration.
- **Conservation Agencies:** They should be aware of the lessons learned and their applicability in other contexts. This enables successful strategies and practices to be.

WELCOME TO OUR CONSERVATION STRATEGY!

We extend our deepest gratitude to everyone who contributed to this monumental effort. The B+C&W Conservation Strategy is not just a document; it's a roadmap for a sustainable future for Colombia and, by extension, the world. We are especially thankful to our beneficiaries, allies and the Cataruben Foundation team, whose dedication and expertise have been invaluable.

We acknowledge the various challenges that Colombia faces in terms of biodiversity, carbon emissions, and water conservation. However, we believe that with strategic action, stakeholder involvement, and a commitment to sustainable practices, we can overcome these challenges.

We are excited to announce that the B+C&W Conservation Strategy is an open-source code, inviting researchers, policymakers, and conservationists to contribute to its ongoing development.

By making this strategy open-source, we aim to foster a collaborative environment where knowledge and resources can be shared freely. We invite you to take advantage of this open-source code to adapt, improve, and implement the B+C&W strategy in your own communities and networks.

Feel free to contact us for all queries!