METHODOLOGICAL DOCUMENT BIODIVERSITY CONSERVATION ACTIVITIES

Nature-based solutions for quantifying net gains in biodiversity

BIOCARBON CERT™

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Acronyms and abbreviations

CDB	Convention on Biological Diversity
BDC	Biodiversity credits
CONTAG	Contagion index
CR	Critically endangered
D	Dominance index
DMG	Margalef Diversity Index
EN	In danger
EW	Extinct in the wild
HVC	High Conservation Values
IUCN	International Union for Conservation of Nature
LBI	Landscape biodiversity index
Ij	Jaccard similarity index
MSU	Minimum Spatial Unit
LPI	Largest Patch Index
NE	Specific richness (number of species)
NP	Number of Fragments or Patches
PAFRAC	Perimeter-Area Fractal Dimension
PLAND	Percentage of Landscape

1 Introduction

Although the loss of biodiversity has been one of the significant concerns of today's society, few actions have successfully prevented or mitigated the continuous phenomenon of loss from ecosystems to species and genes, with anthropogenic activities being the most relevant of its causes.

Thus, within the set of standards and methodologies for the developing projects whose objectives consider either carbon credit accounting or sustainability certification, biodiversity conservation has been only one of its elements. In proposing and beginning the BioCarbon Biodiversity Standard (BBS), BIOCARBON proposes a strategy that actively enables to capitalize on the results of the activities of initiatives that aim to reduce direct pressures on biological diversity and contribute to the conservation or restoration of ecosystems, promoting the sustainable use of biodiversity as a strategy for its conservation.

Therefore, this methodological document focuses on the quantifying of net biodiversity gains, which constitute the fundamental basis of the Crediting NGB for Biodiversity Conservation Initiatives. Therefore, the proponents of such initiatives must adhere to them.

It is essential to highlight and consider that the approach of the biodiversity standard focuses on the landscape as an element from which to build strategies and establish plans for conservation, restoration and/or sustainable use of biodiversity. Therefore, this methodological document focuses on the concept of landscape in connection with that biodiversity at the taxon, species, population or community level.

2 Objectives

The objectives of this methodological document (from now on referred to as this Methodology) are to:

(a) provide requirements for the quantification of net biodiversity gains from conservation activities limited to: preservation, ecological restoration (at the landscape scale), or sustainable use of biodiversity and their specific actions per each category;

(b) provide methodological requirements for the identification of a biodiversity baseline (BBL) for biodiversity conservation initiatives;

(c) provide the methodological requirements to demonstrate that the preservation, restoration and/or sustainable use activities proposed to avoid biodiversity loss are additional by identifying specific actions (one or more);

(d) establish methodological requirements to demonstrate the nature and scope of initiatives are voluntary actions for the preservation, conservation or sustainable use of biodiversity;

(e) bring the requirements for monitoring of biodiversity preservation, conservation or sustainable use activities and their specific actions.

3 Version and validity

This document constitutes the version 2.0. February 24, 2024.

This version may be updated from time to time and intended users should ensure that they use the most recent version of the document.

4 Scope

This Methodology corresponds to a methodology for:

(a) the definition of the geographic boundaries of biodiversity conservation areas;

(b) identification of the biodiversity baseline;

(c) characterization of the drivers of landscape transformation and the consequent loss of biodiversity;

(d) demonstration of the additionality of biodiversity conservation initiatives;

(e) the selection of objectives/targets for the preservation, restoration and sustainable use of biodiversity;

(f) the selection and application of valuation variables and techniques to quantify net gains in biodiversity.

This Methodology is limited to the following biodiversity conservation activities:

(a) actions that lead to maintaining the natural state of biodiversity and ecosystems, landscapes, by limiting or eliminating human intervention in them, defined as "*Preservation*".

The specific preservation actions include: a). isolation of areas/ establishment of ecological barriers; b). isolation of forest fragments; c). Isolation of surveillance and control programs; d). Reduction of hunting and fishing activities; e). others;

(b) ecosystem and landscape management and management processes because of the need to restore degraded ecosystems and prevent future damage, understood as "*Restoration*.

Specific restoration actions include: a). re-establishment (RE): of a degraded area in regards of its function, structure or composition; b). rehabilitation (REH): of the productivity and/or ecosystem services of the original ecosystem; c). Recovery (REC): of the usage of the ecosystem and/or ecosystem services different from the ones of the original ecosystem; d). removal (REM): of the agents causing degradation on the ecosystem; e). others.;

(c) activities involving the use of components of biological diversity in a manner and at a rate that does not lead to their long-term decrease: "*sustainable use*.

Specific Sustainable use actions include: a). purse-seine and other control efforts; b). limitation on entry and/or actions of the public/tourists to a landscape or ecosystem; c). limitation of heavy or destructive machinery/tools and/or other forms of technology that may cause collateral damage to other elements of the landscape or ecosystem; d). recycling/rotation of soil nutrients; e). composting; f). sustainable agriculture; e). limitation of agrochemicals or fertilizers; g). others."

This Methodology should be used by holders of biodiversity conservation initiatives to certify and register with the BIOCARBON CERT™, the initiatives under the BioCarbon Biodiversity Standard (BBS).

5 Applicability conditions

This Methodology is applicable under the following conditions:

a) the holder of the conservation initiative aims to generate sustainable use, restore or preserve the "*in situ conditions*" of biodiversity (the state at a defined point in time in quantitative and qualitative terms) and avoiding irreversible losses of biodiversity;

b) the conservation initiative holder demonstrates that in situ conservation is the main objective on which the biodiversity conservation initiative activities and specific actions are based;

c) conservation activities prevent the partial or total loss of an ecosystem, or changes in land use, generating net gains in biodiversity;

d) conservation activities prevent the loss (direct or indirect) of a taxon, population or species;

e) conservation activities prevent the extinction of an endemic population or species of scientific, ecological or cultural value;

f) conservation activities prevent the net loss of diversity at the taxon, species or ecosystem level;

g) conservation activities prevent the modification of natural systems, natural ecosystems or unique biotopes;

h) conservation activities prevent the extinction of taxon, species, populations; or decrease their viability to levels that increase their risk of extinction;

i) the area within the geographic boundaries of the conservation initiative is not under any other biodiversity compensation scheme, yet it could be adjacent to one (this may include being adjacent to a GHG project as well);

j) conservation activities and specific actions target more than one native species and habitat, and is designed to support landscape-scale conservation objectives of the original ecosystems or landscapes. This, without putting in potential risk/danger said ecosystem or landscape, nor any of its biological components;

k) conservation activities and specific actions are designed and developed in terrestrial ecosystems or wetlands.

6 General Terms

The following general terms apply to this Methodology:

(a) "Shall" is used to indicate that the requirement shall be complied with;

(b) "Should" is used to indicate that, among several possibilities, one course of action is recommended as particularly suitable;

(c) "May" is used to indicate that it is permitted.

7 Normative references

The following references are indispensable for the application of this Methodology:

(a) Convention on Biological Diversity. United Nations (1992);

(b) National policies and action plans related to the use and management of biological diversity, or those that modify or update them;

(c) Environmental legislation that dictates norms on the management of biological diversity or that which modifies or updates it;

(d) The BioCarbon Biodiversity Standard and the methodological guidelines that apply to biodiversity conservation initiatives, in its most recent version;

(e) The guidelines, other orientations and/or guidelines defined by BIOCARBON CERT™ within the scope of biodiversity conservation initiatives.

8 Terms and definitions

Additionality

The conservation activities generate changes in biodiversity-related attributes and values in addition to any existing values, i.e., the conservation outcomes would not have occurred without the conservation initiative activities.

Biodiversity (Biological diversity)

The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems[1].

Biodiversity baseline

The biodiversity baseline corresponds to the complete assessment of existing conditions within the geographic boundaries of the conservation initiative prior to the initiation of conservation activities. The biodiversity baseline should be established based on the land cover present within the boundaries of the initiative, in conjunction with the evaluation of the physical and biotic components.

Direct driver

Direct drivers of biodiversity loss are related to human activities that directly affect ecosystems. They group together factors operating at the local scale, different from the initial

[1] Convention on Biological Diversity CBD (1992). Available in: https://www.cbd.int/doc/legal/cbd-en.pdf

structural or systemic conditions, which originate in land use and affect vegetation cover through changes in land use[2].

Ecological restoration

According to the Society for Ecological Restoration (SER), ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.[3]

Ecosystem

A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit[4].

Habitat

The place or type of site where an organism or population naturally occurs[5].

In situ conditions

The conditions where genetic resources exist within ecosystems and natural habitats, and. in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties[6].

In situ conservation

The conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties[7].

Landscape

It corresponds to a heterogeneous area composed of groups of ecosystems that interact with each other. It is spatially delimited at the mesoscale level and presents an inherent structure, which is made up of homogeneous patches in its edaphic (soils), lithological (rocks), and topographic characteristics, as well as biological (vegetation or other structurally or

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[2] The term "driver" or "direct cause" is equivalent to the concept of "motor" of changes in biodiversity

[3] https://www.ser.org/

[4] CDB op. Cit, p. 4

[5] Convention on Biological Diversity CBD (1992). Available in: https://www.cbd.int/doc/legal/cbd-en.pdf

[6] CDB op. Cit, p. 3

[7] CDB op. Cit, p. 3

functionally important organisms). It is the product of the interaction of the so-called landscape-forming factors in a given space and time[8].

Net gains in biodiversity

The net gain corresponds to the differential between the biodiversity values at the beginning of the conservation initiative and those observed due to biodiversity conservation activities throughout initiative implementation.

Population

A population comprises individuals of the same species and a specific geographic area. Populations interact with other populations of the same type, with populations of other species and with physical aspects of their territory.

NOTE: This term is used in a specific sense in the IUCN Red List Criteria. "Population is defined as the total number of individuals of the taxon. Within the context of a regional assessment, it may be advisable to use the term global population for this. In the Guidelines the term population is used for convenience, when reference is made to a group of individuals of a given taxon that may or may not interchange propagules with other such entities" [9].

Species

Species are groups of individuals or natural populations that are actually or potentially interbreeding, reproductively isolated from other similar groups by their physiological properties (producing incompatibility between parents or sterility of hybrids, or both).

Sustainable use

"Sustainable use" means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations[10].

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[8] http://repository.humboldt.org.co/handle/20.500.11761/31411 (References to other authors are included in the source text and have been omitted here to facilitate understanding of the concept)

[9] https://portals.iucn.org/library/sites/library/files/documents/RL-2012-002.pdf

[10] https://www.cbd.int/doc/legal/cbd-en.pdf

Taxon

A taxon corresponds to organisms that, once described, have been assigned a scientific name (or Latin name).[11]

Underlying cause

Underlying causes are factors that reinforce the direct causes of ecosystem changes. They include social, political, economic, technological and cultural variables, which constitute the initial conditions in the existing structural relationships between human and natural systems. These factors influence the decisions made by the agents and help to explain why the phenomenon of changes in land use occurs, with the consequent loss of biodiversity.

9 Geographic boundaries of the conservation initiative

The boundaries of the conservation initiative consist of the sites on which biodiversity conservation activities are carried out. The Minimum Spatial Unit (MSU) is represented in terms of surface area and corresponds to 1 hectare (10,000 m2).

The holder of biodiversity conservation initiatives must demonstrate that the areas within the geographic boundaries of the initiative correspond to the categories of vegetation or land cover considered by the land cover and land use identification system applicable to the country in which the activities of the conservation initiative are implemented[12]. The land cover identification and land use must be carried out at a scale of 1:10,000 or higher, considering the diversity of the landscape in each MSU.

This identified area units determine the sites within the boundaries of the conservation initiative. They should be represented in a Geographic Information System, for the duration of the conservation initiative. This should be done following appropriate methodologies for information systems and land cover analysis.

For example, geographic information should be handled following the quality standards of ISO 19111:2019(en)[13], which defines the conceptual schema for the description of referencing by coordinates, the minimum data required to define coordinate reference systems and the additional descriptive information (coordinate reference system metadata).

[11] Rodríguez-Melo, M. 2022

[12] Such as CORINE Land Cover

[13] https://www.iso.org/obp/ui#iso:std:iso:19111:ed-3:v1:en

Now, for the identification and selection of areas, the initiative holder must provide evidence that the area within the boundaries of the initiative is eligible by complying with the following steps1[14]:

a) Demonstrate that at the beginning of the activities of the proposed initiative, the vegetation cover corresponds to one or more of the classes or types of vegetation associated with the land use, providing the following information:

i. the geographic boundaries of the biodiversity conservation initiative; and,

ii. the extent and location of the areas in each land cover type and/or land use.

To demonstrate the conditions mentioned above, the initiative holders shall provide one of the following verifiable information alternatives:

a) the land cover and/or land use categories present in the geographic boundaries of the conservation initiative; for this purpose, aerial photographs or satellite images may be used, complemented with cartographic information of references taken in the field;

b) field studies (land use permits or concessions, land use plans or information from local records such as cadastral, land registry, land use or management records); or,

c) if options (a) and (b) are either not found or not applicable, the project participants must submit written testimony which, in turn, must have been prepared using one of the participatory rural appraisal methodologies and/or social cartography which includes participatory evaluation methods with the Indigenous Peoples or Local Communities (IPLC).

10 Temporal limits and analysis period

The temporal limits of biodiversity conservation initiatives correspond to the periods during which biodiversity conservation activities avoid the partial or total loss of an ecosystem, taxon, population or species, or changes in land use, thus generating net biodiversity gains.

The temporal limits of biodiversity initiatives should be defined considering the following:

(a) the starting date of the activities leading to the avoidance of biodiversity loss in the area of the biodiversity conservation initiative;

(b) the period of quantification of net gains in biodiversity; and,

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(c) the monitoring periods.

Biodiversity conservation initiatives can quantify and demonstrate net gains in biodiversity for a period of 10 years.

This period can be extended in accordance with the applicable procedures. The initiative holder can extend the period of the conservation initiative for another 10-year period justifying the reasons, objectives and expected results of said extension. The initiative holder shall evaluate the baseline conditions, the additionality or other applicability conditions set by BioCarbon or other applicable regulations.

11 Biodiversity baseline

To determine the biodiversity baseline, the initiative holder shall complete an assessment of the structure and composition of the ecosystem in each of the different types of land cover and/or land use map. It is also necessary to include information, as detailed as possible, on climate, soil and other biodiversity and landscape determinants

The biodiversity baseline shall be established based on the extent of land cover and/or land use and the evaluation of the physical and biotic components, which may preferably be based on primary information supported by validated field methodologies. If secondary information is used, it should come from official sources.

The baseline characterization shall also include assessments related to ecosystem structure and composition for all land cover and/or land use categories, before the start of conservation initiative activities, along with the map delineating the areas corresponding to each of the different cover types found.

Similarly, the baseline should include an assessment of the Conservation Values, following appropriate methodologies, such as the Landscape Species Approach[15].

To establish the biodiversity baseline, the following can be used, among others:

a. Aerial photographs, satellite images, etc.;
b. Basic cartography, topographic maps, thematic cartography, geologic maps, soil maps, etc.;
c. Bibliographic documents of specific works developed in the area or zone where the biodiversity conservation initiative is located;

[15] Wildlife Conservation Society (WCS) y Living landscape program.

d. Models developed based on field measurements.

Baseline identification determines that the conservation activities and specific actions result in a direct and quantifiable biodiversity gain, equivalent to the net gain derived from the activities of the biodiversity conservation initiative.

12 Additionality analysis

The additionality analysis demonstrates that net increases in biological diversity at the landscape level will be observed due to the initiative conservation activities and specific actions. Such gains would not have occurred if the biodiversity conservation initiative had not been implemented. Consequently, they will be considered additional:

i. Initiatives whose activities effectively demonstrate that they are carried out through intentional and direct interventions on the landscape;
ii. It is demonstrated that the activities to be implemented correspond to a land use alternative that does not represent the use and/or coverage related to a usual activity;

Conservation activities or specific actions shall target more than one native species and be designed to support landscape-scale conservation objectives of the original ecosystems or landscapes. This, without putting in potential risk/danger said ecosystem or landscape, nor any of its biological components. Therefore, it is a requirement that the conservation initiative holder establishes measurable biodiversity attributes, based on reliable and credible criteria and indicators for each biodiversity component.

13 Characterization of drivers of transformation and biodiversity loss

Conservation initiative holders should conduct an assessment related to all drivers of landscape transformation and subsequent biodiversity loss. The main drivers of transformation and biodiversity decline are habitat loss and degradation. However, other drivers of transformation and biodiversity loss may include: deforestation, forest clearing, conversion to other land uses, overexploitation of resources, mining activities, and construction of infrastructure and roads.

To characterize direct drivers of transformation and underlying causes, a qualitative rating matrix (table 1) indicating the extent and frequency with which drivers of biodiversity loss have occurred should be used.

Table 1. Drivers of transformation and biodiversity loss

Driver	Extension			Frequency		
	High	Media	Low	High	Media	Low
1.						
2.						
3.						
....						
n						

In the case of underlying causes, the initiative holder shall qualitatively categorize (using table 2) the intensity and frequency with which estimates of the underlying causes of biodiversity loss have been present.

Table 2. Underlying causes of biodiversity loss

Underlying cause	Extension			Frequency		
	High	Media	Low	High	Media	Low
1.						
2.						
3.						
....						
n						

14 Conservation objectives

Based on the information recorded in sections 11 and 13 of this document (above), the conservation initiative holder shall establish and justify the chosen conservation objectives/targets, in order to carry out preservation, restoration, or sustainable use activities and their specific actions

The conservation objectives/targets must be directly related to the Conservation Values. Likewise, these should be demarcated and delimited in the areas within the geographic boundaries of the proposed initiative.

A helpful tool for identifying, measuring, and monitoring conservation objectives is the *Theory of Change* (TOC). A logical sequence represents the conditions and factors necessary to achieve the expected impact, with variables that allow the connections between conservation measures and net gains in biodiversity to be adequately represented.

The conservation initiative holder can use the FSC Guidance for Demonstrating Impacts on Ecosystem Services[16]. This guide includes the essential elements of a theory of change and a quality checklist for a TOC.

Additionally, other guides may be implemented. Stakeholder consultations and interviews are also crucial to identify specific needs of the IPLC, the ecosystems and their biodiversity.

15 Indicators and methods for estimating net biodiversity gains

Net gains in biodiversity shall be estimated by addressing the components that bring up biological diversity in an integrated manner. In this sense, just as environmental variables (e.g., climate, relief, hydrology and soils) are deemed, it is necessary to consider that these create landscape patterns that, in turn, determine the distribution, composition and abundance of organisms in a given landscape.

Consequently, landscape and biological community characterization provide valuable indicators for determining net biodiversity gains. In this sense, the quantification of net biodiversity gains is based on valuation techniques related to habitat quality. Therefore, these allow the quantification and weighting of ecological indicators of habitat or biodiversity for each type of land cover and/or land use in terrestrial landscapes or ecosystems and wetlands only.

15.1 Landscape characterization

Composition refers to the diversity and abundance of fragment types in a landscape. In contrast, structure refers to the spatial organization of fragments in the landscape and the spatial relationships between fragments.

15.1.1 Landscape Biodiversity Index (LBI)[17]

The Landscape Biodiversity Index (LBI) is composed of five parameters that together represent numerical measures to determine the composition and configuration of landscapes; as well as the proportion of each land cover/land use, the morphology of landscape elements, fragmentation and finally the existing connectivity between its components.

[16] FSC-GUI-30-006 V1-0 ES. Forest Stewardship Council® (FSC,2018). FSC®F000100.

[17] Methodology from the World Resources Institute document: SUSTAINABILITY INDEX FOR LANDSCAPE RESTORATION. A tool for monitoring the biophysical and socioeconomic impacts of landscape restoration. Available at: https://www.wri.org/research/sustainability-index-landscape-restoration

These indices allow comparison between landscape types and/or determine changes in the same landscape over time. It is also possible to project future scenarios in a given landscape. This evaluation can be carried out at three levels: (a) fragment or patch level, (b) class level (land use types), and (c) at the landscape level in general.[18]

Perimeter-Area Fractal Dimension (PAFRAC)

This indicator explains the complexity in the shape of each of the patches of the same land use type (class), which can range from very simple -such as squares or rectangles (in the case of crops)- to more complex shapes, typical of a forest or natural vegetation cover. This indicator takes values between 1 and 2. It approaches 1 for shapes with very simple perimeters such as squares involving crop or other coverage areas. It approaches 2 for shapes with highly complex perimeters. PAFRAC is calculated with the Equation 1.

$$PAFRAC = \frac{2\, ln\, ln\left(.25P_{IJ}\right)}{ln\, ln\, a_{ij}} \qquad \text{Equation 1}$$

Where:

$PAFRAC$	=	Perimeter-Area Index
P_{ij}	=	The perimeter of the patch ij; m
a_{ij}	=	Area of patch ij; m²

Percentage of landscape (PLAND)

The Landscape Percentage (PLAND) quantifies the proportional abundance of each type of landscape patch, i.e., the area occupied by each class in the landscape. Thus, PLAND is equal to the percentage of the landscape composed of the corresponding patch type. PLAND occupies values between 0 and 100 and is calculated with the Equation 2.

$$PLAND\ (P_i) = \frac{\sum_{j=l}^{n} a_{ij}}{A}\ (100) \qquad \text{Equation 2}$$

Where:

[18] McGarigal, Kevin; Marks, Barbara J. (1995). FRAGSTATS: spatial pattern analysis program for quantifying landscape structure. Disponible en: https://www.srs.fs.usda.gov/pubs/3064

P_i	=	The proportion of landscape occupied by patch type (class) i.
a_{ij}	=	Area of patch ij; m²
A	=	Total area of the landscape; m²

Number of Patches (NP)

NP expresses the fragmentation of a given class or of the landscape in general. It represents the number of fragments (patches) of each fragment type; it is a simple measure of the extent of subdivision or fragmentation of the fragment type. It is calculated as shown in Equation 3.

$$NP = n_i \qquad \text{Equation 3}$$

Where:

NP	=	Total number of fragments or patches
n_i	=	Number of fragments in the landscape of fragment type (class) i

Largest Patch Index (LPI)

Corresponds to an indicator of dominance, showing the area of the largest patch for each class. It represents the percentage of the landscape occupied by the largest patch. It can be recognized as an indicator of representativeness. It is calculated with the Equation 4.

$$LPI = \frac{max_{j=1}^{n}\left(a_{ij}\right)}{A}(100) \qquad \text{Equation 4}$$

Where:

LPI	=	Largest Patch Index; percentage
n	=	Number of patches in the landscape
a_{ij}	=	Area of patch ij; m²
A	=	The total area of the landscape; m²

Contagion Index (CONTAG)

This index represents the potential for connectivity in the landscape. It explains the extent to which patch types are aggregated or clustered, i.e., dispersion.

The contagion index measures the degree to which mapped attributes are clustered within areas ("patches") with the same or equal attribute classes and is an indicator of the degree of fragmentation of the landscape.

CONTAG considers all patch types present in an image, including any present at the edge of the landscape, if present, and considers similar adjacencies (i.e., cells of patch types adjacent to the same type). It is calculated with Equation 5.

$$CONTAG = \left[1 + \frac{\sum_{i=1}^{m} \sum_{k=1}^{m} \left[P_i \circ \frac{g_{ik}}{\sum_{k=1}^{m} g_{ik}} \right] \circ \left[ln \left(P_i \circ \frac{g_{ik}}{\sum_{k=1}^{m} g_{ik}} \right) \right]}{2ln(m)} \right] (100) \qquad \text{Equation 5}$$

Where:

$CONTAG$	=	Contagion Index; percentage
P_i	=	The proportion of the landscape occupied by patch type (class) i
g_{ik}	=	Number of adjacencies (joints) between pixels of patch type (class) i and k
m	=	The number of patch types (classes) present in the landscape, including the edge of the landscape, if any.

Once the five indices have been calculated and normalized, the PPI can be calculated by averaging the normalized values of the indices (Equation 6).

$$LBI = \frac{(PAFRAC + PLAND + NP + LPI + CONTAG)}{5} \qquad \text{Equation 6}$$

Where:

LBI		Landscape Biodiversity Index
PAFRAC	=	Perimeter-Area Index
PLAND	=	The proportion of the landscape occupied by patch type
NP	=	Total number of fragments or patches
LPI	=	Larger Patch Index
CONTAG	=	Contagion Index

The LBI shall be calculated based on the land cover and land use map, which classifies landscape or land use types within the boundaries of the conservation initiative. To calculate landscape indices, the conservation initiative holder may use tools such as FragScape, Fragstat, Grass, Patch Analyst, V-late, or other modeling methods that estimate landscape metrics.

LBI takes values between 0 and 1. The maximum value indicates that the landscape has sufficient attributes to ensure stability in the current state of biodiversity. The PPI value decreases as the degree of landscape degradation increases.

During each monitoring period, the conservation initiative holder shall show that these values improved, thus demonstrating that the conservation initiative activities have generated net gains in biodiversity.

15.2 Characterization of biological communities [19]

The holder of the conservation initiative shall perform a characterization of the biological communities based on diversity indexes, such as those of dominance index, composition, and diversity (α and β)[20].

15.2.1 Alpha diversity (α).

Alpha diversity is the species richness in a community that is considered homogeneous, representing richness at the local level. Under this Methodology, the assessment should be made at the level of a "landscape unit" (according to the definitions in section 15.1).

Several indices are related to the number of species (richness) or to structural data to measure alpha diversity, such as abundance and dominance.

Richness indexes

Specific richness (number of species)

The simplest way to determine richness is the number of species per sampling site. However, some indicators that determine species richness require primary data or parameters.

Margalef Index of Diversity

Relates the number of species to the total number of individuals. In general, value 2.0 represents areas with low biodiversity; values above 5.0 indicate high biodiversity. The index is calculated with Equation 7.

$$D_{Mg} = \frac{S-1}{lnN} \qquad \text{Equation 7}$$

Where:

[19] Descriptions and equations taken from VILLARREAL, H., ALVAREZ, S., CÓRDOBA, F., ESCOBAR, G., FAGUA, F., GAST, H., MENDOZA, M., OSPINA y A.M. UMAÑA. 2004. Manual de métodos para el desarrollo de inventarios de biodiversidad. Programa de Inventarios de Biodiversidad. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, Colombia. 236 p. Available at: http://repository.humboldt.org.co/handle/20.500.11761/31419

[20] Flora and fauna

D_{Mg}	=	Margalef Index of Diversity
S	=	Total number of species
N	=	Number of individuals

Dominance index (or Simpson's diversity index)

This index for measuring the richness of organisms in the landscape units. It is calculated with the Equation 8.

$$D = \sum \left(\frac{(n_i^2 - n_i)}{(N^2 - N)}\right) \quad \text{Equation 8}$$

Where:

D	=	Dominance Index
n_i	=	Number of individuals of the same species
N	=	Total number of individuals in the sample

Equity indexes

Shannon-Wiener Index

This index estimates species abundance assuming that all species are represented in the samples and that all individuals were randomly sampled. It can acquire values between zero (when there is only one species) and the logarithm of S when the same number of individuals represents all species. It is calculated with the Equation 9.

$$H' = -\sum_{i=1}^{S} \quad p_i ln p_i \quad p_i = \frac{n_i}{N} \text{ y, } \sum \quad p_i = 1 \quad \text{Equation 9}$$

Where:

H'	=	Shannon-Wiener Index
p_i	=	Proportional abundance of species i, which implies obtaining the number of individuals of species i (n_i) divided by the total number of individuals in the sample (N)
S	=	Total number of species; i=1,2,3, …, S

Pielou's index

Based on the diverse values of the Shannon-Wiener index, it represents a ratio between the observed diversity and the maximum expected diversity value. It expresses fairness as the ratio of observed diversity to the maximum expected diversity. It takes values between 0 and 0.1, being 0.1 when all species have the same abundance. It is calculated with the Equation 10.

$$J' = \frac{H'}{H'_{max}} \quad \text{y} \quad H'_{max} = lnS$$ Equation 10

Where:

J'	=	Pielou's Index
H'	=	Shannon-Wiener index value
S	=	Total number of species; i=1,2,3, ..., S

15.2.2 **Beta diversity (β)**

The degree of species turnover is mainly evaluated by considering proportions or differences. Proportions can be determined with the help of indexes and/or coefficients that indicate how similar or dissimilar two communities or samples are.

Similarity or dissimilarity expresses the degree of similarity in species composition and their abundances in two samples.

Jaccard similarity index

The Jaccard index is a method that expresses the similarity between two sites, considering species composition. It also relates the number of shared species to the total number of exclusive species. In addition, this index gives equal weight to all species regardless of their abundance. It thus gives importance to even the rarest species.

$$I_j = \frac{c}{a + b - c}$$ Equation 11

Where:

I_j	=	Similarity index
a	=	Number of species at site A
b	=	Number of species at site B
c	=	The number of species present at both sites A and B, i.e. they are shared.

This index ranges from zero (0) when there are no shared species, to one (1) when the two sites share the same species. This index measures differences in the presence or absence of species.

Whittaker Index (species replacement index)

This index describes gamma diversity from the integration of beta and alpha diversities. Its value ranges from 0 to 1, corresponding to situations where the species have the same abundance. It is calculated with Equation 12.

$$\beta = \frac{S}{\alpha - 1} \quad \text{Equation 12}$$

Where:

β	=	Beta diversity
S	=	Number of species recorded in a set of samples (gamma diversity)
α	=	The average number of species in the samples (average alpha)

15.2.3 Gamma diversity(γ)

Gamma diversity is the total species richness existing in a larger area. The geographic boundaries of the conservation initiative can constitute. Gamma diversity is the sum of the alpha diversity in all landscape units within the boundaries of the initiative. It can also be an average of alpha richness or a ratio of total richness to average beta diversity.

Gamma Index (Schluter y Ricklefs)

This index is defined as the product of the average alpha diversity, the average beta diversity, and the sample size, which is the total number of communities. It is calculated with Equation 13.

$$\gamma = Prom(\alpha) \times \beta \times SS \quad \text{Equation 13}$$

Where:

γ	=	Gamma Index
$Prom(\alpha)$	=	Average alpha diversity
β	=	Beta diversity (α in equation 12)
SS	=	Sample size (total number of communities)

As with the parameters related to landscape characterization, the conservation initiative holder must demonstrate that these indicators show net gains in biodiversity.

15.3 Other indicators

High Conservation Values and the presence of threatened species complement the representative characteristics of the areas within the boundaries of the conservation initiative.

15.3.1 High Conservation Values

The holder of the conservation initiative shall demonstrate that High Conservation Values (HCVs) are present in the initiative area[21]. According to the HCV network, "*an HCV is an exceptionally significant or critically important biological, ecological, social or cultural value.*"

Holders of biodiversity conservation initiatives should submit a rigorous assessment of HCVs, interpreting the results based on the precautionary principle[22]. To conduct the HCV assessment, it is recommended to use what is described in the FSC Standard version 5.0 (Principle 9: high conservation values)[23].

The identification of HCVs consists of interpreting what the HCV definitions mean in the conservation initiative area and demonstrating that they are represented in the conservation initiative sites (Table 3).

Table 3. High Conservation Values

HCV 1	Species diversity. Concentrations of biological diversity including endemic species, and rare, threatened or endangered* species that are significant at global, regional or national levels.
HCV 2	Landscape-level ecosystems and mosaics. Intact forest landscapes and large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.
HCV 3	Ecosystems and habitats. Rare, threatened, or endangered ecosystems, habitats or refugia.
HCV 4	Critical ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.
HCV 5	Community needs. Sites and resources fundamental for satisfying the basic necessities of local communities or Indigenous Peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or Indigenous Peoples.
AVC 6	Cultural values. Sites, resources, habitats and landscapes* of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or Indigenous Peoples, identified through engagement with these local communities or Indigenous Peoples.

Fuente: BioCarbon, 2023[24]

[21] The concept of High Conservation Value (HCV) was defined by the Forest Stewardship Council - FSC (1996) in its Principles and Criteria. Currently, HCVs are based on the criteria defined by the High Conservation Value (HCV) network. https://www.hcvnetwork.org/

[22] Principle 15. Rio Declaration on Environment and Development. Available at: https://www.cbd.int/doc/ref/rio-declaration.shtml

[23] https://connect.fsc.org/document-centre/documents/resource/392

[24] Based on FSC. Available at: https://connect.fsc.org/document-centre/documents/resource/392

All of this is done through an HCV assessment, which consists of stakeholder consultation, analysis of existing information and collection of additional information where necessary.

HCV assessments should result in a clear report of the presence or absence of values, their location, status and condition, and to the extent possible should provide information on habitat areas, essential resources, and critical areas that maintain those values. This will be used to develop management recommendations to ensure that HCVs are maintained or even enhanced.

15.3.2 Threatened species

The holder of the conservation initiative demonstrates that globally threatened species (according to the IUCN Red List™)[25] are present in its geographic boundaries and that develops actions aimed at conserving these species.

"*The IUCN Red List of Threatened Species™ is the world's most comprehensive information source on the global extinction risk status of animal, fungus and plant species. It is based on an objective system for assessing a species' risk of extinction if conservation action were not taken*" [26].

According to IUCN,[27] "*More than 41,000 species are threatened with extinction. That is still 28% of all assessed species*". Consequently, determining whether species under some degree of threat are found within the geographic limits of biodiversity conservation initiatives makes it possible to link conservation actions with reducing pressures on species in order to prevent extinction processes.

The categories defined by the IUCN relate the risk of extinction to a certain degree of threat. The categories are found in Table 4.

[25] https://www.iucnredlist.org/

[26] UICN. (2012). IUCN. (2012). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp. Available at: https://portals.iucn.org/library/sites/library/files/documents/RL-2001-001-2nd.pdf

[27] https://www.iucnredlist.org/es/

Table 4. Categories IUCN™ Red List

Categories	Symbol	Definition
EXTINCT	EX	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
EXTINCT IN THE WILD	EW	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
CRITICALLY ENDANGERED	CR	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
ENDANGERED	EN	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
VULNERABLE	VU	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
NEAR THREATENED	NT	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
LEAST CONCERN	LC	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category
DATA DEFICIENT	DD	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.
NOT EVALUATED	NE	A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

Source: IUCN RED LIST CATEGORIES AND CRITERIA[28]

In the IUCN document there is a description of the nature of the categories, as follows:

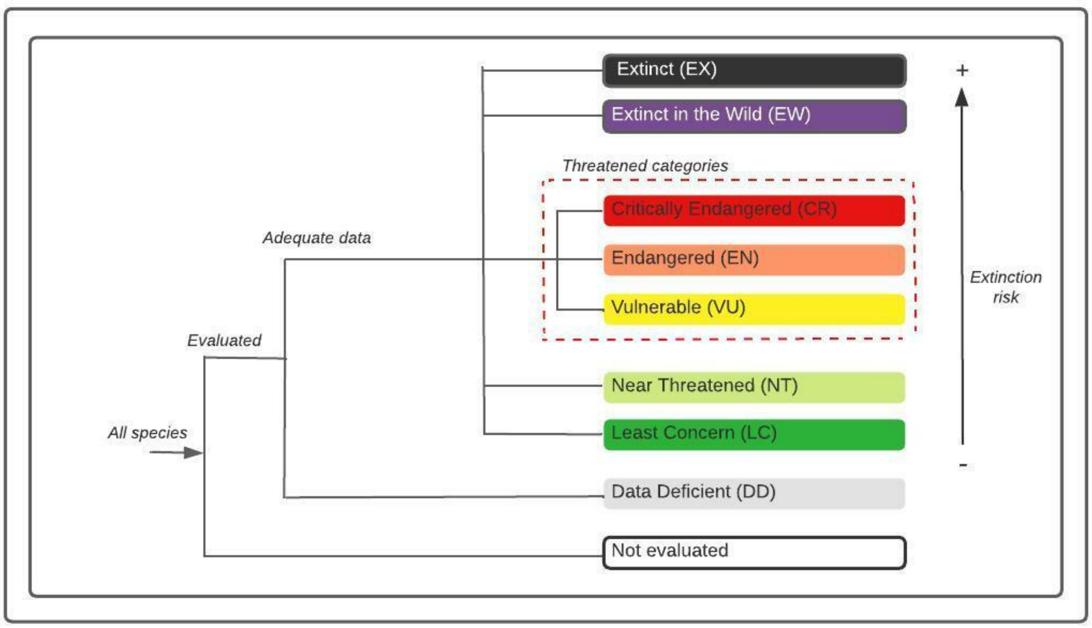
"*Extinction is a chance process. Thus, a listing in a higher extinction risk category implies a higher expectation of extinction, and over the time-frames specified more taxa listed in a higher category are expected to go extinct than those in a lower one (without effective conservation*

[28] https://portals.iucn.org/library/sites/library/files/documents/RL-2001-001-2nd.pdf

action). However, the persistence of some taxa in high-risk categories does not necessarily mean their initial assessment was inaccurate.

All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable. Together these categories are described as 'threatened'. The threatened categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories".

Figure 1. Structure of the categories



Fuente: IUCN RED LIST CATEGORIES AND CRITERIA [29]

The result of the threatened species assessment should be a list of species present within the geographic boundaries of the conservation initiative. This should contain the classification in the categories described above (with the number of species in each category).

In case a species, population, taxa is not found in the IUCN Red List, other national, regional or local databases may be used.

[29] Op. Cit. p. 5

16 Interpretation of indexes and estimation of net biodiversity gains

16.1 Net gains in biodiversity

As described above, the holder of the biodiversity initiative must demonstrate net gains in biodiversity by applying the indicators proposed in section 15 of this document.

In other words, the initiative holder shall demonstrate the net gain based on the application of the indicators (Table 5), comparing the values at time t1 with the values at time t2.

Table 5. Indicators to demonstrate net gains in biodiversity

Indicator	Unit	Dimension
Landscape Biodiversity Index (LBI)	Numeric	$0 \leq LBI \leq 1$
Specific richness (number of species)	Numeric	$NE \geq 1$
Margalef Index of Diversity (DMG)	Numeric	$DMG \geq 0$
Dominance index (D)	Numeric	$0 \leq D \leq 1$
Shannon-Wiener Index (H')	Numeric	$0 \leq H' \leq ln(S)$
Pielou's Index (J')	Numeric	$0 \leq J' \leq 0{,}1$
Jaccard similarity index (Ij)	Numeric	$0 \leq I_j \leq 0{,}1$
Whittaker Index(β)	Numeric	$\beta \geq 1$
Gamma Index (γ)	Numeric	$\gamma \geq 0$

Fuente: BioCarbon, 2023

16.2 Quantification of biodiversity credits (BDC)

A biodiversity credit is a unit of measurement that quantifies the net gains in biodiversity within the geographic boundaries of the conservation initiative

The area within the boundaries of the conservation initiative is multiplied by the factors associated with biodiversity. These factors are presented in Table 6.

Table 6. Biodiversity factors for quantifying biodiversity credits

Biodiversity index	**Unit**	**Dimension**	**Scale**	**Rating**	**Factor**	**Multiplier factor**
Landscape Biodiversity Index (LBI)*						
Landscape Biodiversity Index (LBI)	Numeric	0 ≤ LBI ≤ 1	0 ≤ LBI ≤ 0,3	Low	f_{LBI}	1,0
			0,3 < LBI ≤ 0,7	Medium		1,2
			0,7 < LBI ≤ 1	High		1,5
Characterization of biological communities						
Alpha diversity						
Richness						
Specific richness (number of species NE)	Numeric	NE ≥ 1	1 ≤ NE ≤ 10	Low	f_{NE}	0
			10 < NE ≤ 30	Medium		1,03
			NE > 30	High		1,05
Margalef Index of Diversity (DMG)	Numeric	DMG ≥ 0	1 ≤ DMG ≤ 2	Low	f_{DMG}	0
			2 < DMG ≤ 5	Medium		1,03
			DMG > 5	High		1,05
Dominance index (or Simpson's diversity index D)	Numeric	0 ≤ D ≤ 1	0 ≤ D ≤ 0,3	Low	f_{D}	0
			0,3 < D ≤ 0,7	Medium		1,03
			0,7 < D ≤ 1	High		1,05
Equity						
Shannon-Wiener Index (H')	Numeric	0 ≤ H' ≤ ln(S)	**		$f_{H'}$	N/A
Pielou's Index (J')	Numeric	0 ≤ J' ≤ 0,1	0 < J' ≤ 0,05	Low	$f_{J'}$	1,03
			0,05 < J' ≤ 0,1	High		1,05
Beta diversity						
Jaccard similarity index (Ij)	Numeric	0 ≤ Ij ≤ 0,1	0 < Ij ≤ 0,05	Low	f_{Ij}	0
			0,05 < Ij ≤ 0,1	High		1,05
Whittaker Index(β)	Numeric	β ≥ 1	1 ≤ β ≤ 3	Low	f_{β}	0
			3 < β ≤ 7	Medium		1,03
			β > 7	High		1,05
Gamma diversity						
Gamma Index (γ)	Numeric	γ ≥ 0	1 ≤ γ ≤ 2	Low		0

Biodiversity index	Unit	Dimension	Scale	Rating	Factor	Multiplier factor
			2 < γ ≤ 5	Medium	f_γ	1,03
			γ > 5	High		1,05
Other indicators						
High Conservation Values (HCV)	Numeric	VOC ≥ 0	VOC = 0	Null	f_{VOC}	0
			1 < VOC ≤ 3	Medium		1,02
			VOC > 3	High		1,04
Threatened species						
Extinct in the Wild (EW)	Numeric	EW ≥ 0	EM = 0	Null	f_{EW}	0
			1 < EW ≤ 3	Medium		1,05
			EW > 3	High		1,06
Critically Endangered (CR)	Numeric	CR ≥ 0	CR = 0	Null	f_{CR}	0
			1 < CR ≤ 3	Medium		1,04
			CR > 3	High		1,05
Endangered (EN)	Numeric	EN ≥ 0	EN = 0	Null	f_{EN}	0
			1 < EN ≤ 7	Medium		1,03
			EN > 7	High		1,04
Vulnerable (VU)	Numeric	VU ≥ 0	VU = 0	Null	f_{VU}	0
			1 ≤ VU≤ 3	Low		1,01
			3 < VU ≤ 7	Medium		1,02
			VU > 7	High		1,03
Near Threatened (NT)	Numeric	NT ≥ 0	NT = 0	Null	f_{NT}	0
			1 ≤ NT ≤ 3	Low		1,00
			3 < NT ≤ 7	Medium		1,01
			NT > 7	High		1,02
Least Concern (LC)	Numeric	LC ≥ 0	LC = 0	Null	f_{LC}	0
			1 ≤ LC ≤ 3	Low		1,00
			LC > 3	High		1,01
*The interpretation of the individual value of the landscape indices is limited, so a joint analysis of the indicators shall be performed. ** used to calculate the Pielou's index						

Fuente: BioCarbon, 2023

The amount of biodiversity credits (BDCs) is derived from the MSU and the area within the geographic boundaries of the conservation initiative. The number of biodiversity credits that can be issued is determined using the overall increase in biodiversity, counted over the area within the boundaries of the conservation initiative (A_{ci}).

$$BDC_{year} = A_{ci} \times \left(f_{IBP} + f_{NE} + f_{DMG} + f_D + f_{J'} + f_{Ij} + f_\beta + f_\gamma + f_{HCV} + f_{EW} + f_{CR} + f_{EN} + f_{VU} + f_{NT} + f_{LC}\right) \quad \text{Equation 14}$$

Where:

BDC_{year}	=	Biodiversity credits, year=1, 2, 3, …n
A_{ci}	=	The area within the boundaries of the conservation initiative; hectares
f_{IBP}	=	Landscape Biodiversity Index (LBI)
f_{NE}	=	Specific richness (number of species NE)
f_{DMG}	=	Margalef Index of Diversity (DMG)
f_D	=	Dominance index (or Simpson's diversity index D)
$f_{J'}$	=	Pielou's Index (J')
f_{Ij}	=	Jaccard similarity index (Ij)
f_β	=	Whittaker Index (β)
f_γ	=	Gamma Index (γ)
f_{HCV}	=	High Conservation Values
f_{EW}	=	Extinct in the Wild (EW)
f_{CR}	=	Critically Endangered (CR)
f_{EN}	=	Endangered (EN)
f_{VU}	=	Vulnerable (VU)
f_{NT}	=	Near Threatened (NT)
f_{LC}	=	Least Concern (LC)

Source: BioCarbon, 2023

Once conservation activities and their specific actions and tools have been carried out and monitored and biodiversity enhancement has been assessed, biodiversity credits are issued in response to positive changes in biodiversity indicators measured in the conservation initiative area.

The estimation of biodiversity credits is not calculated based on the difference between the values of one year and another. If the value of the indicator increases with respect to the previous year, the value of the current year (which has been monitored) should be taken. If the indicator does not increase, this variable should not be taken into account for the estimation.

17 Monitoring plan

As part of the conservation initiative document, initiative holders must submit a monitoring plan that, at a minimum, contains the following:

(a) the data and information needed to estimate net biodiversity gains;

(b) data and complementary information to determine the biodiversity baseline;

(c) information related to risk assessment and management;

(d) the procedures established for the management of biodiversity net gain results and related quality control for monitoring activities;

(e) description of the procedures defined for the periodic calculation of net gains in biodiversity;

(f) the assignment of roles and responsibilities for monitoring and reporting variables relevant to the estimation of net biodiversity gains;

(g) the procedures related to the evaluation of the contribution of the biodiversity conservation initiative to the Sustainable Development Goals (SDGs);

(h) the necessary procedures to follow up on climate change adaptation strategies and social co-benefits;

(i) the criteria and indicators related to the initiative's contribution to sustainable development objectives, applicable to the activities proposed by the initiative's owner;

The monitoring plan should be structured appropriately and follow the following:

(a) national circumstances and the context of the biodiversity conservation initiative;

(b) good monitoring practices appropriate for the follow-up and control of the activities of the biodiversity conservation initiative;

(c) procedures to ensure the quality of the data.

Additionally, the monitoring plan should provide for the collection of all relevant data necessary to:

(a) verify that the applicability conditions listed in section 5 of this document have been met;

(b) check for changes from baseline conditions associated with the activities of the conservation initiative;

(c) to follow up on the risks identified and their proper management;

(d) the results of net gains in biodiversity;

(e) the contribution of the biodiversity conservation initiative to the Sustainable Development Goals (SDGs);

(f) Follow up climate change adaptation strategies.

The monitoring plan shall include follow-up on qualitative and quantitative indicators associated with the structure, composition and functionality of the ecosystems, and other variables of analysis, including the description of the indicator, the unit of measurement, as well as the periodicity and the person responsible for the measurement.

The proposed indicators should be consistent with the baseline data collection, the objective of which is to monitor the results of conservation activities and evaluate proposed conservation activities and adaptation strategies.

Monitoring can be carried out annually and shall be submitted to the certification body. However, the monitoring periods may be specified and established by the initiative holder per the objectives/targets of each conservation initiative, and it shall not exceed a monitoring period of 5 years.

18 Risk management

The holders of biodiversity conservation initiatives should assess the environmental, financial, and social risks of implementing conservation activities.

Based on identifying risks in these three dimensions, the initiative holder shall design measures to manage the risks so that the net gains in biodiversity are maintained during and after the duration of the conservation activities.

In this regard, the holder of the biodiversity conservation initiative should:

(a) determine the context, defining the scope and criteria required for risk management;

(b) identify potential natural and anthropogenic risks to which conservation actions may be exposed and determine the measures necessary to mitigate such risks;

(c) identify potential financial risks related to expected costs and investments, as well as the cash flows of the conservation initiative and define the necessary measures to mitigate financial risks;

(d) determine, in the medium and short term, the risks associated with the participation of local communities and stakeholders in the activities proposed in the biodiversity conservation initiative;

(e) quantify the risk in each of the components described above.

The holder of the conservation initiative should employ appropriate methodologies to assess expected risks (direct and indirect) and consider mitigation measures within adaptive management.

Adaptive management is a process by which conservation activities and specific actions and tools can be adapted to future conditions to ensure the achievement of the proposed objectives. It is a structured decision-making process that considers the incidence to reduce uncertainty about the results.

The conservation initiative holder should include a summary of risks and management actions in a matrix/table outline, referencing a specific plan or procedure in the initiative's action plan.

19 Uncertainty management

The conservation initiative holder shall consider uncertainty by documenting the sources of information, the consistency and relevance of the data, and the results related to net biodiversity gains.

An uncertainty analysis should be conducted using an appropriate model and justifying the choice of variables related to the assessment.

20 Permanence

Within the framework of compliance with the proposed conservation objectives and activities/actions/tools, the initiative holder shall demonstrate that the initiative's implementation has a legal and financial basis that guarantees its implementation in the medium and long term.

Appropriate management of the elements that make up the long-term viability of conservation initiatives includes, but is not limited to, the following:

(a) Legal and institutional frameworks (as well as compliance with them) as adequate instruments for minimizing risks associated with the permanence of the conservation initiative's activities;

(b) Defined roles and responsibilities for the execution and monitoring of conservation activities;

(c) A legal framework that includes rigorous agreements that guarantee the recognition of rights over biodiversity credits;

(d) Rigorous, serious and quality assurance during the process of registration and issuance of biodiversity credits;

(e) Supervised, monitored and managed biodiversity conservation initiative activities.

Document history

Type of document

Methodological document. BIODIVERSITY CONSERVATION. Nature-based solutions for quantifying net gains in biodiversity.

Version	Date	**Nature of the document**
Document for public consultation	November 21, 2022	Initial version - Document submitted for public consultation
Version 1.0	January 9, 2023	Updated version Some clarifications and minor editorial changes
Version 2.0	February 24, 2024	Updated version Quantification period Eligible activities Monitoring period