GUIDANCE M

Native Vegetation and Natural Ecosystems

Version 1

RAINFOREST ALLIANCE

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For any question related to the precise meaning of the information contained in the translation, please refer to the official English version for clarification. Any discrepancies or differences in meaning due to translation are not binding and have no effect for auditing or certification purposes.

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Contents

ABBREVIATIONS

CH = Certificate Holder

FPIC = Free, Prior, and Informed Consent

HCV = High Conservation Value (area)

HCVRN = High Conservation Value Resource Network

IFL = Intact Forest Landscape

IMS = Internal Management System

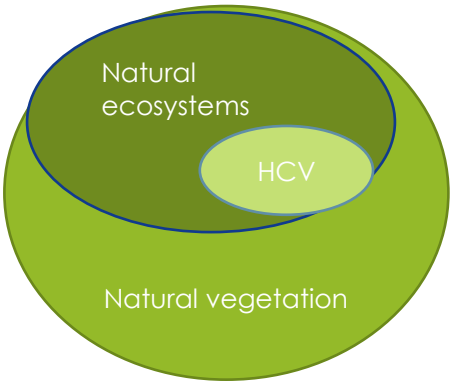
KBA = Key Biodiversity Area

PA = Protected Area

***Note**: throughout this document, underlined words denote terms that are defined in the Standard glossary. These definitions are not repeated in this guidance, so it is important to consult the glossary as you implement the standard criteria.

INTRODUCTION

Conservation of natural ecosystems and natural vegetation supports biodiversity conservation and protects ecosystem services such as pollination, pest control, water purification, soil protection and conservation, crop resilience, micro-climate regulation, carbon sequestration, and overall resilience against climate change impacts.



This document provides guidance to implement Sections 6.1, 6.2, and 6.3 of the 2020 Rainforest Alliance Sustainable Agriculture Standard. These three sections of Chapter 6 address natural ecosystems, High Conservation Value (HCV) areas, natural vegetation, and riparian buffers. Guidance for sections 6.1-6.3 is presented together since the topics addressed in these three sections are highly connected and related to one another: Natural ecosystems and riparian buffers contain natural vegetation, and conservation of natural ecosystems, natural vegetation, and riparian buffers serve to protect and mitigate risks to HCV areas (Figure 1).

Figure 1. *Relationship between natural vegetation, natural ecosystems, and HCV areas.*

RISK-BASED APPROACH TO NATURAL ECOSYSTEMS

The 2020 Rainforest Alliance Certification Program takes a risk-based approach and includes risk assessments that inform farm management and audit preparations. There are two main tools used to assess risk:

1. **Risk maps** are developed by the Rainforest Alliance and include risks for key issues such as deforestation and encroachment into protected areas at certificate holder and farm level. These maps combine location data with external data to help internal inspectors and auditors determine whether a farm is compliant with the requirements of the standard. Information from risk maps should drive farm management decisions and the development of the management plan. This guidance discusses risk maps for standard requirements 6.1.1, which address deforestation, and 6.1.2, which addresses encroachment into protected areas..
2. The **risk assessment tool** is filled in by the Certificate Holder and also informs the development of the management plan. The risk assessment tool is available in Annex S3 of the Rainforest Alliance Farm Standard (**Farm Risk Assessment Tool**). This guidance focuses on the risk assessment related to High Conservation Value (HCV) areas (requirement 6.1.3-6.1.4) and natural ecosystems (requirement 6.2.1).

SCOPE

This guidance is organized into three main sections as illustrated below:

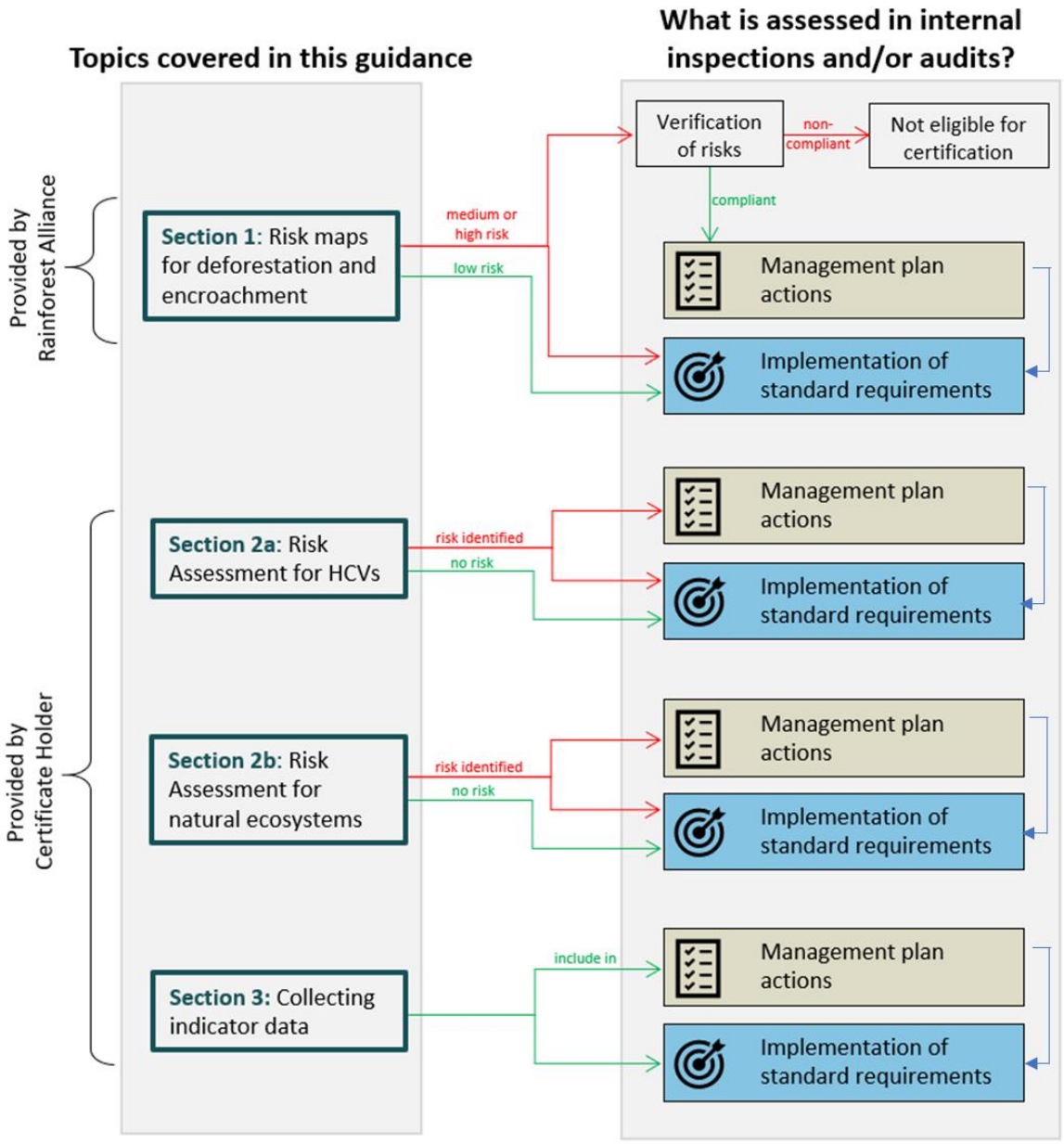
Section 1: Risk maps – This section provides information on how risks of deforestation and encroachment are mapped and assessed. Related to requirements 6.1.1 and 6.1.2.

Section 2: Risk assessment – This section provides information on how to identify and develop actions to include in the farm management plan based on the answers in the risk assessment tool.

2a: Risks to HCVs. Related to requirements 6.1.3 and 6.1.4

2b: Risks to natural ecosystems. Related to requirement 6.2.1.

Section 3: Collecting indicator data – This section provides information on how to collect indicator data and set targets for natural vegetation and riparian buffer requirements. Related to requirements 6.2.2; 6.2.3; 6.2.4; 6.2.5 and 6.2.6.



1. RISK MAPS

1.1 CONVERSION OF NATURAL ECOSYSTEMS AND PRODUCTION IN PROTECTED ARES

Requirements 6.1.1 and 6.1.2 of the standard address conversion of natural ecosystems, and production in protected areas. Conservation of natural ecosystems and protected areas is fundamental to the Standard.

➢ **Core Requirement**

Requirement 6.1.1 From January 1st 2014, onward, natural forests and other natural ecosystems have not been converted into agricultural production or other land uses.

➢ **Core Requirement**

Requirement 6.1.2 Production or processing foes not occur in protected areas or their officially designated buffer zones, except where it complies with applicable law.

The Rainforest Alliance risk maps help Certificate Holders, internal inspectors, and auditors identify cases of forest and ecosystem conversion after 2014 and cases of production in protected areas. These maps indicate producers and areas that are associated with past deforestation or encroachment into protected areas.

If risk maps identify potential past deforestation or encroachment into protected areas on a farm or group of farms, this risk must be investigated by internal inspectors and will be verified by auditors.

If potential risks are found, Certificate Holders must describe in their management plan the actions they will take to protect against future deforestation or encroachment (see below). If deforestation or illegal encroachment is verified during internal inspections and/or audits, the farms in question will not be eligible for certification.

For more information about the collection of geolocation data and the risk mapping approach, see **Guidance D: *Geolocation Data Requirements and Risk Maps***. Further information on deforestation is available in **Annex S12: Additional Details on Requirements for No-Conversion**.

Evaluation of risk map outcomes

Where risk maps show a risk of deforestation or encroachment into protected areas, internal inspectors must evaluate s these issues at the field level, at the internal management system (IMS) level, and at the factory level, as appropriate. Inspectors will investigate, for example, whether signs of recent deforestation or illegal logging are present and have been recorded.

In cases where internal inspectors or auditors suspect that deforestation has occurred, even without evidence from Rainforest Alliance risk maps (e.g., based on external reports or physical traces on farms), they can conduct interviews with local authorities, neighboring farms, and community members to determine whether deforestation has actually occurred. If at least two sources confirm potential deforestation (e.g., risk map + evidence in the field, evidence in the field + interview, interview + IMS level inspection), a non-conformity should be raised. Table 1 shows examples of risk and respective actions that should be carried out during internal inspections.

Example of risks	Actions in Internal Inspections
Medium/high risk for a location within a protected area	• Before internal inspection/audit: research and become familiar with the maps of protected areas to ensure all relevant protected areas are reported on the map. Also make sure you are familiar with the management plans of the protected areas by the relevant authorities. • Internal inspection/audits shall verify whether there is indeed an overlap of the farm with a protected area (i.e., the GPS points or polygons show that all or part of the farm is located inside a protected area or buffer zone). • The risk of overlap is based on protected area maps provided by by the World Database on Protected Areas (WDPA). WDPA maps are continuously being update with countries national maps.., Based on these maps, the exact boundaries of protected areas and whether the farm is encroaching must be verified in the field (e.g., verify the geolocation data, check for any recent official maps, documents, or permits that allow production in the area). • If the area is identified as a "Go Area" on the risk map, which means production is allowed under applicable law (indicated by a medium risk level): make sure the production complies with the regulation set by the applicable law or management plan; if permits are needed for the production (for example, admitted farms in Ghana): – check the existence of operational permits for the farm to operate within the protected area boundaries – check validity period of any permit • If there is an overlap with a "No-go" protected area, this means that production is not allowed (indicated by high-risk level) and this group member or production unit cannot be certified.
Medium risk for deforestation	• Assess the age of the crop trees: o Plots in which all trees seem to be planted after 2014 have a higher risk of being established on deforested land • Verify whether there are signs of deforestation in the identified areas. Signs of recent deforestation include, for example: – Trees confined to the borders of forest patches that show signs of recent changes such as young branches growing into the open patch – Young tree stumps present in a new production area – Destruction signs from felling large trees – Cleared strips of land in the forest or in production sites – Colonization of open spaces by species of moss, lichen, grass and species (i.e *Cecropia peltate*) that grow easily in barren environments, which could indicate that land has recently been cleared of trees
High risk for deforestation	• Assess evidence of recent deforestation as described above; In cases of high risk, the assumption is that conversion has occurred, and evidence is required to contest the finding of the risk maps. Such evidence may include: – Explanation of why the conversion indicated in risk maps is inaccurate (e.g., non-natural forest plantations that are harvested and converted to agricultural use; harvesting shade trees) – Evidence that the farm area with high risk of conversion was established prior to the cut-off date.

Table 1. *Example of verification actions during internal inspections for different risk levels.*

Developing risk mitigation actions for inclusion in the management plan

Cases of non-compliance

If non-compliances with requirements 6.1.1 and 6.1.2 are found (i.e., deforestation since 2014 or illegal production in a protected area), the Certificate Holder shall exclude the non-compliant group member or production unit from the certification program.

Large farms can still apply for certification if the converted area is smaller than 1% of the total farm area or no more than 10 hectares (see also: **2020 Certification and Auditing Rules; Annex S12. Additional details for requirement on no-conversion**). In this case, the conversion must be compensated by restoring natural ecosystems and/or providing compensatory conservation benefits as follows:

- A restoration/compensation plan must be developed in collaboration with an ecologist. It should follow the parameters for effective environmental restoration and conservation as set out in the Accountability Framework.[1] The planned restoration must be:
  - **Proportional***:* The area to be restored must be at least as big as the converted area. This requirement can be met by taking the converted area out of production and restoring it, or by restoring and/or providing compensatory conservation benefits on a nearby area;
  - **Equivalent***:* The ecosystem to be restored must be equivalent to the lost natural ecosystem in ecological value. If the value of the restored area is or will be lower than that of the converted area, then a larger area must be restored;
  - **Additional***:* The restoration activities must be additional to the activities planned for other reasons, including compliance with the Rainforest Alliance requirements on natural vegetation;
  - **Permanent***:* The restoration activities must be designed in a way to ensure long-term viability, including funding, management responsibilities, and clear land designations and land rights;

  The plan must include intermediate time-bound targets, clear responsibilities for the included activities, and a plan for monitoring at least once every three years. The plan must be audited at the outset and progress on implementation must be monitored and reported at least once every year and verified during the audit.

If your farm is large and has conversion on less than 1% or 10 hectares of the total farm area, your management plan should include:

☑ A description of the restoration/compensation plan

[1] https://accountability-framework.org/

Cases of potential future non-compliance

In certain cases, the Certificate Holder must work with producers to prevent the risk of future non-compliances. These are:

i) Cases where the risk maps and internal inspections identify conversion or expansion into protected areas close to, but not on, certified farm(s);

ii) Cases where non-conforming group members/production units are excluded but the Certificate Holder has other producers in the nearby area.

If your farm or group of farms has a risk of potential future non-compliance related to deforestation or encroachment, your management plan should include actions to:

- ☑ Collect GPS polygon data for all group members or production areas in proximity to the medium/high risk area to check for risk of conversion or encroachment;
- ☑ Directly inform all producers that conversion and encroachment are not allowed and develop agreements with producers to ensure that they will not convert or encroach;
- ☑ Organize activities and training to raise awareness about deforestation, natural ecosystem conversion, and encroachment into protected areas;
- ☑ Organize reforestation activities in the proximity.

2. RISK ASSESSMENT

2.1 RISKS TO HIGH CONSERVATION VALUE (HCV) AREAS

High Conservation Value areas (HCVs) are significant environmental and social features of critical importance. The HCV Resource Network (HCVRN) defines six high conservation values: species diversity; landscape-level ecosystems, local ecosystems and habitats; ecosystem services; community needs; and cultural values.[2] HCVs are an internationally agreed concept that many companies and international NGOs adhere to.

Rainforest Alliance Certificate Holders are expected to maintain and enhance such values through appropriate management and monitoring activities. Many of the standard requirements address topics related to HCVs. To further protect these areas, the Rainforest Alliance worked with HCVRN to develop a risk-based approach to HCVs to help Certificate Holders identify and mitigate threats to HCVs on or near their production and processing areas. To prevent on-farm activities from impacting HCVs, farmers must determine the risk to HCVs by answering questions in the risk assessment tool (Requirement 6.1.3/6.1.4).

If the risk assessment shows that the farm or group of farms has a low impact on HCVs, compliance with the other standard criteria is considered enough to protect any HCVs that may be present, without further assessment or mitigation.

If the farm is determined to have a high risk to HCVs, additional measures to minimize and mitigate threats are required as specified in the risk assessment. These measures must be detailed in the Certificate Holder's management plan.

[2] https://hcvnetwork.org/how-it-works/

Requirement 6.1.3 Core Requirement (for large farms

- **Requirement 6.1.4 Mandatory Improvement L1 (for group management)**

Management includes the mitigation measures from the Risk Assessment Tool in 1.3.1 with regards to High Conservation Values (HCVs) in the Management Plan (1.3.2). Management implements these measures.

Risk Assessment Question 1: Proximity to Intact Forest Landscapes

Intact Forest Landscapes (IFLs) are large areas of forest and forest mosaics, minimally influenced by human activity and without signs of logging, mining, or infrastructure visible on satellite imagery. IFLs store vast amounts of carbon in their trees and soil and provide important habitat for regional wildlife. All IFLs are considered areas of High Conservation Value.

While certified farms are unlikely to be located within IFLs, they may be found nearby. In such cases, farmers need to be aware of activities that may degrade IFLs, such as opening new access routes, timber harvesting, expanding subsistence home gardens, and constructing temporary settlements.

Question 1: Is the farm (or any farm in a group) located closer than 5 km to an Intact Forest Landscape?

☑ **If you answered "yes" to this risk assessment question, you need to develop** a list of all activities by farmers (and any resident staff) that involve tree felling, clearing or burning of vegetation, cattle-grazing, and hunting/collection in the wider landscape outside of the farm

Based on this list, include the following in your management plan:

☑ A plan to stop or redirect any activities that may degrade the structure or species composition of the IFL

Risk Assessment Question 2: Proximity to Protected Areas, Key Biodiversity Areas, Ramsar Sites, or UNESCO World Heritage sites

This question is intended to address risks to particularly valuable "conservation attributes." Conservation attributes are the key species and values that priority conservation areas (such as protected areas, Key Biodiversity Areas, Ramsar sites, and UNESCO sites) are designed to protect. Farms near these areas may also provide habitat for conservation attribute species.

Question 2: Is the farm (or any farm in a group) located in or closer than 2 km to a designated protected area, a Key Biodiversity Area, a Ramsar site, or a UNESCO World Heritage Site?

If you answered "yes" to this risk assessment question, include the following in your management plan (use the ' Template: Conservation attribute sheet' at the end of this guidance document and the information in the following sections to help with this exercise):

- ☑ Identify and list the conservation attributes of relevant protected areas, Key Biodiversity Areas, Ramsar sites, and UNESCO sites
- ☑ Identify the necessary conditions are for maintaining those attributes
- ☑ Assess your potential impact and include activities in your management plan to avoid or mitigate your impact

The following sections provide detailed information on priority conservation areas (protected areas, Key Biodiversity Areas, Ramsar sites, and UNESCO World Heritage sites) and how to locate information about relevant conservation attributes.

Step 1: Identify Priority Conservation Areas

Protected Areas (PAs)

Information about a specific PA can be obtained through local, regional, or national conservation authorities and/or the World Database of Protected Areas (www.protectedplanet.net). On this website, you can locate a specific PA on the global map and click on it to access information about its size, IUCN classification, and other details. You can also contact the relevant local nature protection agency to obtain additional information on which activities are permitted inside the PA and its buffer zone.

If your farm or group of farms is located near a protected area, check whether this area is a Key Biodiversity Area or a Ramsar site (see below).

Key Biodiversity Areas (KBAs)

Key Biodiversity Areas (KBAs) are important for the global conservation of biodiversity in terrestrial, freshwater, and marine ecosystems. KBAs are identified through inclusive and consultative processes, based on IUCN criteria for threatened biodiversity, geographically restricted biodiversity, ecological integrity, biological processes, and irreplaceability.

To find information about a specific KBA, see the World Database of Key Biodiversity Areas (www.keybiodiversityareas.org/home). On this website, navigate to the global map, then search for the relevant KBA. Most KBAs are important for birds as well as other organisms, and if so, there will be a link to a "BirdLife DataZone IBA Factsheet" under "Further information." BirdLife factsheets normally contain enough information for the purposes of implementing HCV risk assessments. Where such sheets are missing, other sources of information may be sought on the internet or obtained through national or regional conservation agencies or civil society organizations (e.g. national NGO representing BirdLife International).

Ramsar Sites

Ramsar sites are freshwater, brackish, or marine wetlands of international importance for the conservation of biodiversity, designated under the Convention on Wetlands (Ramsar Convention), an intergovernmental treaty. Data on Ramsar sites is available through the Ramsar Sites Information Service **(**https://rsis.ramsar.org). On this website, select the relevant region and country under "Explore by filters." Ramsar sites are displayed as orange dots. Click on a site to generate a fact sheet with more information and a satellite map of the area. Detailed Ramsar Information Sheets with descriptions of the ecology, species composition, ecosystem services, threats, and conservation measures are available under "Downloads," as are maps of vegetation and infrastructure of sites and surroundings.

Wetlands assigned as Ramsar site should have a Ramsar Management Plan which includes information about all or part of the watershed, buffer zones, restoration measures, land use restrictions, and more. Your regional nature conservation authority should be able to provide the Ramsar Management Plan.

UNESCO World Heritage Sites

UNESCO World Heritage sites are sites of outstanding universal cultural or natural value as defined in an international convention from 1972, recognized by almost all countries. An interactive map of World Heritage sites is available online (https://whc.unesco.org/en/list/). On this website, symbol shapes and colors represent cultural, natural, and mixed sites, and indicate which sites are at risk (red). Click the "library" symbol next to the site name to access an information sheet (available in eight languages) with a brief description and a summary of the values, integrity, and conservation status of the area.

Step 2: Identify Conservation Attributes

Conservation attributes are the key species and values that the priority conservation areas described above are designed to protect. If your farm or group of farms is located near a priority conservation area, it may also host conservation attributes that must be protected. Once you have determined which priority conservation areas are located near your farm or group of farms, you must assess which specific conservation attributes are present and identify measures to protect them.

Vulnerable and endangered species

For information about species, see the global IUCN Red List (www.iucnredlist.org), national Red Lists (www.nationalredlist.org), or list of regional focal points (www.iucn.org/about/union/members/membership-focal-points). Use these websites to search for any vulnerable or endangered species identified in your research on priority conservation areas:

1. Look up species by entering the common (English) or scientific (Latin) name into the search box;
2. Locate information about the species' extinction risk, distribution, and population size;
3. Fill in any relevant information in the Conservation Attribute Sheet (available at the end of this guidance)..

Example: Leopard (*Panthera pardus*)

Searching for "leopard" on the IUCN Red List shows that this mammal is categorized as "vulnerable" and global populations are decreasing. By clicking on "view on map", you also learn that leopards used to be present in all tropical and subtropical regions of Africa, the Middle East, and Asia, but now occupy less than half of their original distribution.

Clicking on the species name in the box generates a fact sheet with brief summaries of leopard habitat and ecology, threats and conservation measures, and numerous links to more detailed information.

Step 3: Assess Threats

At this stage, your Conservation Attribute Sheet should contain a summary of the values for which the area has been designated, along with the main threats to these values. The next step is for you to assess if your own agricultural and landscape-use practices threaten any of these conservation attributes. This may be the case if you perform or take part in any activity listed as a threat in the information sources or if you may cause other negative impacts that you are aware of.

If so, you are expected to identify how you will change your practices in order to minimize threats to conservation attributes. This may mean abstaining from practices that are likely to have negative impacts, amending certain practices to avoid detrimental effects, and/or adopting certain new measures to "be on the safe side."

Enter your "action points" into the Conservation Attribute Sheet and include them in your management plan. This allows you to keep track of and monitor your HCV obligations and to demonstrate to the auditor that you have complied with the procedures.

Risk Assessment Question 3: Local Communities

Local communities may have rights to move through, access, or use on-farm natural ecosystems for specific purposes including to reach fishing grounds, water cattle, collect construction material, etc. This includes seasonal access to water, fodder, natural products, or food sources. Land on your farm may also be subject to a combination of individual and collective ownership and use rights.

Certificate Holders must identify all parties with legitimate formal or informal rights or claims to use land or resources on the farm, and address and resolve conflicts or disputes resting on legitimate claims through a Free, Prior, and Informed Consent (FPIC) process.

If local communities have customary or legal land or resource use rights on your farm, you will also need to consider if any of their activities are a threat to the conservation attributes. If so, you must go through an FPIC process with the communities, and mutually agree on the measures that will be taken to mitigate their impacts on the conservation attributes.

Question 3: Do local communities have any legal or customary rights on the farm?

If you answered "yes" to this risk assessment question you need to::

- ☑ Map local community land uses on the farm in a participatory and inclusive way with the affected community
- ☑ Identify and mitigate any direct and indirect impacts from farming activities on these resources, or on habitats that support these resources
- ☑ Formalize agreements with communities on the use and management of such areas using Free, Prior, and Informed Consent (FPIC) principles, and document the process

Include in your management plan: any actions identified based on the above

Risk Assessment Question 4: Use of Communal Lands

Communal lands often provide the wider community with a range of resources and ecosystem services and may be important for biodiversity. Such areas serve the collective interests of farming and non-farming families alike. Farming-related activities can degrade communal lands if not well managed or controlled. For example, excessive cattle grazing can compact the soil and prevent natural regeneration; bushmeat hunting by hired labor may deplete protein sources for local communities. If communal lands are degraded, or their resources diminished, they may lose value both for the wider community and for the farmer.

As a first step, farmers should aim to minimize any direct impacts on communal lands by listing their current or planned uses and carefully considering how these affect the vegetation and the uses of the land by the wider community. As an example, timber harvesting for the construction of farm buildings changes the forest structure and could then reduce the availability of essential non-timber forest products or other resources that the rest of the community relies upon. In this example, to avoid this negative impact on the local community, the farmer should seek a supplier of legally sourced timber for the planned construction.

In addition, farmers are encouraged to engage with or initiate community-level processes where the community collectively agree on how to manage and maintain the lands, and

what are acceptable and unacceptable farming-related practices. Collaborating with local academic institutions or non-governmental organizations may facilitate access to technical support on community-based natural resource management and restoration projects.

Question 4: Do you use communal lands for purposes related to production or processing of the certified crop, e.g., timber collection?

If you answered "yes" to this risk assessment question you need to:

- ☑ Identify the describe all current or planned practices related with farming or processing of the certified crops, such as drying, building sheds, etc. that use resources from communal lands
- ☑ Evaluate if these activities impact the vegetation structure, the community's land-uses, or the religious/sacred importance for the community
- ☑ Seek ways to reduce negative impacts and avoid relying on the resources of communal lands when expanding or diversifying farming activities

Include in your management plan:

- ☑ any actions identified based on the above

Risk Assessment Question 5: Farm and/or Group Size (ha)

The size of the farm or group of farms in combination with the answers of previous risk assessment questions determines whether a farm or group needs to engage in a full HCV risk assessment. Large farms (>10,000 ha) in or near the priority conservation areas described above, or those that affect the customary rights of local communities, are more likely to hold HCVs. They also pose greater risks to HCVs from farm activities.

In such situations, the Rainforest Alliance requires a full HCV assessment by a licensed HCV Assessor. For this group and farm management need to get in contact with the HCV Resource Network (https://hcvnetwork.org/) to identify if and where HCVs are present, and what may be direct or indirect threats to these values. The HCV assessor also provides recommendations on how to manage and monitor HCVs on farm as well as in the wider landscape. The assessment is conducted through a combination of desktop review, field-collected data, and stakeholder consultation with local communities and experts.

2.2 RISK TO NATURAL ECOSYSTEMS ON THE FARM

Section 6.2 of the Rainforest Alliance standard addresses natural ecosystems and natural vegetation. The goals of this section are to measure and track the extent and quality of natural ecosystems so that they can be effectively managed and conserved (Requirement 6.2.1) and to maximize the amount and diversity of natural vegetation on the farm in order to increase habitat availability and support ecosystem health (Requirement 6.2.3-6.2.6).

Many terms used in this section, including "natural ecosystem" and "conservation," are defined and described in the glossary in Annex S1 of the standard; Users are encouraged to review that document. Note that natural ecosystems include largely pristine natural ecosystems as well as regenerated, managed, or partially degraded natural ecosystems.

> ➢ **Core Requirement**
>
> **Requirement 6.2.1** Management develops and implements a plan to conserve natural ecosystems. The plan is based on the map required in 1.2.9 and the natural ecosystems section of the Risk Assessment Tool in 1.3.1 and is updated annually.

This section contains guidance on addressing questions from the risk assessment related to natural ecosystems. The risk assessment questions only apply if the natural ecosystem in question (e.g., forest, wetland, etc.) is present on your farm or group of farms.

Risk Assessment Question 1: Natural Forests

The goal of this risk assessment question is to assess whether the forest areas on your farm or group of farms resemble natural forests (or are regenerating naturally) or whether there are aspects of these ecosystems that require additional management activities to conserve and enhance their quality. Certificate Holders should use the following features to gain a better understanding of the forest quality on their farm: canopy cover, the number of forest strata, and whether forest growth is impacted by vine/liana growth. These are explained below:

Canopy cover

Canopy cover is an estimate of the density or fullness of the forest ecosystem. Canopy cover provides vital habitat for forest species, supports ecosystem water balances, and acts as a proxy for one of the quantifiable benefits of trees – carbon dioxide respiration. The structure and fullness of the canopy also affects plant growth and survival. The appropriate amount of canopy cover will depend on the type of native vegetation present in your region's natural forests but will generally be at least 40%. For details on measuring canopy or shade cover, see the methodology in this document In section 3.1. *Natural vegetation in agroforestry systems.*

Forest strata

Healthy natural forests contain multiple vertical layers, or strata, that reflect the structural integrity of the forest and contribute to ecosystem functioning. The main strata include

- the forest floor (consisting of soil, leaf litter, woody debris etc.),
- the understory (composed of herbaceous plants, shrubs, saplings and young trees),
- the mid-story or canopy (above the understory, approximately 15-30m above the forest floor, often dense with vegetation; vines and lianas are common), and
- the overstory or emergent canopy (reaching heights of 30 or more meters, scattered tall trees with canopies that stretch above the mid-level canopy).

Each layer plays a role in forest functioning, including light regulation, soil enrichment, and habitat (Figure 2).

Natural forests generally have four to five healthy vertical strata. You can estimate the number of strata in your on-farm forested areas using simple field observations: Find a representative point in the forest where you are surrounded by relatively consistent forest and note whether any forest strata are lacking or are less developed. Based on your observations and the diagram in Figure 2, determine if there are any obvious gaps in the vertical structure of the forest or if any vertical layers are much denser than others. Repeat this observation at multiple points within the forested area to determine the representative number of strata.

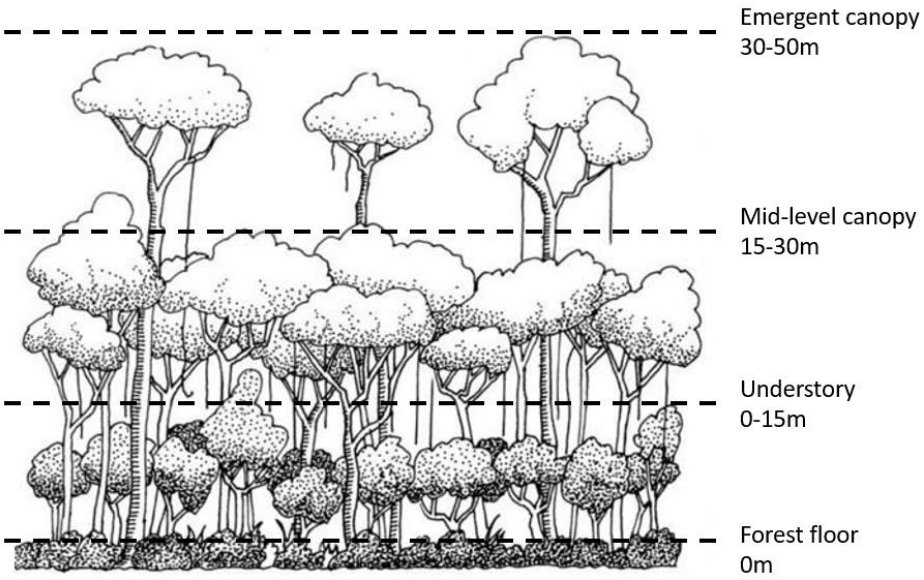


***Figure 2**. Diagram showing the four main strata in a healthy natural forest.*

Vines and lianas

Vines and lianas (woody climbing plants) are abundant in tropical and subtropical forests and make up a significant amount of the vegetation. These plants grow fast and do not invest energy into developing supporting structures, instead relying on existing trees for support. As a result, lianas and other vines slow tree growth, with negative impacts on biomass accumulation and carbon sequestration. Nonetheless, vines are a natural part of tropical forests and, when their growth is kept in check, they help ecosystem functioning by providing food and canopy-to-canopy access for species that live in trees.

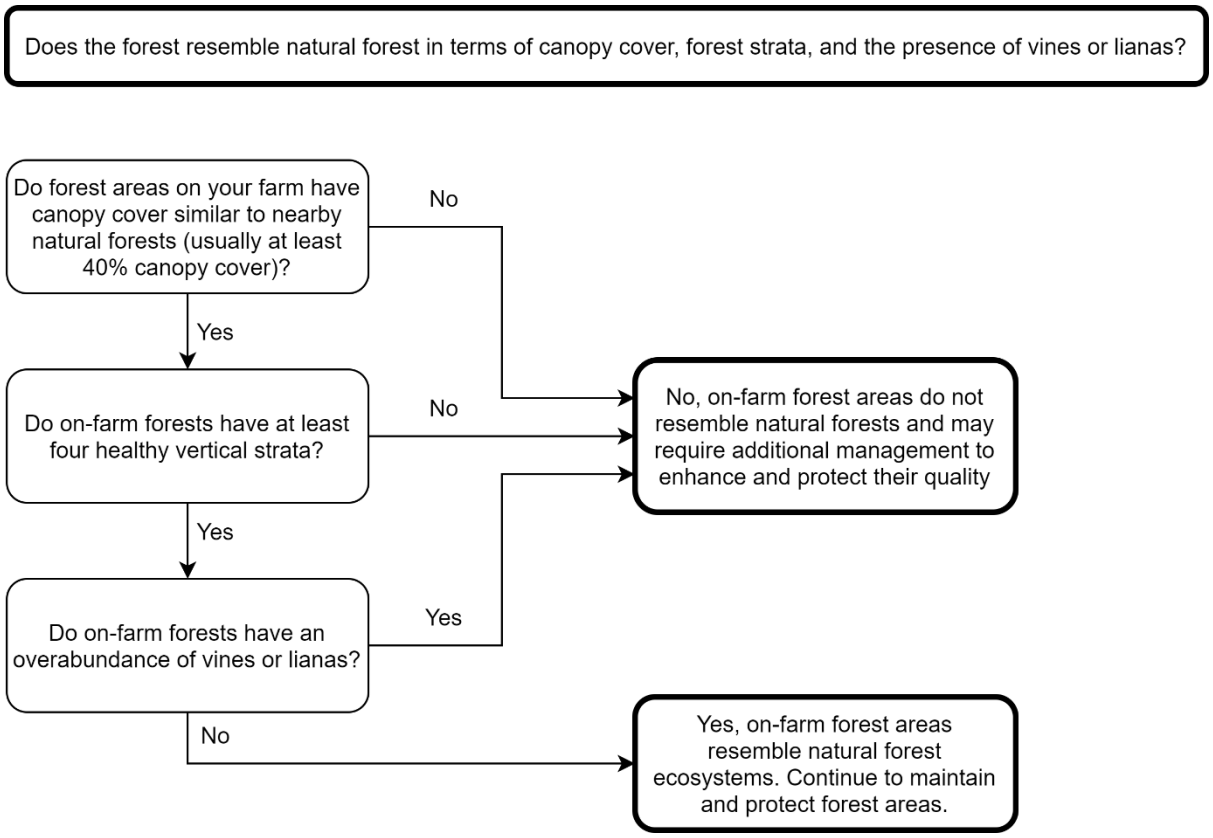
In general, lianas/vines with stems greater than 5 cm in diameter are considered to be beneficial elements of natural tropical forests, while smaller stem vines/lianas often negatively affect the trees they are growing on. A well-structured forest with tall trees and a covered canopy will accumulate fewer vines and lianas because of its shady environment. As a result, an overabundance of small lianas/vines signals reduced forest quality.

Based on field observations and farmer knowledge, determine whether there is an overabundance of small vines or lianas in the on-farm natural forest ecosystems. A "yes" answer to any of the following questions may indicate an overabundance of vines.

1. Have vines and lianas been growing rapidly or increasing in number over time?
2. Is the growth of any young or mature trees being hindered or influenced by the physical presence of large vines or lianas?
3. Are more than 50% of trees infested with vines or lianas?
4. Are vines or lianas concentrated in the crowns of infested trees?

If so, your management plan should include measures for removing certain types of vines or otherwise reducing the impact of vine or liana overgrowth on the forest ecosystem.

Use this flow chart to help you determine your answer to the risk assessment question:



Question 1: Does the forest resemble natural forest in terms of canopy cover, forest strata, and the presence of vines or lianas?

If you answered "no" to this risk assessment question, include the following in your management plan:

- ☑ Plan to manage canopy cover, forest strata, and presence of vines or lianas (e.g., by creating openings, planting additional species, and restricting harvesting or grazing as necessary) to facilitate natural forest regeneration and growth

Risk Assessment Question 2: Wetlands

Wetlands are unique among water bodies for their ability to protect against flooding. Wetlands contain porous soil and specialized vegetation that allows them to adapt to irregular hydrological regimes. For example, during heavy rains, wetlands soak up and store excess water and slowly release it, mitigating flooding. Because wetlands may not always be fully flooded, it is important to determine the spatial extent of wetlands so that agricultural activities or other development does not affect the ability of the wetland to control flooding.

Note that there are other requirements in the Rainforest Alliance Standard that must be considered when managing a wetland (for example, see the requirements on riparian buffer zones (6.3.1, 6.3.2, 6.3.3) andnon-application zones for agrochemicals (4.6.6). Here, we focus on wetlands and their role in flood mitigation.

What is a floodplain?

Flooding occurs when rivers or other waterways receive a high volume of water in a short period of time, usually from heavy rainfall, damming, or snowmelt. The surrounding areas that regularly or periodically become inundated are known as floodplains and are a natural part of healthy rivers. Floodplains create seasonal or periodic wetland habitats that are important for birds and other wildlife. They also provide benefits to nearby communities by absorbing flood water and slowing its speed. Wetland floodplains, such as tidal marshes, are also present in many coastal areas. These wetlands serve as flood control during large tidal events, storms, or as a result of sea level rise. Even though wetland floodplains may only be active during certain seasons or time periods, protecting and restoring these areas is critical to maintain their benefits and avoid more devastating impacts of flooding.

Question 2: Do wetlands store or convey flood waters at any time of the year?

If you answered "yes" to this risk assessment question, include the following in your management plan:

- ☑ Plan to delineate and manage the wetland and active floodplain, and ensure that production or processing activities do not encroach into the floodplain

Risk Assessment Question 3: Erosion Risk

Natural ecosystems with large bare areas and those that contain steep slopes are prone to erosion and loss of topsoil. Such processes reduce land productivity and increase sediment loads in water bodies and irrigation channels, sometimes impacting farming and fishing communities far downstream. Steep slopes may also result in landslides, with potentially fatal impacts on downhill human settlements and infrastructure.

Areas (larger than 0.1 ha) that have a slope greater than 1 meter of rise over 3 meters of run have a high risk of erosion (Figure 3). In addition, large patches (greater than 0.1 ha) of bare ground within grassland, rangeland, savannah, and desert ecosystems are at risk of eroding and should be stabilized with groundcover, vegetation, living fences, or mulching, among other options.

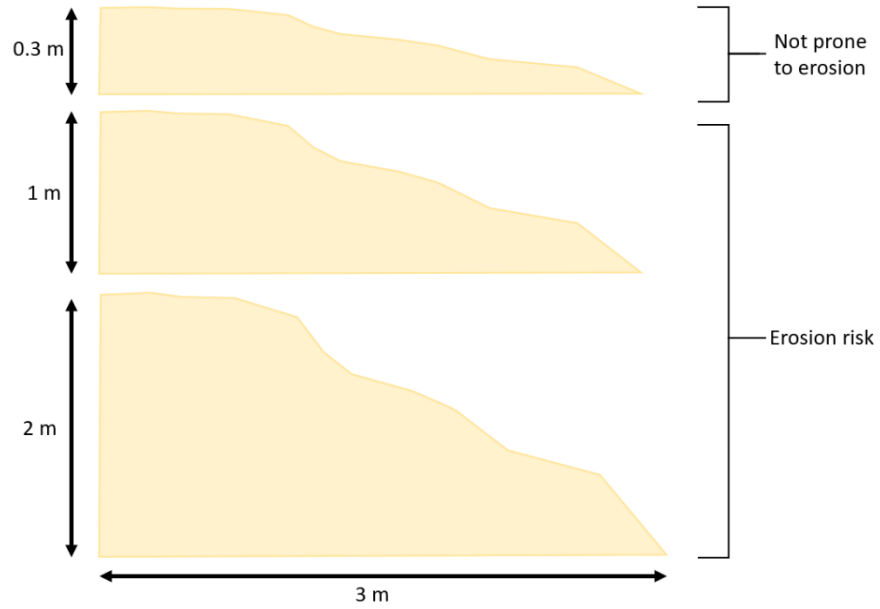


***Figure 3**. Diagram showing erosion-prone slopes (areas with a slope greater than 1m rise over 3m run)*

Erosion risks may be mitigated by making sure that the ground is permanently covered by vegetation including grasses, shrubs, or trees with stabilizing roots. Slopes may also be stabilized by using terraces to level the slope. However, terraces require much initial work to establish and need continuous maintenance to avoid degradation, and so are mostly used for intensive cultivation of high-value crops in densely populated areas. Maintaining and/or restoring protective slope vegetation require less effort and may be achieved through tree gardens or productive agroforestry based on shade-trees and perennial undergrowth crops (e.g., coffee or cocoa).

Question 3: Do grassland/rangeland or non-natural desert areas contain large bare areas that are at risk of eroding into nearby waterways?

If you answered "yes" to this risk assessment question, include the following in your management plan:

- ☑ Plant additional native groundcover (grasses, shrubs, trees) and implement other measures to protect against erosion

Risk Assessment Question 4: Tree Regeneration on Fallow Land

Fallow land

Areas that were previously used for agricultural purposes but have been removed from production are known as fallow land. They can be taken out of production temporarily, in order to enrich soils (for example, through weathering or natural fertilization from plants and animal manure) or permanently in order to regenerate natural vegetation. If fallow land was previously forested or is located in an area that can support forest growth, the land can often be restored to a forested state with significant benefits for hydrological and nutrient cycling, soil quality, erosion control, habitat provision, and climate change mitigation. Tracking forest regeneration on fallow land provides an indication of the quality of the soil and helps farmers measure progress towards building or re-building forest.

Certificate holders may also use permanent fallow land to reach the 10% or 15% threshold of natural vegetation as described in requirement 6.2.4. In this case, fallow areas should be left to naturally regenerate, aided by management practices to improve vegetation quality and biodiversity. Farmers and group managers can assess the quality of fallow land and determine appropriate management practices by determining how long the land has been left to fallow and how well vegetation is naturally regenerating.

Based on farming records, your knowledge, and other observations, determine when the land was last used for agricultural purposes and whether the land has been left to naturally regenerate since then. Using field observations, determine if trees are regenerating on fallow land and identify management activities that you can implement to facilitate regeneration (e.g., planting of native seedlings, protecting current seedlings, etc.)

Question 4: Are trees regenerating naturally on permanently fallow land?

If you answered "no" to this risk assessment question, include the following in your management plan:

- ☑ Re-vegetate fallow land by planting native grass, shrub, and tree species in accordance with an appropriate successional regime
- ☑ Make sure that fallow land is not impacted by pesticide and fertilizer use (i.e., spray drift or agrochemical runoff)

Risk Assessment Question 5: Ecosystem Connectivity

Although conserving all-natural ecosystems is important, the spatial configuration of ecosystems on the farm or group of farms can affect their quality and functioning. Habitat fragmentation – the process by which large habitats are broken up into smaller and smaller fragments, often through human activity – has an overwhelmingly negative impact on biodiversity. Research suggests that fragmentation of natural ecosystems reduces biodiversity by up to 75% and impairs key ecosystem functions, including nutrient cycling and biomass accumulation.

Fragmented ecosystems are generally more exposed to human land uses along their edges. As fragmentation increases, the amount of disturbed habitat also increases. If fragments become isolated from one another, animal movement between patches can slow or stop, especially if the intervening land is not suitable for animal movement (e.g., open, degraded, or agricultural land). As a result, fragmentation impacts both short- and long-term ecosystem functions.

Determine if the natural ecosystem areas on your farm are connected by landscape corridors by consulting satellite maps or sketch maps of the property. Figure 4 illustrates continuous, isolated, and connected natural ecosystem areas. The goal is to create

connected or continuous natural ecosystems. If the natural ecosystem areas on your property are currently present as isolated fragments, these can be connected by planting native vegetation corridors. You may want to consult with local nature conservation authorities and other relevant organizations in your regions for advice on key characteristics of landscape corridors and how to support them.

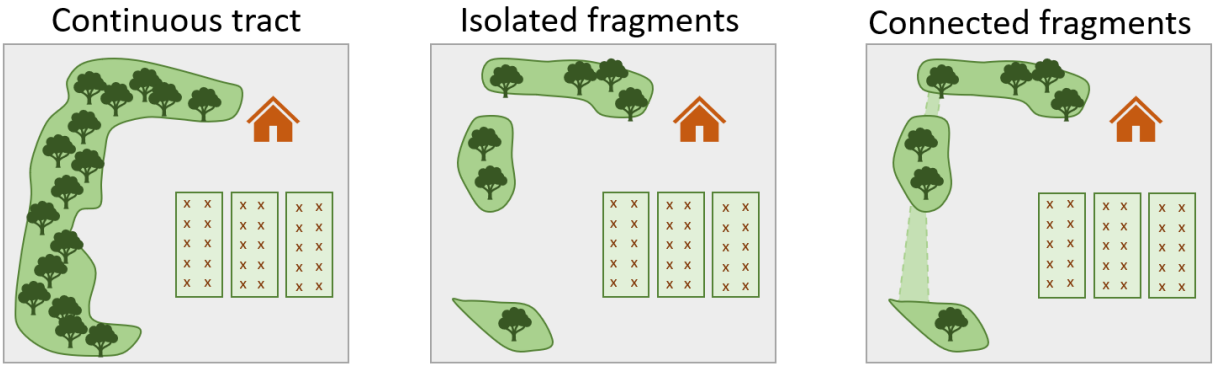


Figure 4. *Diagram of on-farm natural ecosystems showing a continuous tract of ecosystem (left), isolated ecosystem fragments (middle), and connected fragments (right).*

Question 5: Are the areas of natural ecosystem connected by landscape corridors?

If you answered "no" to this risk assessment question, include the following in your management plan:

- ☑ Plan to connect existing ecosystem fragments with habitat or landscape corridors
- ☑ Maintain and enhance buffer zones around existing ecosystem fragments to prevent encroachment of farm activities and enforce agrochemical "non-application zones"

Risk Assessment Question 6: Native Vegetation Species

Riparian buffers, forests, hedges, and tree lines ("living fences") all provide an opportunity to increase the abundance and diversity of native plant species on your farm. Native species are those occurring within their natural range and are adapted to the environmental conditions where they naturally grow. As a result, native species are likely to thrive in a given environment and play an important role in supporting native wildlife, including birds, mammals, and pollinators that rely on native plant species for food and habitat.

Farmers should pursue opportunities to increase the amount and diversity of native plant species in all-natural and semi-natural ecosystems on the farm or group of farms. Native vegetation species can be planted in living fences, used to stabilize stream banks and in riparian buffers, or planted on regenerating land or in forests. Planting and conserving native vegetation species will also help you meet the Standard's natural vegetation criteria (requirements 6.2.3-6.2.6).

Question 6: Do you expect all on-farm natural ecosystems, including hedges, tree lines, riparian buffers, and forest, to contain native species?

If you answered "no" to this risk assessment question, include the following in your management plan:

- ☑ Measures to increase the number and diversity of native plant species in on-farm natural ecosystems; measures can include planting native species in riparian buffers, regenerating areas, fallow land, or as flowering strips, hedges, and tree lines
- ☑ Seek out opportunities to increase native species diversity and abundance on the farm or group of farms

Risk Assessment Question 7: Expansion of Production Areas

Certificate Holders should track spatial changes in the areas used for production and processing to ensure that the integrity of on-farm natural ecosystems is not threatened by shifting production activities. To protect natural ecosystems, production and processing activities should not extend up to the very edge of the natural ecosystem areas; maintaining buffer zones around natural ecosystems ensures that these areas are protected from agrochemical use, physical disturbance, foot and vehicle traffic, and other activities that often accompany agricultural production and processing.

Question 7: Are production areas shifting or expanding?

If you answered "yes" to this risk assessment question, include the following in your management plan:

- ☑ Ensure that workers know that natural vegetation and natural ecosystems must be maintained through awareness-raising and regular monitoring
- ☑ Clearly mark the boundaries of on-farm natural ecosystems and their buffer zones and ensure that production and processing activities, including agrochemical use, do not encroach into these areas

Risk Assessment Question 8: Harvesting of Forest Products

The Standard does not allow natural ecosystems to be used for agricultural production, however non-commercial harvesting by farmers and their families and community members may take place. Harvested products could include timber and non-timber forestry products such as nuts, berries, and medicinal plants. If any of these activities are taking place, the farmer or farm manager should develop a plan for sustainable harvesting to ensure that the quality of forests and other ecosystems is not threatened or degraded. As part of this process, the farmer or farm group manager should assess and monitor the extent and regularity of harvesting practices.

Question 8: Is there any harvesting of forestry products, including wood and non-timber forestry products, from natural ecosystems on the farm or group of farms?

If you answered "yes" to this risk assessment question include the following in your management plan:

- ☑ Describe the harvesting activities and include a plan for sustainable continuation of these practices; Identify any potential threats to the quality or spatial extent of natural ecosystems resulting from harvesting practices
- ☑ Conduct capacity building for workers and community members on sustainable harvesting and of timber and non-timber forestry products
- ☑ Establish a simple but effective monitoring system for harvesting in order to make sure that harvesting is sustainably conducted

3. COLLECTING INDICATOR DATA

3.1 NATURAL VEGETATION

Natural vegetation refers to vegetation made up predominantly of native plant species that resembles, in terms of structure and species composition, the vegetation that would occur in the absence of human interference. Natural vegetation has evolved over time together with native wildlife to form a community that is well-suited to local soil conditions, air temperatures, moisture regimes, and other climatic elements. Because natural vegetation is adapted to the local environment, these plants generally require less care and fewer inputs than introduced vegetation. Natural vegetation also provides vital habitat for wildlife including insects which in turn can have important functions in pollination and pest control.

➢ **Mandatory L2 Improvement**

Requirement 6.2.4 There is natural vegetation cover

- On at least 10% of the total area for farms growing non-shade tolerant crops
- On at least 15% of the total area for farms growing shade-tolerant crops

➢ **Core Requirement**

Requirement 6.2.2 Farms maintain all remnant forest trees, except when these pose hazards to people or infrastructure. Other native trees on the farm and their harvesting are sustainably managed in a way that the same quantity and quality of trees is maintained on the farm.

➢ **Mandatory Smart Meter**

Requirement 6.2.3 Producers maintain and management monitors natural vegetation cover and reports annually on the indicator from year one onwards.

If there is less than 10% of the total area under natural vegetation cover or less than 15% for farms growing shade-tolerant crops, management sets targets and takes actions for farms to reach these thresholds as required in 6.2.4.

Natural vegetation is vegetation made up predominantly of native or locally adapted species, resembling in species composition and structure the vegetation that occurs or would occur in the absence of human interference. Natural vegetation can include one or more of the following (not exclusive):

- Riparian buffers
- Conservation areas within the farm
- Natural vegetation in agroforestry systems
- Border plantings, live fences and barriers around housing and infrastructure, or in other ways
- Conservation and restoration areas outside the certified farm that effectively provide for long-term protection of the subject areas (for at least 25 years) and yield additional conservation value and protection status relative to the status quo

Indicator: % of total farm area under natural vegetation cover

Protecting and enhancing natural vegetation boosts soil quality, conserves biodiversity, protects water sources, mitigates climate change through carbon sequestration, and maintains ecological processes. As a result, the Standard requires all Certificate Holders to establish and maintain and sustainably manage natural vegetation on the farm or group of farms (requirement 6.2.2) Requirements 6.2.3 and 6.2.4 require Certificate Holders to maintain

a minimum amount of natural vegetation coverage (10% or 15%, depending on whether shade-tolerant crops are present) on or across farms by year 6. This means that Certificate Holders must: i) measure and monitor the amount of natural vegetation on their farm or group of farms, and ii) if existing natural vegetation cover does not meet the 10% or 15% threshold, set intermediate targets and implement actions to reach the threshold by year 6.

In addition to meeting the minimum natural vegetation cover requirements, Certificate Holders are encouraged to work towards optimal shade coverage for shade-tolerant crops (self-selected smart meter 6.2.5) and increase the amount of natural vegetation on their farm or group of farms above and beyond the requirements (self-selected smart meter 6.2.6).

➢ **Self-selected Smart Meter**

Requirement 6.2.5 Farms with shade-tolerant crops work towards agroforestry systems with optimal shade coverage and species diversity according to the Shade coverage and species diversity reference parameters

Indicators:

- % shade cover averaged over the portion of the farm or group of farms growing shade-tolerant crops

➢ **Self-selected Smart Meter**

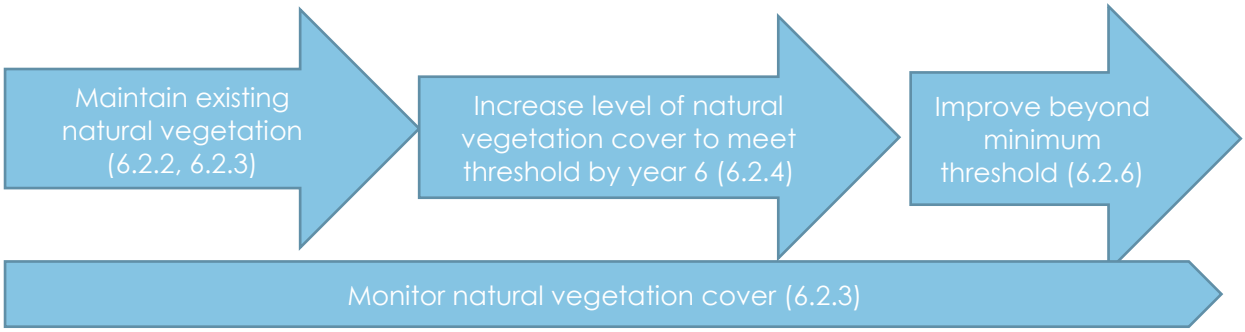
Requirement 6.2.6 Farms increase the areas under natural vegetation beyond the amounts required by criterion 6.2.3

Indicator:

- % of total farm area under natural vegetation cover

The requirements provide a step by step approach to maintaining, increasing, and improving the amount and quality of natural vegetation on the farm to maximise the benefits for the farm and the surrounding ecosystem.

Requirement 6.2.3 also requires Certificate Holders to monitor naturtal vegetation cover to measure progress and so appropriate actions can be taken to achieve the required improvements.



Measuring Natural Vegetation Cover

Natural vegetation cover includes natural ecosystems, riparian buffers, planted natural vegetation, and trees within agroforestry systems. Therefore, natural vegetation can occur in land that has been set aside for conservation or can be incorporated into the production area as agroforestry shade cover. Farmers can also reach the natural vegetation threshold through a combination of set-aside conservation area and agroforestry. In the case of a group of farms, natural vegetation cover is calculated by averaging across group members.

This section describes how to measure natural vegetation in set-aside conservation land and in production areas (such as agroforestry shade cover).

Example 1: A 21-hectare farm has 1 ha of conservation area (forest land), one 10-ha plot of coffee with 10% shade, and one 10-ha plot of coffee in full sun. In total, this farm has 2 ha of natural vegetation out of 21 ha of land which equals 9.5% natural vegetation cover

This farm does NOT meet the natural vegetation cover requirement

Because this farm is growing coffee (a shade-tolerant crop), natural vegetation cover must reach 15% by year 6. The farm is encouraged to work towards agroforestry shade cover of 40%, the optimal level for coffee.

Example 2: A group of cocoa producers has 30 members with varying levels of agroforestry shade on their farms. Ten producers have 30% shade cover, ten have 0% shade cover, and ten have 15% shade cover. On average, agroforestry shade cover in this group is 15%.

This farm meets the natural vegetation cover requirement

Even though not every farm in the group has a minimum of 15% shade cover, on average the group members reach the 15% shade threshold. Group members are encouraged to work towards agroforestry shade cover of 40%, the optimal level for cocoa.

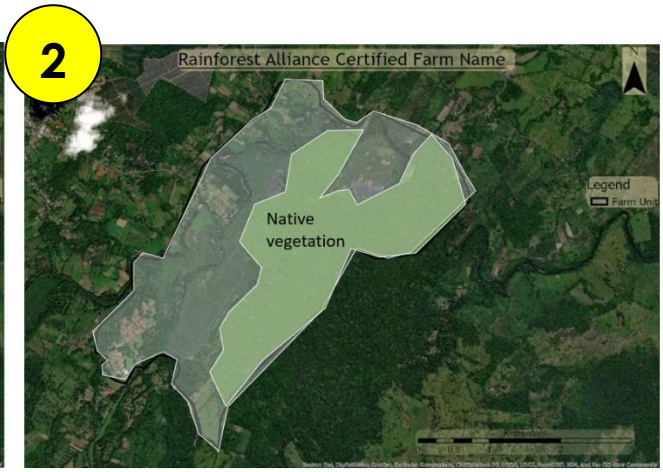
Natural vegetation in set-aside conservation areas

There are two main methods for calculating natural vegetation in set-aside conservation areas that can be used to measure compliance with criteria 6.2.3 and 6.2.4.

1. Dot grids

Dot grids can be used to estimate natural vegetation cover from sketch maps or satellite maps (see example below).

Map showing the outline of a Rainforest Alliance Certified farm.

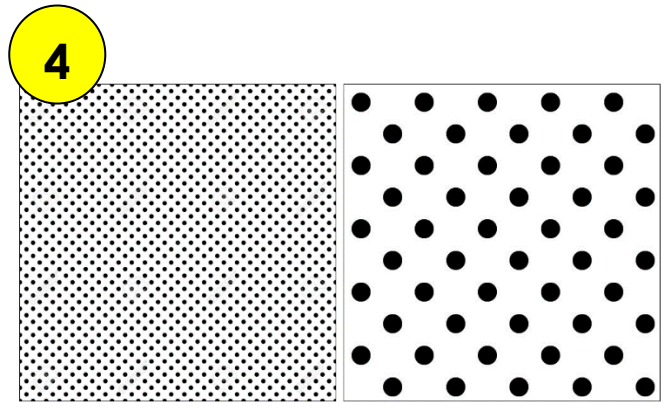


In this map, the area that contains natural vegetation is highlighted. Our goal is to determine what percentage of the total farm area is covered with natural vegetation.

The total amount of natural vegetation cover as a percentage of total farm area can be estimated by overlaying a dot grid.

To calculate the natural vegetation cover, divide the number of dots in the natural vegetation area by the number of dots across the whole farm:

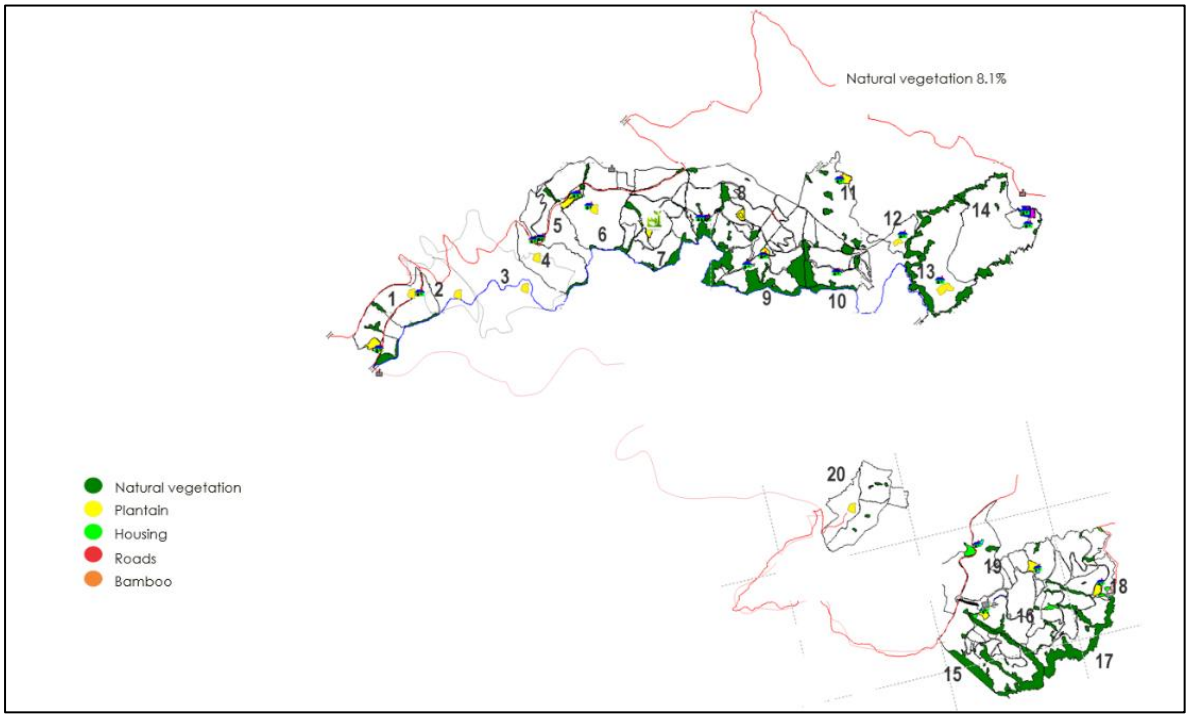
$$\%\ \text{natural vegetation cover} = \left(\frac{\#\ \text{dots in natural vegetation area}}{\text{total}\ \#\ \text{dots in farm area}}\right) \times 100\%$$



Using a grid with a higher number of smaller dots (left) will provide a more accurate estimate of the total native vegetation cover.

2. Google Earth, My Maps or Geographic Information System (GIS) programs

For large farms, Certificate Holders should create spatial polygons of the total farm area and the area covered with natural vegetation using remote sensing technology such as Google Earth, My Maps, or other GIS programs. GIS programs can be used to calculate the area covered by natural vegetation by measuring the size of the polygons. For more information on creating maps, see **Guidance F: GPS & Polygons**.



Example of a polygon for a large coffee farm indicating areas covered by natural vegetation

Natural vegetation in agroforestry systems

In addition to set-aside conservation areas, natural vegetation can also occur in agroforestry systems as shade cover. Note that agroforestry cover can only count towards the natural vegetation requirement if it resembles – in species diversity and composition – that of vegetation occurring in the region in the absence of human interference. This means that shade trees only count if they consist mainly of native species and if the diversity of species resembles a natural system (Table 1). An agroforestry system with only one of two shade tree species does not count as natural vegetation; however, this system can be modified to reach the natural vegetation requirement by planting more native species and increasing species diversity.

Shade Tolerant Crop	Regions	Min. Canopy Cover (%)	Min. No. of shade trees species
Coffee	Africa, Asia, Latin America, and the Caribbean	40%	12
Cocoa	West Africa, East Africa, South East Asia, Latin America, and the Caribbean	40%	5
Clove, Vanilla	East Africa	40%	12
Pepper	South Asia	20%	12

***Table 1**. Shade cover thresholds according to the Rainforest Alliance parameters for canopy cover and species diversity.*

Because shade cover is difficult to estimate, we recommend using the following categorization system to assess shade cover:

1. **0-10% shade**: sparse shade, not enough to comply with the mandatory L2 requirement 6.2.3; needs improvements to increase shade cover
2. **10-25% shade**: low-intermediate shade level; complies with requirement 6.2.3; for compliance with self-selected improvement 6.2.5, need to increase shade (for example, for coffee and cocoa, the minimum shade threshold is 40%)
3. **25-35% shade**: intermediate-high shade level; near compliance with self-selected improvement 6.2.5
4. **35-45% shade**: high shade level; compliant with self-selected improvement 6.2.5
5. **>45% shade**: excessive shade level; suggest to selectively thin by harvesting commercial trees

Detailed below are recommend methodologies that can help you determine which shade category your farm or group of farms falls into.

For more information on estimating shade cover in agroforestry systems, see the following documents (In Spanish):

- FNC: Evaluación de herramientas para valorar el porcentaje de sombra en sistemas agroforestales con café (https://www.cenicafe.org/es/publications/AVT0472.pdf)

1. Measuring agroforestry shade cover using photographs

Using photographs to assess shade cover is moderately accurate and requires some experience to implement. This method is recommended for crops where the shade canopy can easily be observed (e.g., relatively open coffee or cocoa plantations).

- Using a smartphone app such as HabitApp[3], CanopyCapture[4], or Canopeo[5], measure the canopy cover in your agroforestry system. These apps work by taking photos of representative portions of the canopy and automatically calculating canopy cover. They need to be calibrated prior to measuring the canopy cover but provide a simple and accurate method of measuring this indicator (Figure 5, left).
- If smartphone apps are not available, simply take photos of the canopy cover and compare them to a shade cover reference estimator (Figure 5, right).

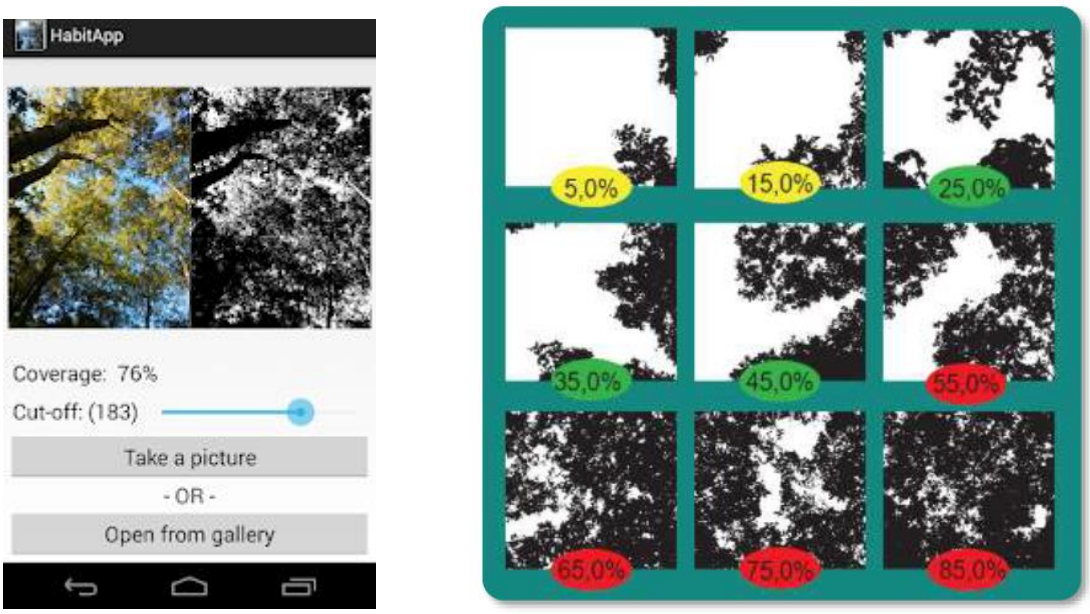


***Figure 5**. (left) Example of a photo taken through HabitApp showing 76% shade cover; (right) example of a shade cover reference grid which can be used to estimate shade cover based on field photographs and observations.*

2. Measuring agroforestry shade cover using data on tree species and abundance

Using tree species and abundance data can be an accurate method of estimating agroforestry shade cover. If reliable data is available, shade cover can be estimated by counting the number of tree species and recording their species and age/size (diameter at breast height).

There are three main approaches to measuring agroforestry shade cover using data on specific tree species density and abundance:

- If supporting smartphone apps are available (e.g., CanOvaLator app in Ghana), use these to calculate percent shade cover based on data input by the user.
- In the absence of supporting apps, use reference tables that show the relationship between tree density and percent shade cover for specific tree species, if available.
- You can also use a simple calculation based on the crop and shade tree density to estimate agroforestry shade cover – estimate the number of shade trees per hectare and divide by the number of crop trees per hectare. For example, if your farm has

[3] https://play.google.com/store/apps/details?id=com.scrufster.habitapp&hl=en
[4] https://nikp29.github.io/CanopyCapture/
[5] http://canopeoapp.com/#/login

800 cocoa trees per hectare, then around 120 shade trees would represent 15% natural vegetation cover (800 x 0.15).

3. Measuring agroforestry shade cover using dot grids

Using satellite images and a dot grid, estimate shade cover within agroforestry plots. See the example above in the section on Natural vegetation in set-aside conservation areas 1. Dot grids

4. Measuring agroforestry shade cover using tree basal area

Basal area is a measure of the cross-section of tree stems. Using basal area can be a simple and reliable method of estimating shade cover if reliable reference tables are available. Basal area is estimated with the help of an angle gauge (Figure 6). To calculate total basal area, add up all shade trees in each size category.

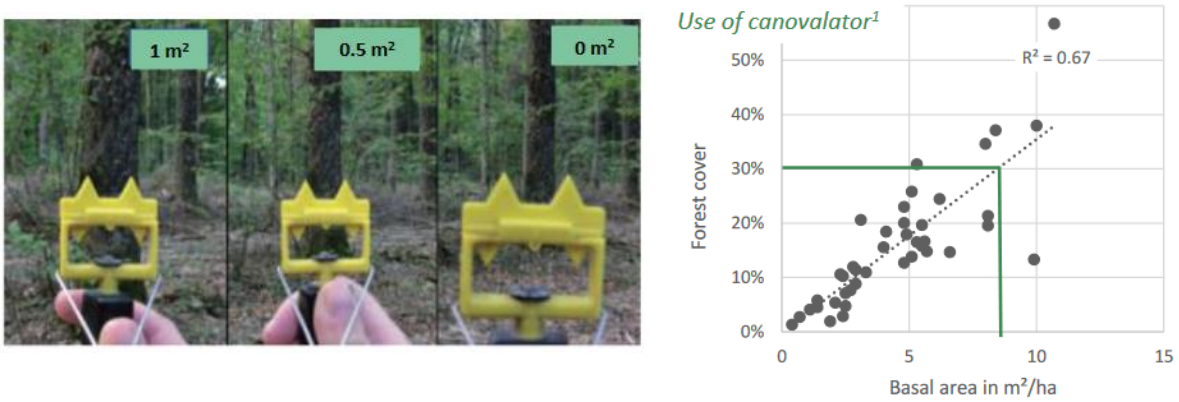


***Figure 6**. (Left) Example of an angle gauge and (right) a reference table showing the relationship between basal area and canopy cover in Côte d'Ivoire (source: https://www.nitidae.org/en). Here the reference table was developed with the help of the canovalator app.*

5. Measuring agroforestry shade cover using a densiometer or spectrometer

If available, densiometers or spectrometers are tools that can help users obtain accurate assessments of shade cover, especially in contexts where the canopy is open and easily visible (e.g., coffee agroforestry systems). Densiometers/spectrometers are pocket-sized instruments that use a convex mirror with a grid of 24 squares. Canopy cover is calculated by recording the number of squares on the mirror filled with vegetation.

For more information on estimating shade cover in agroforestry systems, see the following documents (In Spanish):

- FNC: Evaluación de herramientas para valorar el porcentaje de sombra en sistemas agroforestales con café (https://www.cenicafe.org/es/publications/AVT0472.pdf)

Timing of natural vegetation data collection

Natural vegetation cover is measured annually during internal inspections. However, shade cover often varies throughout the year. Therefore, the Rainforest Alliance Standard requirements are based on shade cover estimates collected during the time of year when tree foliage is most dense (e.g., during the rainy season) and never immediately after pruning has occurred.

Because shade cover varies spatially throughout a farm, data collection must be repeated at different locations across the farm. The number of samples also depends on the methodology used: If the estimation is based on the number of trees or information on the specific shade tree distribution, sampling should cover the entire farm.

Increasing and restoring natural vegetation cover

In order to protect natural vegetation, Standard requirements 6.2.3 and 6.3.3 require farm and group managers to develop a plan with a fixed schedule for implementing improvements in the following cases:

- The farm or group of member farms do not comply with the required natural vegetation threshold across the farm (10% or 15% for shade-tolerant crops)
- Riparian buffer zones (areas adjacent to aquatic ecosystems) are not maintained according to the Rainforest Alliance buffer width parameters.

In these cases, farm and group managers must include a well-defined schedule for improvements in their farm management plan. For the natural vegetation threshold, the improvement plan must be established in year 0 and completed in year 6 (requirement 6.2.4, Mandatory L2 Improvement), and for riparian buffers, the improvement must be completed by year 3 (requirement 6.3.3, Mandatory L1 Improvement).

If your farm or group of farms does not meet the minimum criteria for natural vegetation or riparian buffer widths, your management plan should include a schedule for implementing the following improvements:

- ☑ Restoration and enhancement of riparian buffer zones (adjacent to aquatic ecosystems) with natural vegetation
- ☑ Restoration of marginally productive cultivated areas to natural ecosystems
- ☑ Incorporation of non-crop natural vegetation as border plantings and barriers around housing and infrastructure, live fences, and agroforestry shade trees
- ☑ Connecting areas of natural ecosystems with natural vegetation corridors

Identifying opportunities for restoration and agroforestry

Prior to developing a plan to increase natural vegetation cover, identify potential opportunities for restoration and agroforestry based on the local landscape and context:

- Gather maps of the certification scope and landscape
- Involve landscape stakeholders including the farmer, local forestry service or environmental agency, local community members, and indigenous people, etc.
- Consider the costs and benefits for each type of restoration – assess the value of the land area, the benefits of restoration (e.g., ecosystem services), the proposed methods, and the type of restoration that is needed (e.g., restoring a natural ecosystems versus developing an agroforestry system)
- Consider what maintenance will be needed to support natural vegetation, such as watering, protection of young trees against wildfire and grazing, etc.
- Consider the benefits of biodiversity. For example, restoring natural vegetation corridors that connect two natural ecosystems helps wildlife move between habitat patches.
- Connect with local research institutes, government agencies, and other support services for more information on restoration practices that may be well-suited for your region

Restoration of marginally productive cultivated areas

Natural vegetation can be established on fallow lands and marginally productive cultivated areas to help Certificate Holders meet the Standard requirements related to natural vegetation cover. The following practices can be used to restore these areas:

- Re-vegetation with native plant species
- Elimination of invasive species and other non-native species
- Land management to facilitate natural ecological succession in ecosystems that have suffered previous destruction or degradation

Once natural vegetation has been established in these areas, it should be managed according to requirement 6.2.1 and the findings from the Risk Assessment Tool.

Increasing agroforestry shade cover

Plans to increase shade cover should take the following into account:

- **Opportunities for incorporating new shade trees** – new trees should be introduced during periods of plot rejuvenation, replanting, or when new areas are being planted.
- **Agroforestry design** – the design should be aligned with local conditions; for example, in humid climates, dense agroforestry systems may facilitate the spread of fungal disease. In these contexts, shade trees could be planted in clusters around the plot so that air is able to circulate throughout the crop; if mechanized harvesting or pruning is used, shade trees could be planted in rows to facilitate the movement of machinery.
- **Tree species** – different species have different functions; frequently, trees are distinguished by whether they provide services, fruit, or timber: service trees provide an ecosystem service such as nitrogen fixation, water retention, or organic matter generation; fruit trees provide fruit or nuts; and timber trees are used to harvest timber forest products. Fruit trees often compete with crops for nutrients and water, so service and timber species might be preferable in some contexts.
- **Benefits for farmers** – shade trees can generate different benefits for farmers such as nutrient cycling, fodder for animals, and additional produce and livelihood opportunities including fruits, nuts, and timber
- **Shade tree management** – agroforestry systems need management at every stage; for example, young trees may require protection and irrigation, and mature trees should be pruned so that they do not overgrow crops – this type of management is in compliance with the Rainforest Alliance Standard even though it may temporarily reduce canopy cover.

Developing targets and actions for your management plan

See also **Guidance B: Template of Management Plan**

The example below illustrates the types of targets that farm and group managers can set to increase natural vegetation on their farm or group of farms:

Activity	Timeline	Resources	Responsible Personnel
Plant 300 seedlings of native shade trees in a coffee plot			Technical assistant
Restore riparian areas between two natural ecosystems through supporting natural growth of trees through pruning etc.	2 years		
Take out crop trees from marginal area meant to be restored to natural ecosystem			

3.2 RIPARIAN BUFFERS

Riparian buffers are wide strips of natural vegetation between the edge of a waterbody and the areas used for production or processing. These natural areas should be allowed to grow undisturbed in order to serve as a buffer between the active areas of the farm and the water body or water source. The area of riparian buffers also counts towards the natural vegetation requirements of the Standard (see above).

Riparian buffers serve important biological, chemical, physical, and ecological functions. For example, riparian buffers filter out pollutants including pesticides, nitrogen, phosphorus, and other chemicals used in agricultural production. Riparian buffers also trap sediment from erosion and in runoff from disturbed fields, reducing sedimentation into streams and rivers. As a result, riparian buffers are especially important near agricultural areas.

In addition to their role in trapping pollutants and sediment, riparian buffers also provide important habitat and food sources for invertebrates, fish, and other wildlife, and moderate water temperature through shading. Finally, riparian buffers control erosion along the banks of streams, rivers, and lakes by stabilizing the soil. They can serve as natural biotope corridors connecting habitats and facilitating the movement of animals.

➢ **Core Requirement**

Requirement 6.3.2 Producers maintain the following additional safeguards for the protection of drinking water in case the farm is located closer than 50 m to a source of drinking water.

Around the source:

- Maintain or establish a riparian buffer > 10 m
- Maintain a pesticides non-application zone > 20 m
- Maintain an additional zone > 40 m, in which pesticides are only applied through mechanical, hand-assisted or targeted application

If farms are located closer than 50 m to a source of drinking water, Certificate Holders must ensure that additional safeguards are in place to protect the quality of drinking water (Requirement 6.3.2).

➢ **Mandatory Improvement**

Requirement 6.3.3 Aquatic ecosystems are surrounded by riparian buffers with the following riparian buffer width parameters:

- 5 meters horizontal width along both sides of water courses between 1 - 5 m wide. For farms < 2 ha, the width of the buffer may be reduced to 2 meters at both sides
- 8 horizontal width along both sides of water courses between 5-10 m wide, and around springs, wetlands, and other water bodies

The width of riparian buffers must be appropriate to the size of the waterway or water body as indicated in Requirement 6.3.3. In general, wider riparian buffers result in greater biological and ecological benefits;

the guidelines below should be considered minimum widths (Figure 7).

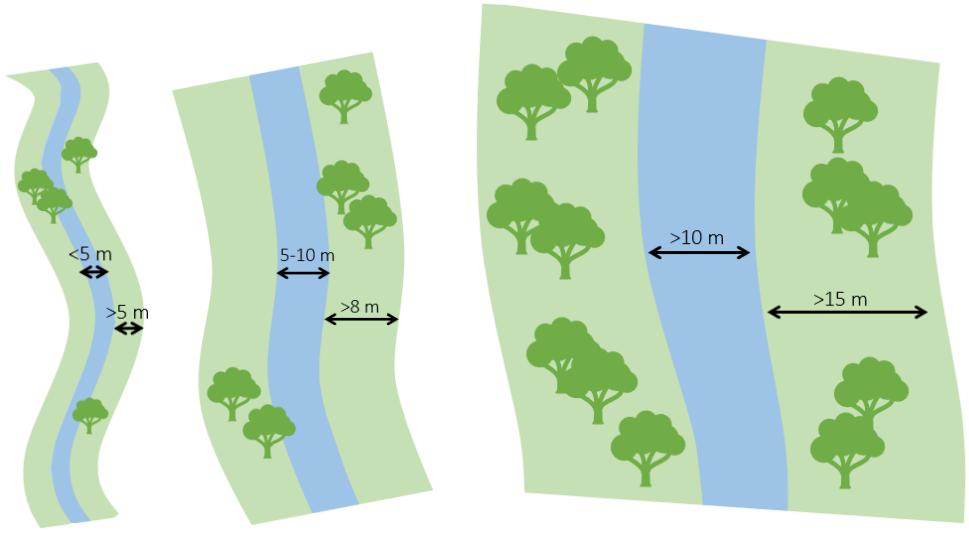


***Figure 7**. Minimum widths for riparian buffers related to the size of the relevant waterway.*

If your farm or group of farms does not meet the minimum width criteria for riparian buffers, your management plan should include a schedule for implementing the following improvements:

- ☑ Restoration and enhancement of natural vegetation within riparian buffers
- ☑ Planting of areas near aquatic ecosystems with natural vegetation to increase the width of the vegetated buffer zone between production/processing areas and aquatic ecosystems

TEMPLATE: CONSERVATION ATTRIBUTE SHEET

Type of conservation priority area:
Name and location:
Main conservation attributes: 1_____ 2_____ 3_____
Source(s) of conservation attribute information (web links, agencies, organizations, experts, literature): 1 _____ 2_____ 3_____
Potential farm/farming threats to these conservation attributes: 1_____ 2_____ 3_____
Measures to be taken by farmer to avoid, minimize, or mitigate threats to each conservation attribute: 1_____ 2_____ 3_____