Forestry* Criteria

The Forestry Criteria for the Climate Bonds Standard & Certification Scheme

November 2018

Climate Bond Certified

* These Criteria also cover the conservation and restoration of non-forested land

Definitions

Climate Bonds Initiative (CBI): An investor-focused not-for-profit organisation, promoting large-scale investments that will deliver a global low carbon and climate resilient economy. The Initiative seeks to develop mechanisms to better align the interests of investors, industry and government so as to catalyse investments at a speed and scale sufficient to avoid dangerous climate change.

Climate Bond: A climate bond is a bond used to finance – or re-finance - projects needed to address climate change. They range from wind farms and hydropower plants, to rail transport and building sea walls in cities threatened by rising sea levels. Only a small portion of these bonds have been labelled as green or climate bonds by their issuers.

Certified Climate Bond: A Climate Bond that is certified by the Climate Bonds Standard Board as meeting the requirements of the Climate Bonds Standard, as attested through independent verification.

Climate Bonds Standard (CBS): A screening tool for investors and governments that allows them to identify green bonds where they can be confident that the funds are being used to deliver climate change solutions. This may be through climate mitigation impact and/ or climate adaptation or resilience. The CBS is made up of two parts: the parent standard (Climate Bonds Standard v2.1) and a suite of sector specific eligibility Criteria. The parent standard covers the certification process and pre- and post-issuance requirements for all certified bonds, regardless of the nature of the capital projects. The Sector Criteria detail specific requirements for assets identified as falling under that specific sector. The latest version of the CBS is published on the Climate Bonds Initiative website

Climate Bonds Standard Board (CBSB): A board of independent members that collectively represents $34 trillion of assets under management. The CBSB is responsible for approving i) Revisions to the Climate Bonds Standard, including the adoption of additional sector Criteria, ii) Approved verifiers, and iii) Applications for Certification of a bond under the Climate Bonds Standard. The CBSB is constituted, appointed and supported in line with the governance arrangements and processes as published on the Climate Bonds Initiative website.

Climate Bond Certification: allows the issuer to use the Climate Bond Certification Mark in relation to that bond. Climate Bond Certification is provided once the independent Climate Bonds Standard Board is satisfied the bond conforms with the Climate Bonds Standard.

Green Bond: A Green Bond is where proceeds are allocated to environmental projects. The term generally refers to bonds that have been marketed as "Green". In theory, Green Bonds proceeds could be used for a wide variety of environmental projects, but in practice they have mostly been the same as Climate Bonds, with proceeds going to climate change projects.

Forestry assets and projects: Assets and projects relating to the acquisition and / or management of forests, and / or the production of associated infrastructure.

Technical Working Group (TWG): A group of key experts from academia, international agencies, industry and NGOs convened by the Climate Bonds Initiative. The TWG develops the Sector Criteria - detailed technical criteria for the eligibility of projects and assets as well as guidance on the tracking of eligibility status during the term of the bond. Their draft recommendations are refined through engagement with finance industry experts in convened Industry Working Groups and through public consultation. Final approval of Sector Criteria is given by the CBSB.

Industry Working Group (IWG): A group of key organisations that are potential issuers, verifiers and investors convened by the Climate Bonds Initiative. The IWG provides feedback on the draft sector Criteria developed by the TWG before they are released for public consultation.

The Climate Bonds Initiative gratefully acknowledges the Technical and Industry Working Group members who supported the development of these Criteria. Members are listed in Appendix 4. Special thanks are given to Christine Negra, Versant Vision, the lead specialist coordinating the development of the Criteria through the Technical Working Group.

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1 Introduction

1.1 Overview

This Criteria Document provides all the requirements that must be met for forestry related assets and projects to be awarded Climate Bonds Certification. The purpose is to provide instruction to issuers and verifiers about the requirements of the Forestry Criteria. The Criteria Document is supported by a Background Document that captures the various dialogues and inputs and substantiates the reasoning behind the requirements set in the Forestry Criteria.

The Criteria are developed through a consultative process with Technical Working Groups (TWGs) and Industry Working Groups (IWGs), and through public consultation. The TWGs comprise academic and research institutions, civil society organizations, multilateral banks and specialist consultancies whereas IWGs are represented by industry experts including potential bond issuers and investors. A period of public consultation offers the opportunity to any member of the public to comment on the Criteria.

Supplementary information available in addition to this document include:

1. Forestry Criteria Brochure: a 2-page summary of the Forestry Criteria
2. Forestry Background Document: the rationale behind the Forestry Criteria
3. Climate Bonds Standard V3: the umbrella document laying out the common requirements that all Certified Climate Bonds need to meet, in addition to the sector-specific Criteria (V3 is the most recent update version)
4. Climate Bonds Standard & Certification Scheme Brochure: an overview of the purpose, context and requirements of the Climate Bonds Standard & Certification Scheme

For more information on the Climate Bonds Initiative and the Climate Bonds Standard & Certification Scheme, see https://www.climatebonds.net/standard. For the documents listed above, see https://www.climatebonds.net/standard/forestry

1.2 The Climate Bonds Standard

Investor demand for Green Bonds and Climate Bonds is strong, and will increase in line with the delivery of quality products into the market. However, investor concerns about the credibility of green labelling are also growing. standards, assurance & certification is essential to improve confidence and transparency, which in turn will enable further strong growth in the market.

The Climate Bonds Standard and Certification Scheme is an easy-to-use screening tool that provides a clear signal to investors and intermediaries on the climate integrity of Certified Climate Bonds.

A key part of the Standard is a suite of sector-specific eligibility Criteria. Each Sector Criteria sets climate change benchmarks for that sector that are used to screen assets and capital projects so that only those that have climate integrity, through their contribution to climate mitigation, and adaptation and resilience to climate change, will be certified. Where a bond encompasses a mixed portfolio of assets across several sectors, each sub-category of assets will be subject to the relevant Sector Criteria for those assets.

The Sector Criteria are determined through a multi-stakeholder engagement process, including a Technical Working Group (TWG) and Industry Working Group (IWG), convened and managed by the Climate Bonds Initiative, and are subject to public consultation. Finally, they are reviewed and approved by the Climate Bonds Standard Board.

The second key part of the Climate Bonds Standard is the overarching Climate Bonds Standard available at https://www.climatebonds.net/standards/standard_download. This gives the common fund management and reporting requirements that all Certified Climate Bonds must meet, in addition to meeting the specific Sector Criteria.

1.3 The need for Forestry Criteria

The UNFCCC has estimated that, globally, an additional USD 14 billion in financial flows will be required to address climate impacts in agriculture, forestry, and fisheries in 2030.[1] In the context of the forestry sector, estimates vary:[2]

- The International Institute for Applied Systems Analysis (IIASA) suggests USD 30–53 billion are required per year to achieve zero net deforestation and degradation by 2020;
- UNEP estimates that USD 17-33 billion per year is required to achieve a 50% reduction in deforestation by 2030;
- WWF estimates that a minimum of USD 42 billion per year is needed by 2020;
- Restoration of peat forests and other burned areas in Indonesia is projected to cost USD 5.5 billion over five years[3]

Several UNFCCC mechanisms have stimulated limited funding for mitigation and adaptation in the land use sectors including through the UNFCCC Clean Development Mechanism (CDM) and Joint Implementation (JI) mechanism, which sought to support the creation of a global voluntary carbon market, and the Adaptation Fund. More than USD 6 billion – primarily from donor governments including Norway, Germany, the UK and the US – has been provided for REDD+[4] activities in developing countries and additional funding is anticipated through the Green Climate Fund, which will support REDD+ readiness and diverse activities on previously forested lands, managed forests, and primary forests.[5] The World Bank's Forest Carbon Partnership Facility (FCPF) has two separate but complementary funding mechanisms – the Readiness Fund and the Carbon Fund. The Readiness Fund supports tropical and sub-tropical developing countries to prepare themselves to participate in a future, large-scale, system of positive incentives for REDD+. The Carbon Fund will remunerate the selected countries in accordance with negotiated contracts for verifiably reducing emissions more than in the reference scenario.

While REDD+ has received significant attention in policy dialogues such as the UNFCCC, the UN Convention on Biological Diversity (CBD), the Convention to Combat Desertification (UNCCD), and the post-2015 Sustainable Development Goals (SDGs), private finance has been modest and demonstration of emission reduction at scale is pending.[6] At a global level, sales of voluntary or government-sanctioned carbon offset credits are unlikely to generate sufficient funding to meet land use sector mitigation and adaptation needs.[7]

Efforts to avoid deforestation through investments in sustainable intensification of agriculture include the recent international commitment, anchored by a USD 100 million contribution from Norway, for a USD 400 million fund intended to catalyse protection of 5 million hectares of forests and peatlands through increased productivity of smallholder farmers.[8]

The objective of the Forestry Criteria is not to specify eligibility criteria for receiving offset credits that can generate revenue through sale of credits in carbon markets. Offset (carbon credit) based revenue streams are only likely to be considered relevant by investors where there is robust market demand for purchase of offset credits (e.g., geographies where there is a clear policy framework such as in the US State of California). To mobilise investment in sustainable forestry from large pools of global capital, bond issuers will need to repay bond debt by generating revenues in more traditional ways such as through sale of forest products or revenue streams related to production.

1.4 Scope of the Forestry Criteria

These Criteria apply to assets and projects relating to:

- Plantation forestry
- Sustainable forest management
- Production of non-timber forest products (NTFP)
- Forest restoration and conservation
- Conservation and restoration of non-forested lands

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[1] https://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/adaptation.pdf
[2] WWF. March 2012. WWF submission on finance to AWG LCA. http://unfccc.int/resource/docs/2012/smsn/ngo/201.pdf
[3] https://forestsnews.cifor.org/44299/tax-amnesty-the-green-economy-and-peat-restoration?fnl=en&utm_source=early+May+2017&utm_campaign=NEWS+UPDATE+English+v2&utm_medium=email
[4] REDD+ refers to reducing emissions from deforestation and forest degradation and conserving, sustainably managing and enhancing forest carbon stocks.
[5] https://forestsnews.cifor.org/50548/green-climate-fund-steps-up-to-reduce-deforestation-and-forest-degradation?fnl=en&utm_source=General+contacts&utm_campaign=d4fff2fd6d-CIFOR_News_Update_31_July_20176_7_2017&utm_medium=email&utm_term=0_282b77c295-d4fff2fd6d-117330269
[6] https://forestsnews.cifor.org/50326/redd-results-based-finance?fnl=en&utm_source=General+contacts&utm_campaign=b3b797da64-CIFOR_News_Update_July_20176_7_2017&utm_medium=email&utm_term=0_282b77c295-b3b797da64-117330269
[7] See http://www.forest-trends.org/documents/files/doc_4841.pdf
[8] https://innovation-forum.co.uk/analysis.php?s=drive-for-deforestation-jurisdictional-approach-continues

- Certain supply chain activities linked to the above

Further details of the scope of the Forestry Criteria is in Chapter 2, Table 1.

1.5 Key elements to the Criteria

As a general principle, bonds will meet the requirements of the Climate Bonds Standard if the associated use of proceeds:

- Promote GHG mitigation through reduced emissions or increased carbon sequestration;
  Demonstrate significant attention to climate risks and a clear plan for achieving a positive effect on operational resilience; and
- Meet minimum disclosure requirements to raise the level of transparency in green bonds[9].

Complete details of the requirements for the Forestry Criteria are in Chapter 3 of this document.

1.6 This document

This document details:

- The current scope of forestry assets and projects eligible for certification under the Climate Bonds Standard – Chapter 2;
- The specific eligibility Criteria under which these assets and projects can be certified – Chapter 3;
- List of Technical Working Group members – Appendix 1
- List of Industry Working Group members – Appendix 2
- Details of the requirement for no conversion of natural landscape since 2010 – Appendix 3
- Details of the Adaptation & Resilience checklist – Appendix 4
- Details of the Management Plan requirements – Appendix 5
- And Description of the Ecoregion Approach – Appendix 6

Supporting information is available at https://www.climatebonds.net/standard, https://www.climatebonds.net/standard/forestry and https://www.climatebonds.net/standard/land_cons_and_rest as follows:

1.7 Revisions to these Criteria

These Criteria will be reviewed two years after launch, or potentially earlier if the need arises, at which point the TWG will take stock of issuances that arise in the early stages and any developments in improved methodologies and data that can increase the climate integrity of future bond issuances. As a result, the Criteria are likely to be refined over time, as more information becomes available. However, certification will not be withdrawn retroactively from bonds certified under earlier versions of the Criteria.

2 Assets and Projects in Scope

2.1 Assets in scope

Table 1 presents use of proceeds that might be included in a Certified Climate Bond, subject to meeting the Criteria described in Chapter 3. The first column in Table 1, 'Eligible activity types', gives an exhaustive list of all the activity types that are within scope of the Forestry Criteria. The second column, 'Example use of proceeds', is an illustrative list of the type of projects that may be included in a Certified Climate Bond. It is not possible to include an exhaustive list of all potential use of proceeds due to the breadth of possibilities, but all use of proceeds must fall within one of the specified eligible activity types.

The assets in Table 1 are eligible for inclusion in a Certified Climate Bond if they meet the relevant:

- Mitigation requirements (see Chapter 3 for details); AND
- Resilience requirements (see Chapter 3 for details)

[9] Disclosure requirements are stipulated in the overarching Climate Bonds Standard rather than the Forestry Criteria

Bonds financing multiple projects may also have to prove compliance with other Sector Criteria to be eligible for Climate Bonds Certification. For example, if a bond includes both forestry projects and solar projects it would be necessary for the issuer to prove compliance with both the Forestry Criteria and the Solar Criteria.

Table 1 provides signposting as follows:

- A green circle indicates these use of proceeds, when fully described and documented, automatically meet the Criteria requirements, with no further disclosure or documentation required
- An orange circle indicates that the eligibility of these use of proceeds is conditional on meeting specific requirements
- A red circle indicates these use of proceeds are not eligible for certification under any circumstances

Table 1: scope of eligible projects and assets for Climate Bonds Certification under the Forestry Criteria

Eligible activity types	Example use of proceeds	Mitigation	Adaptation & resilience
Plantation forestry – planted forest that is intensively managed and meet all the following criteria at planting and stand maturity: one or two species, even age class and regular spacing[10]	Land acquisition for purpose of establishing or expanding forest stands for timber production	●	●
	The purchase of equipment and cost of resources needed for planting and replanting activities (such as seedling production, soil preparation, and seedling planting, nursery maintenance, pest control), ongoing maintenance, clearing, thinning, fertilisation, management, harvesting and extracting.	●	●
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.	●	●
Sustainable forest management – commercial management of natural forests in a sustainable manner for the production of timber. Natural forests are forest areas with many of the principal characteristics and key elements of a native ecosystem, such as complexity, structure and biological diversity, including soil characteristics, flora and fauna, in which all or almost all the trees are native species, not classified as plantations[11]	Land acquisition for purpose of establishing or expanding native forest stands for commercial sustainable forest management	●	●
	The purchase of equipment and cost of resources needed for activities (such as seedling production, soil preparation, and seedling planting, nursery maintenance, pest control), ongoing maintenance and management, clearing, thinning, fertilisation, harvesting and extracting	●	●
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.	●	●
Production of non-timber forest products (NTFP) – the commercial cultivation and/ or extraction of goods derived from forests that are tangible and physical objects of biological origin other than wood.[12] Includes, amongst other things, the commercial cultivation and harvesting of amriso (broom grass), timur, bamboo stems, bamboo shoots, paper mulberry bark, rattan stems, gum, resin, nuts, mushrooms, fruits, herbs, spices, aromatic plants, game, fibres, medicinal, cosmetic or cultural produce. Can be practised in either plantations or sustainably managed forests.	Land acquisition for purpose of establishing or expanding either plantation or natural forest stands	●	●
	The purchase of equipment and cost of resources needed for all operational activities associated with maintaining forests for NTFP and for harvesting and extracting the NTFP	●	●
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.	●	●

[10] FAO, Global Forest Resource Assessment 2020: Terms and Definitions, FRA 2020

[11] 'Natural forest' includes the following categories: (i) Forest affected by harvesting or other disturbances, in which trees are being or have been regenerated by a combination of natural and artificial regeneration with species typical of natural forests in that site, and where many of the above-ground and below-ground characteristics of the natural forest are still present. In boreal and north temperate forests which are naturally composed of only one or few tree species, a combination of natural and artificial regeneration to regenerate forest of the same native species, with most of the principal characteristics and key elements of native ecosystems of that site, is not by itself considered as conversion to plantations. (ii) Natural forests which are maintained by traditional silvicultural practices including natural or assisted natural regeneration. (iii) Well-developed secondary or colonizing forest of native species which has regenerated in non-forest areas. (iv) The definition of 'natural forest' may include areas described as wooded ecosystems, woodland and savanna. *Definition from FSC*

[12] FAO, Global Forest Resource Assessment 2020: Terms and Definitions, FRA 2020

Forest conservation - non-commercial forestry activities designed to maintain the existing forest habitat in both area and quality. Activities will range from minimal interventions to active management and could include protection from deforestation risk, voluntary and mandatory set aside and active conservation efforts	Land acquisition for purpose of protecting and conserving, forested areas for a range of ecosystem services		
	The purchase of equipment and cost of resources needed for the on-going maintenance and management of conservation forestry project		
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.		
Forest restoration and rehabilitation – non-commercial forestry activities designed to increase the area or improve the quality of existing forest habitat or to establish new forest stands. Activities will range from minimal interventions to active restoration including facilitating regeneration and restoration via natural or artificial means,	Land acquisition for purpose of expanding and restoring forested areas for a range of ecosystem services		
	The purchase of equipment and cost of resources needed for the on-going maintenance and management of restoration and rehabilitation forestry projects		
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.		
	Reforestation or afforestation of former mined land		
Conservation of non-forested land – conservation of non-commercially productive land to maintain the existing habitat in both area and quality. Activities could include the establishment of protected land or national parks, voluntary or mandatory set aside	Land acquisition for purpose of conserving existing areas for a range of ecosystem services		
	The purchase of equipment and cost of resources needed for the on-going maintenance and management of conservation projects		
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.		
Restoration or rehabilitation of non-forested land – restoration or rehabilitation of non-commercially productive land to improve the quality or to increase the area of existing habitats or to establish new habitats	Land acquisition for purpose of expanding and restoring existing areas and for establishing new habitats for a range of ecosystem services		
	The purchase of equipment and cost of resources needed for the on-going maintenance and management of restoration and rehabilitation projects		
	The cost of setting-up and maintaining protection measures (e.g. rangers and monitoring equipment). GIS analysis, satellite data collection and data analysis.		
	Restoration or rehabilitation of former mined land		
Supporting and supply chain infrastructure – infrastructure that is associated with the forestry sector and initial processing of timber. It could be processing of timber products into wood products or paper and pulp, storage, manufacture of monitoring and assessing equipment and plant nurseries	Cost of installation, upgrade, maintenance or running costs of manufacturing and processing facilities and associated equipment for solid wood production, veneer and plywood production and reconstituted panels		
	Cost of acquiring, upgrade, maintenance or running costs for vehicles used on the forestry concession		
	Cost of establishing, upgrading or maintain forest roads on the forestry concession		
	Installation, upgrade or maintenance of warehouses and storage infrastructure and associated equipment		
	Installation, upgrade or maintenance of warning systems or satellite monitoring for fire, illegal incursion, epidemics, invasion of harmful invasive species, flood and drought conditions.		
	Installation, upgrade or maintenance of information and information management systems such as installation of weather, soil and plant information capture and analysis systems (e.g. weather stations), and technologies to promote precision forestry harvesting		
	Installation, upgrade or maintenance of plant nurseries supplying the forestry sector		
	Cost of acquiring, upgrade, maintenance or running costs for aircraft used on the forestry concession		
	Installation, upgrade or maintenance of fertiliser production infrastructure		

2.2 Assets out of Scope

The red items in Table 1 are excluded either because they are incompatible with a low carbon or climate-resilient economy or because determining their eligibility is outside the mandate of the Forestry Criteria. The justifications for exclusions are presented in section 3.3 of the Background Document.

2.3 Alignment with other Sector Criteria

It is essential that clear guidance on which Sector Criteria assets and projects are eligible for Climate Bonds Certification is given. This saves confusion and means that it is clear, both to the verifier, issuer and investor, which requirements a given asset or project is expected to meet. Table 2 identifies possible overlaps and explains which Sector Criteria should be referred to in which cases. The following sections give further explanation.

Table 2: clarification of which Sector Criteria assets or activities are eligible for Climate Bonds Certification under

Assets or Activity	Applicable Sector Criteria
Land transport	Vehicles used within the forest concession up to the forest gate are applicable for Certification with the Forestry Criteria. Vehicles used beyond the forest concessions and past the forest gate must comply with the Transport Criteria.
Water transport	Vessels used within the forest concession up to the forest gate are applicable for Certification with the Forestry Criteria. Vessels used beyond the forest concessions and past the forest gate will be covered by the Shipping Criteria that are currently in development.
Restoration of forest for the purposes of watershed management, flood and drought protection	Must comply with the Water Criteria
Agroforesy, palm oil and silvopastoralism	Will be covered by the Agriculture Criteria. Excluded from Climate Bonds Certification under the Forestry Criteria because of cross-over with agriculture
Bioenergy facilities or plants	Must comply with the Bioenergy Criteria. Growth of timber derived bioenergy feedstocks (e.g. forest stands destined for bioenergy) must comply with the Forestry Criteria

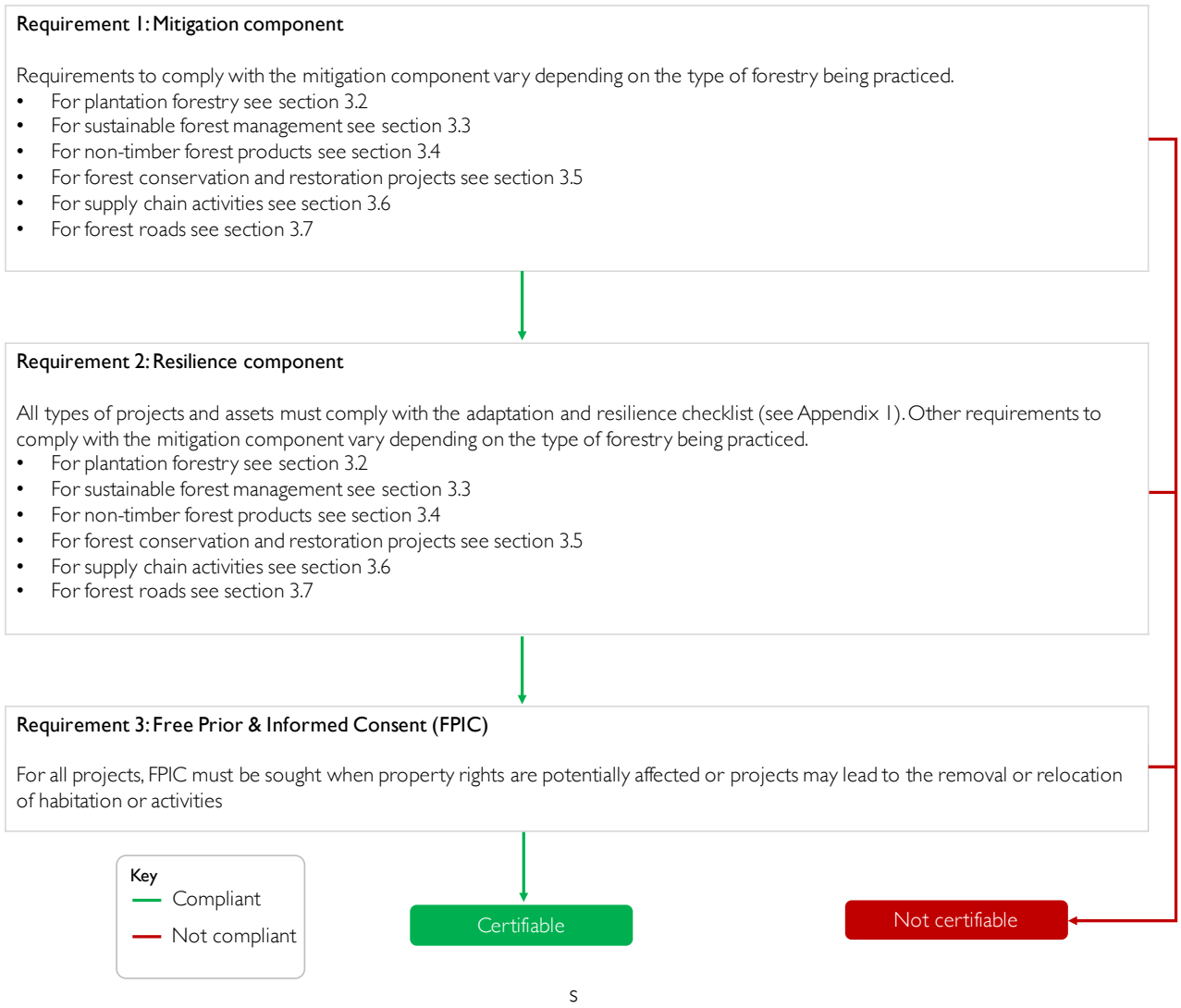
3 Eligibility Criteria

3.1 Overview

The Forestry Criteria has three components:

1. Mitigation component
2. Resilience component
3. FPIC component

The diagram below shows how these components come together to make up the Forestry Criteria.



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All components apply to all types of forestry assets or projects, but there are different requirements depending on the type of forestry asset or projects in question. Table 3 shows how the Criteria apply to the various project types. Sections 3.2-3.7 explain the details of each requirement and the evidence that projects must give to be compliant.

When seeking certification an issuer or verifier should first consult Table 3 and then they should consult the relevant sections between 3.2 and 3.6 to understand the detail of the Criteria that apply to them. Each type of forestry activity has its own section:

- Section 3.2: Plantation Forestry
- Section 3.3: Sustainable Forest Management
- Section 3.4: Non-Timber Forest Products (NTFP)
- Section 3.5: Forest and Non-Forestry Land Conservation & Restoration
- Section 3.6: Supply Chain Activities
- Section 3.7: Forest Roads

Where the bond portfolio includes several separately identifiable forestry projects or groups of assets, these conditions must be met for each separately identified project or asset grouping. Bond issuers should determine and justify these project boundaries.

Table 3: Matrix showing which types of forestry each component of the Forestry Criteria applies to

		Plantation forestry	Sustainable forest management	Non-timber forest products (NTFP)	Forest conservation & restoration	Conservation & restoration of other non-forested land	Supply chain activities
Mitigation component	No natural landscape conversion	✓	✓	≈[13]	N/A	N/A	N/A
	Carbon stocks of forests or other habitats are maintained through good management practices	✓	✓	✓	✓	✓	✓
Resilience component	Impacts that climate change may cause to the resilience of the forest, land or surrounding ecosystem are understood and mitigated	✓	✓	✓	✓	✓	✓
	General health of forests or other habitats is maintained through good management practices	✓	✓	✓	✓	✓	✓
FPIC component	Free, Prior and Informed Consent is practiced and implemented in the project or activity	✓	✓	✓	✓	✓	✓

Key	
✓	Requirement applies
N/A	Requirement does not apply
≈	Requirement applies in some scenarios

Smallholders

It is recognised that smallholders often may not be able to afford to get external best practice certification. For this reason, there are slightly different acceptable ways to prove compliance with some parts of the requirements for smallholders. The differing requirements are given in the relevant section and presented in a box like this one. If a section does not have a box like this one, assume that there is no differentiation between the requirements for non-smallholders and for smallholders.

For the purposes of these Criteria, smallholder is defined as either:

1. *A forest management unit that is under 100 ha*[14]
2. *A forest that is being managed for the production of non-timber forest products (NTFP) only*[15]
3. *Where the rate of timber harvesting is less than 20% of the mean annual increment within the total production forest area of the unit and the harvest from the total production forest area is less than 5,000m3/year*[16]

[13] Whether NTFP will need to meet this requirements will depend on the type of forestry being practiced
[14] FSC Standard, SLIMF Eligibility Criteria (FSC-STD-01-003 (Version 1-0) EN)
[15] Ibid
[16] Ibid

4. *A forest management unit that complies with the FSC SLIMF Eligibility Criteria – Addendum FSC-STD-01-003a EN*

An example of how we might see Certification being applied to smallholders could be a bank or corporate refinancing loans or microfinancing that they have supplied to a variety of smallholder foresters. It is unlikely that smallholders themselves would issue a bond, and hence unlikely that they would come directly to a verifier seeking Certification.

3.2 Requirements for plantation forestry

Requirement 1: Mitigation component

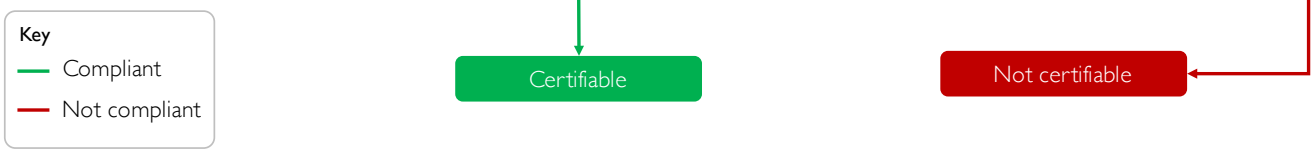
Component	Requirement	Demonstration of compliance	
Mitigation	No natural landscape conversion since 2010	For non-smallholders: • FSC or PEFC certification plus confirmation that no peatlands have been converted since 2010	For smallholders: • FSC or PEFC certification plus confirmation that no peatlands have been converted since 2010 OR • Satellite evidence that all plantations were established before 2010 OR • Evidence that converted land does not fall into the Forestry Criteria's definition of natural landscape
	Carbon stocks of forests or other habitats are maintained through good management practices	For non-smallholders: • FSC or PEFC certified	For smallholders: • Comply with the management plan (see appendix 5)

Requirement 2: Resilience component

Component	Requirement	Demonstration of compliance	
Resilience	Impacts that climate change may cause to the resilience of the forest, land or surrounding ecosystem are understood and mitigated	• Must comply with the adaptation and resilience checklist (see appendix 4)	
	General health of forests or other habitats is maintained through good management practices	For non-smallholders: • FSC or PEFC certified	For smallholders: • Comply with the management plan (see appendix 5

Requirement 3: FPIC

Component	Requirement	Demonstration of compliance
Free, Prior and Informed Consent	FPIC must be sought when property rights are potentially affected or projects may lead to the removal or relocation of habitation or activities	• Comply with a recommend best practice scheme (see section 3.8)



Smallholders

Mitigation component:

- *No natural landscape conversion since 2010 may be demonstrated either by giving evidence that all plantations were established by 2010 or by showing that they did not convert natural landscape to plantations (see Appendix 3 for full details).*
- *The maintenance of habitat carbon stocks and general health may be proved by complying with the management plan requirements as detailed in Appendix 5.*

Resilience component:

- *The requirement that habitats are managed in-line with maintaining resilience may be proved by complying with the management plan requirements as detailed in Appendix 5.*
- *Must also comply with the adaptation and resilience checklist in Appendix 4.*

3.3 Requirements for sustainable forest management

Requirement 1: Mitigation component

Component	Requirement	Demonstration of compliance	
Mitigation	No natural landscape conversion since 2010	For non-smallholders: • FSC or PEFC certification plus confirmation that no peatlands have been converted since 2010	For smallholders: • FSC or PEFC certification plus confirmation that no peatlands have been converted since 2010 OR • Satellite evidence that all forests were established before 2010 OR • Evidence that converted land does not fall into the Forestry Criteria's definition of natural landscape
	Carbon stocks of forests or other habitats are maintained through good management practices	For non-smallholders: • FSC or PEFC certified	For smallholders: • Comply with the management plan (see appendix 5)

Requirement 2: Resilience component

Component	Requirement	Demonstration of compliance	
Resilience	Impacts that climate change may cause to the resilience of the forest, land or surrounding ecosystem are understood and mitigated	• Must comply with the adaptation and resilience checklist (see appendix 4)	
	General health of forests or other habitats is maintained through good management practices	For non-smallholders: • FSC or PEFC certified	For smallholders: • Comply with the management plan (see appendix 5).

Requirement 3: FPIC

Component	Requirement	Demonstration of compliance
Free, Prior and Informed Consent	FPIC must be sought when property rights are potentially affected or projects may lead to the removal or relocation of habitation or activities	• Comply with a recommend best practice scheme (see section 3.8)

Key
— Compliant
— Not compliant

Certifiable

Not certifiable

Smallholders

Mitigation component:

- *The maintenance of habitat carbon stocks and general habitat health may be proved by complying with the management plan requirements as detailed in Appendix 5.*

Resilience component:

- *The requirement that habitats are managed in-line with maintaining resilience may be proved by complying with the management plan requirements as detailed in Appendix 5.*
- *Must also comply with the adaptation and resilience checklist in Appendix 4.*

3.4 Requirements for non-timber forest products (NTFP)

For non-timber forest products (NTFP) to be eligible for certification the forest in which the products are collected must comply with the relevant forest type requirements. For non-timber forest products harvested from:

- Plantations see section 3.2 for the relevant requirements
- Sustainable forest management see section 3.3 for the relevant requirements
- Conservation or restoration projects see section 3.5 for the relevant disclosure requirements

3.5 Requirements for conservation and restoration forestry and non-forested land

[diagram on next page]

Requirement 1: Mitigation component

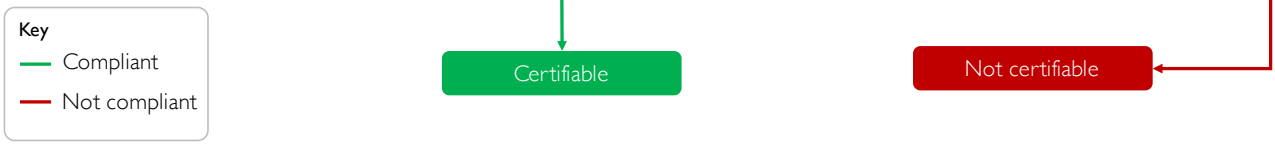
Component	Requirement	Demonstration of compliance
Mitigation	Carbon stocks of forests or other habitats are maintained through good management practices	• FSC or PEFC certified OR • Comply with the management plan (see appendix 5) AND • If conservation, show maintenance of forest or habit area and quality OR • If restoration, show increase to forest or habitat area or improvement to forest or habitat quality

Requirement 2: Resilience component

Component	Requirement	Demonstration of compliance
Resilience	Impacts that climate change may cause to the resilience of the forest, land or surrounding ecosystem are understood and mitigated	• Must comply with the adaptation and resilience checklist (see appendix 4)
	General health of forests or other habitats is maintained through good management practices	• Comply with the Ecoregion Approach (see appendix 6) AND • Comply with the management plan (see appendix 5) OR • FSC or PEFC certified

Requirement 3: FPIC

Component	Requirement	Demonstration of compliance
Free, Prior and Informed Consent	FPIC must be sought when property rights are potentially affected or projects may lead to the removal or relocation of habitation or activities	• Comply with a recommend best practice scheme (see section 3.8)



3.6 Requirements for forestry supply chain

In general supply chain assets are considered to be supporting infrastructure to the forestry industry. In the forestry sector, it is the forests themselves that are most material to delivering emissions savings and climate resilience. For this reason, the requirements of these Criteria focus on making sure the forests themselves are delivering climate mitigation and are climate resilient.

Certification is available to the following suply chain assets:

- Nurseries or seed orchards
- Storage facilities
- Monitoring and assessment equipment
- Soil wood production
- Veneer and plywood production
- Saw mills
- Stud mills
- Reconstituted panels: fibreboard, particleboard, MDF and OSB
- Pulp production
- Paper and board manufacture

Requirement 1: Mitigation component

Component	Requirement	Demonstration of compliance
Mitigation	Carbon stocks of forests or other habitats are maintained through good management practices	• Inputs to the supply chains are all FSC or PEFC certified
	Only for veneer and plywood production, reconstituted panels production, pulp, paper and board manufacture Energy used in the facility is at least 50% from renewable sources	• Proof that at least 50% of energy used is generated from renewable sources

Requirement 2: Resilience component

Component	Requirement	Demonstration of compliance
Resilience	Impacts that climate change may cause to the resilience of the forest, land or surrounding ecosystem are understood and mitigated	• Must comply with the adaptation and resilience checklist (see appenix 4)
	General health of forests or other habitats is maintained through good management practices	• Inputs to the supply chain are all FSC or PEFC certified • Facility must be FSC or PEFC certified

Requirement 3: FPIC

Component	Requirement	Demonstration of compliance
Free, Prior and Informed Consent	FPIC must be sought when property rights are potentially affected or projects may lead to the removal or relocation of habitation or activities	• Comply with a recommend best practice scheme (see section 3.8)

3.7 Requirements for forest roads

1. Road is contained within the forestry concession

AND

2. Forestry concession complies with
    a. 3.2 if it is plantation forestry
    b. 3.3 if it is sustainable forest management
    c. 3.4 if it is harvest of non-timber forest products
    d. 3.5 if it is conservation and restoration
    e. 3.6 if it is supply chain

AND
3. Road does not pass through an Intact Forest Landscape (IFLs)[17]

AND, 3 OR 4
4. Projects and assets are FSC or PEFC certified

OR
5. Road is designed and managed considering:
    a. Soils are protected
    b. Water courses are protected
    c. Disturbance of and damage to rare and threatened species, habitats, ecosystems and landscape values are prevented, mitigated or repaired
    d. Measures are in place to prevent unauthorised vehicle access into the forest stands

3.8 Free, Prior & Informed Consent (FPIC) Requirement

Free, prior & informed consent (FPIC) from indigenous peoples or local communities must be sought out when:

- Property rights are potentially affected, FPIC must be obtained from property rights holders; or
- Project activities may lead to the removal or relocation of habitation or activities important to their culture and livelihood

FPIC must be carried out in accordance with one of the following:

- ILO 169
- FSC
- Climate, community and biodiversity standard
- PEFC
- UN Declaration of the Rights of Indigenous Peoples
- FAO's FPIC Manual for Practitioners
- High Carbon Stock Approach / HCV-HCSA

It is the issuers responsibility to provide information about which FPIC guidance has been followed and evidence that the guidelines have been adhered to.

3.9 Best Practice for Disclosure

While not compulsory, the issuer is encouraged to disclose information on the following:

- GHG emission footprint – including quantification, methodology used and performance over the lifetime of the bond
- Species planted and used – species names of all trees to be planted including whether the species are native to the location or not
- Genetically Modified (GM) plants – whether GM trees are to be planted and harvested and, if so, details regarding these trees
- Percentage of unconverted or conserved land – whether a mixed forestry project comprised of plantation and conservation forestry or solely conservation forestry, an issuer can disclose the percentage of each within a project
- Supply chain assets – issuers are also encouraged to disclose any operational safeguards that may be in place
- Impact assessments, external audits and ESG safeguards – relevant assessments and audits carried out separately to those required in the Criteria are welcomed
- Broader benefits of the project for the surrounding ecosystems and unconverted and conserved land
- Medium to long-term investment plans

[17] An Intact Forest Landscape is a seamless mosaic of forest and naturally treeless ecosystems within the zone of current forest extent, which exhibit no remotely detected signs of human activity or habitat fragmentation and is large enough to maintain all native biological diversity, including viable populations of wide-ranging species. See more here: http://www.intactforests.org/

- Past or pending litigation concerning land rights, livelihood or health issues related to stakeholders, and any remedial action

NB: this is not a requirement for proving compliance with the Forestry Criteria. This information is considered best practice by the market and in the sector. Therefore, issuers may wish to disclose to investors ad more broadly.

3.10 Leveraging Existing Certification Schemes

Existing certification schemes, FSC and PEFC, are leveraged in the Forestry Criteria. They were evaluated against the requirements of the Forestry Criteria. These evaluation processes are explained in full detail in section 4.6 (Leveraging Existing Certification Schemes) of the Forestry Criteria Background Document.

4 Reporting

In accordance with the Climate Bonds Standard, it is the issuers responsibility to provide to the verifier the information necessary to demonstrate compliance with each component of these Criteria as described below. Verifiers must include this information in the scope of verification.

In accordance with the overarching reporting requirements as laid out in the Climate Bonds Standard V3.0, issuers are required to provide this information as follows:

[Note to reader – v3.0 is currently in development – these requirements may be updated]

- Pre-issuance reporting (supported by independent verifiers report): Full disclosure information relating to all nominated assets and projects at time of issuance.
- Post-issuance reporting (supported by independent verifiers report): Any amendments relating to all nominated assets and projects, including any additions or changes to allocated use of proceeds.
- Annual reporting thereafter: Any amendments to the previously provided information should be reported by the issuer by exception as changes arise. If there has been a reallocation of proceeds after post-issuance reporting, the issuer is required to re-engage the verifier to assess whether the newly identified assets and projects meet these Criteria.

All requirements for certification must be maintained in compliance for the duration of the bond.

Appendix 1: Technical Working Group members

Members of the Forestry Technical Working Group

- Christine Negra, Versant Vision LLC, Lead Specialist
- Torsten Boettcher, Agrobanco
- Sergio Collaco de Carvalho, University of Oxford, Geography Department
- Paul Chatterton, WWF International
- Stuart Clenaghan, EcoSystem Service Ltd
- Rupert Edwards, Forest Trends
- David Ganz, RECOFTC
- Michele Laird, Abt Associates
- Petri Lehtonen, Indufor

Members of the Land Use Technical Working Group

- Christine Negra, Versant Vision LLC, Lead Specialist
- Tanja Havemann, Clarmondial AG, Lead Specialist
- Keith Alverson, UNEP
- Geoff Blate, USDA Forest Service
- Rupert Edwards, Forest Trends
- Martial Bernoux, French Research Institute for Development (IRD)
- Adam Chambers, USDA NRCS-National Air Quality and Atmospheric Change Team
- Paul Chatterton, WWF International
- Jane Feehan, European Investment Bank
- David Ganz, RECOFTC
- Mark Holderness, Global Forum on Agricultural Research
- David Howlett, Global Resilience Partnership
- Frank Hicks, Independent advisor
- Henry Neufeldt, (formerly) World Agroforestry Center (ICRAF)
- Mark New, African Climate and Development Initiative, University of Cape Town
- Simon Petley, EnviroMarket Ltd.
- Roseline Remans, Bioversity International, CGIAR
- Lamon Rutten, Independent Consultant
- Brett Shields, Spatial Informatics Group (SIG) and Asia LEDS Global Partnership
- Naomi Swickard and Jerry Seager, Verified Carbon Standard (VCS)
- Annette Thiele, University Greifswald, Partner in the Greifswald Mire Centre
- Raylene Watson, Independent Consultant

Appendix 2: Industry Working Group members

Members of the Forestry Industry Working Group

- Michael Anderson, ERM
- Sophie Beckham, International Paper
- Jean-Dominique Bescond, World Bank
- Brian Kernohan, Hancock Natural Resources Group
- Sami Lundfren & Tim Lehesvrta, UPM
- Lars Mac Key, DanskeBank
- Jacob Michelsen, Nordea
- Beth Nelson & Pip Best, EY
- Mark Robinson, DNV.GL

Members of the Land Use Industry Working Group

- John Tobin & Fabian Huwyler, Credit Suisse
- Hans Biemans & Justin Sherrard, Rabobank
- Marc Sadler, World Bank
- Brian Kernohan, Hancock Natural Resources Group
- Ali bin Mohamed, Hassad Foods
- Howard-Yana Shapiro, Mars / UC Davis
- Oli Haltia, Dasos Capital
- Tim McGavin, Laguna Bay
- Karla Canavan
- Esben Brandi, Quantum Global
- Marcos Mancini, Banorte
- Cristiano Oliveria, Fibria

- Mads Asprem, Green Resources
- Chris Brown, Olam
- Andrew Voysey, Cambridge Institute for Sustainable Leadership
- Jason Green, ECOM Trading
- Lara Yacob, The Nature Conservancy
- John Simpson, Duxton Asset Management
- Katalin Solymosi, IADB
- Timm Tennigkeit, UNIQUE
- Michael Hendriksz, ADM
- Stephen McDowell, Barclays
- Rishi Madlani, Royal Bank of Scotland
- Caroline Cruickshank, Emma Wilkes & Jamie Bartlett, Bank of New York Mellon

Appendix 3: No conversion of natural landscape since 2010

The TWG advocated using the High Carbon Stock (HCS) classification for issuers that are not required to be FSC or PEFC certified but do need to comply with the requirements of 'no natural landscape conversion since 2010'. The TWG identified two categories of land that must not be deforested to make way for plantations; HCS land and peatlands.

High Conservation Value-High Carbon Stock Assessments (HCV-HCSA)[18] are leveraged with regards to smallholders projects complying with the requirement that no natural landscape has been converted since 2010. The HCV-HCSA has six classifications of land; high density forest, medium density forest, low density forest, young regenerating forest, scrub and open land[19]. The first four classes are considered HCS land, however for the Forestry Criteria it is stipulated that scrub should not be converted to plantation forestry because it can have high soil carbon that should be protected. Hence, the resulting requirement was set that the only land that is acceptable to convert to plantation forestry since 2010 is open land (if it is not peatland).

To determine which HCS category land falls into the HCV-HCSA should be used. The toolkit is designed to standardise the methodology and to make it available to all practitioners.[20]

Appendix 4: Climate Adaptation & Resilience Checklist

To demonstrate compliance with this element of the Criteria, all assets and projects must satisfy the requirements of the checklist detailed below.

The checklist (Table 5) is a tool to verify that the issuer has implemented sufficient processes and plans in the design, planning and decommissioning phases of a project to ensure that the operation and construction of the asset minimises environmental harm and the asset is appropriately adaptive and resilient to climate change and supports the adaptation and resilience of other stakeholders in the environment.

All elements of this checklist must be addressed, and appropriate evidence provided that these requirements are being met, or are not applicable in respect of the specific assets and projects linked to the bond. It is expected that their evidence will encompass a range of assessment and impact reports and associated data, including but not limited to those reports required to meet national and local licensing and approval processes. This might include Development Consent Orders, planning regulations adhered to, Environmental Impact Assessments, Vulnerability Assessments and associated Adaptation Plans.

The decision tree below (Figure 1) shows the steps to go through for verifying compliance with the checklist.

[18] http://highcarbonstock.org/
[19] http://highcarbonstock.org/the-hcs-approach-toolkit/
[20] The HCS Approach Toolkit Version 2.0: Putting no Deforestation into Practice (2017) http://highcarbonstock.org/the-hcs-approach-toolkit/

A climate change adaptation assessment may be integrated into a range of appropriate project development steps, which may include, inter alia, strategies and planning, pre-feasibility and feasibility studies, audits, technical assessments, risk assessments, or environmental and social due diligence, e.g. environmental and social impact assessments.

It is the issuers responsibility to provide the relevant information to the verifier. Verifiers must include this information in the scope of verification.

In accordance with the overarching reporting timetable as laid out in the Climate Bond Standard V2.1 issuers are required to report compliance with these eligibility conditions at all of the following stages:

- Pre-issuance reporting (supported by independent verification)
- Post-issuance reporting (supported by independent verification)
- Annual reporting

Notes: for all requirements in the checklist below, project boundaries should be established that take into account the assets and wider system, for example, infrastructure, systems, communities, institutions or ecosystems that are directly affected by the projects or assets in question. The project boundaries should define the scope of the climate resilience checklist.

Figure 1: Decision tree for verifying compliance with the Resilience Checklist

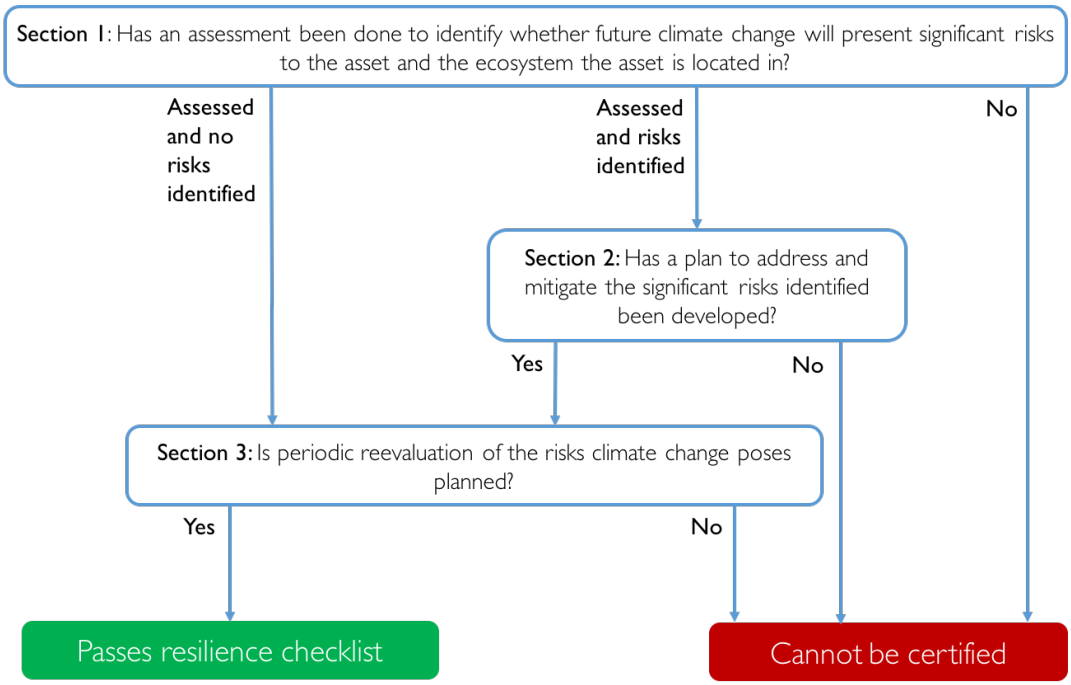


Table 5: Full details of the adaptation and resilience checklist for evaluating the performance of forested and non-forested land assets and projects

	Item	Demonstration of compliance
Section 1: The future climate change related risks and vulnerabilities to the asset/site have been evaluated		
1.1	Processes are in place to assess key risks from a changing climate, both to the asset itself, AND to the broader ecosystem[21] Examples of risks that may need to be evaluated are: • Temperature changes • Changes to water availability • Increased risk of flooding or drought	For example: management plan, fire management plan, environmental impact assessment or adaptation plan. Existing, authoritative and

[21] Risks that the asset poses to the resilience of the broader ecosystem or local stakeholders might include any ways in which forestry activities might affect the resilience of other users/stakeholders or any ways in which forestry activities improve the adaptation capacity or resilience of other users/stakeholders. For example, does the asset impact water availability in the entire ecosystem?

	• Changes to wind patterns • Increased fire risk • Impact on water quality and quantity for other users in the basin Areas that are felt to be of concern for the operation of these assets should be evaluated. This process should include: • Mapping of risks; where, when, severity and likelihood. This may be a quantitative or qualitative mapping of risks • Linking the risk to the possible impact on the asset and ongoing operations – e.g. impact on operating feasibility, harvesting or yield, or impact on maintenance requirements[22] These processes and assessments should use existing, authoritative and peer reviewed analyses or reports such as the Intergovernmental Panel on Climate Change's most recent Assessment Report, National Adaptation Strategies and/or Action Plans, National Adaptation Programmes of Action, Nationally Determined Contributions, Strategic Programmes for Climate Resilience and other relevant adaptation strategies and policies and academic journals. An appropriate timescale over which climate change impacts are assessed should be established. To assess the climate change signal above observed climatic variability, the characteristics of future climate should be assessed over a period of at least 20 years.	peer reviewed analyses that have been used must be cited.
Section 2: A plan has been designed and implemented to mitigate and adapt to the climate risks and vulnerabilities identified and to improve the resilience of the assets		
2.1	A plan has been designed and is being implemented to address the risks identified in 1.1. A link between the risks identified in section 1.1 and the planning and design of the risk mitigation or adaptation measures should be articulated. The expected benefits of recommended measures should be explained. Examples of measures to address risks identified might be: • There are training, capacity and governance arrangements in place for how the organization will deal with the impacts of exceptional events such as droughts, floods, wildfires, severe pollution • Tree species that are appropriate for the expected changes in climate, as well as for the current climate have been selected • There is a programme of stakeholder engagement and collaboration to strengthen resilience outcomes across the system (e.g. policy development, consultation and collaboration to ensure connectivity of green nodes, of supply chain actors, or neighbours in same ecosystem)	For example, adaptation plan, management plan
Section 3: There is a plan in place to re-evaluate the risks climate change poses		
	Re-evaluation should be carried out annually. Re-evaluation of adaptation or resilience plans and measures, as specified in 2.1, is also planned. There are monitoring and reporting systems and processes in place to identify high risk scenarios and to identify when unexpected risks are likely.	

Appendix 5: Management Plan

For the assets and projects that the management plan does apply to, evidence must be given to show that there are plans for management in all of these fields. There should be a designated person allocated to overseeing and implementing all aspects of the management plan.

If an asset or project is Certified by either FSC or PEFC that is considered proof enough that those assets comply with all aspects of the management plan.

Requirements of the management plan
1. Soil health: a soil management plan is developed and implemented with a focus on soil carbon, productivity, retention of soil, retention of soil biomass and soil structure 2. Water management: there has been an assessment done of the water requirements of the forests,

[22] This list taken from World Banks Climate and Disaster Risk Assessment Tool

impacts on and water needs of downstream users (both human and natural) and discharges into watercourses. A water management plan is in place that addresses relevant risks and includes measures to protect ground water and local water bodies

3. Fire management: measures have been developed and are implemented for the prevention of destructive forest fires (i.e. fires that do not serve management purposes)[23]
4. Riparian areas protection: provision has been made to protect riparian areas
5. Biodiversity management: the management plan includes provisions for managing and maintaining biodiversity
6. Species selection: selection of species that are suitable for the project type (e.g. conservation, restoration or sustainable forest management), will not disrupt genetic diversity or that are suitable for current or projected future ecological conditions
7. Chemical use: prohibition of active ingredients that are listed in the Stockholm Convention, the Rotterdam Convention or that are listed as classification Ia or Ib in the WHO recommended Classification of Pesticides by Hazard, except in case of an emergency situation or a governmental order. In these cases, environmental and social risk assessment is required.
8. Forest protection: protection and monitoring measures are in place to prevent and monitor for illegal logging and illegal land conversion.

Appendix 6: Ecoregion approach

This approach is relevant to the certification of conservation or restoration projects as detailed in section 3.5 and 3.6. The goal for certifying conservation and restoration projects is to improve or maintain carbon stocks and the climate resilience of the habitats. For both to be achieved and for the project to be appropriate for the location it is in there has to be consideration of what the native habitat for the given location is. The Ecoregion Approach was recognised by the TWG as the best tool that is available for understanding what the native habitat of a given region is.

An issuer must prove complaince with the Ecoregion Approach by:

Complying with the Ecoregion Approach

1. Identify the ecoregion or ecoregions the projects or assets are in. This can be done through the following process:
    a) Identification of the project and assets locations
    b) Using coordinates of projects and assets, indicate which ecoregions the projects and assets are located in. WWF's GIS shapefile for the ecoregions map should be used as the source for identifying ecoregions[24] [25]
    c) Locate the subsequent ecoregion description using the appropriate biome and thereafter ecoregion[26] [27] The resulting page for the ecoregion concerned will contain detail regarding the species (particularly trees and plants) found within it. Each page will provide the academic sources used to justify the ecoregion delineation
2. Justification should be provided that the projects and assets are consistent with the habitats and species identified in the relevant ecoregion(s). The verifiers must check there is agreement between the ecoregion and the planned projects

[23] This is not meant to address the possible increased fire-proness due to climate change. The resilience checklist covers that part of fire management.
[24] WWF's shapefile can be found here: https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world
[25] Dinerstein et al. (2017) released revised classifications of the ecoregions which increases the number of ecoregions and refined their boundaries. However, these revisions have not yet been adopted by WWF. Therefore, WWF will continue to be used with the expectation that their classifications will eventually be updated to reflect the study by Dinerstein et al. (2017)
[26] Ecoregion descriptions can be found here: https://www.worldwildlife.org/biome-categories/terrestrial-ecoregions
[27] The ecoregion can be more easily found by looking under the corresponding realm