

Carbon Project Ratings - REDD+ Methodology

MSCI ESG Research

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1. Methodology overview

Objective

MSCI Carbon Project Ratings are composite ratings that independently assess the integrity and risks of carbon credit projects across multiple criteria, including their impacts on the climate, environment and society.

A project with a higher rating has a greater likelihood of having a positive emissions impact and a reduced risk of overestimating its emissions impact. It is also more likely that such an emissions impact will have been implemented in a way that supports positive social and/or environmental outcomes and upholds legal and ethical standards. Consequently, a project with a higher rating has a lower likelihood of incurring reputational risks.

Document description

This document describes the detailed project type-specific methodology used to assess Carbon Project Ratings and Pipeline Carbon Project Ratings (but not Preliminary Carbon Project Ratings) for REDD+ projects.

This project type-specific methodology is applied in addition to, and partially in replacement of, the methodology that is described in the overall MSCI Carbon Project Ratings methodology document, "MSCI Carbon Project Ratings and Assessments Methodology." Where an element of the overall methodology is replaced by this project type-specific methodology, it is detailed below. Every element of the overall MSCI Carbon Project Ratings and Pipeline Carbon Project Ratings for REDD+ projects unless explicitly excluded in this document.

Section 2 introduces the core concept of carbon credit integrity and why its assessment is important to the development of the global carbon credit market. Section 3 introduces and defines REDD+ projects. Sections 4-8 provide details on the project type-specific methodology, including data sources and assumptions, used in MSCI ESG Research's Carbon Project Ratings and Pipeline Carbon Project Ratings assessments for REDD+ projects.

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2. Introduction to carbon project integrity

What is carbon credit integrity?

Carbon credits have varying quality characteristics. These stem from fundamental differences in project types, but also from which methodologies have been used to define each project and create the credits (these methodologies are among the standards set by carbon crediting programs, and are hereafter called crediting program methodologies) and how rigorously they have been applied. Projects also differ in terms of their potential co-benefits and their legal and ethical characteristics.

This variation in quality was not intended. Standard setting and governance bodies attempted to create a system in which all carbon credits had an equivalent climate benefit (representing a tonne of carbon dioxide equivalent [CO₂e] removed or avoided) which could be used for voluntary or compliance purposes. This effort dates back to the Clean Development Mechanism (CDM) created under the 1997 Kyoto Protocol and has continued with the evolution of the carbon credit market.

A key challenge lies in the quantification of the climate benefit of a project - i.e., whether the carbon credits calculated for a project are genuinely equivalent to mitigating or removing one tonne of carbon dioxide from the atmosphere. This difficulty stems from the calculation method used to determine what would have happened in the absence of a project, i.e., in the "baseline" scenario (sometimes referred to as the "counterfactual" scenario).

Another difficulty is that projects differ hugely in age, size and technology. The science behind some crediting program methodologies has also evolved over time, as has the enforcement of standards and levels of governance.

Readers should note that, within the carbon markets, the words "quality" and "integrity" tend to be used somewhat interchangeably. Through the rest of this document, we use the word integrity when referring to carbon projects.

The importance of assessing carbon credit integrity

Corporate climate action is critical in the fight against climate change, and carbon credits represent an important mechanism for corporates to mitigate their carbon footprint. However, concerns over carbon credit integrity may have held back, and may continue to hold back, the global carbon credit market from reaching its potential. These concerns center around the perception that many carbon credits are of low integrity and are not delivering the benefits they claim to.

In 2021, the Taskforce for Scaling the Voluntary Carbon Market (TS-VCM) found that credit integrity was at the "heart of buyers' hesitancy,"¹ with 45% of buyers identifying it as a key pain point. Buyer concerns around credit integrity and the related risk of being accused of greenwashing due to the use of low-integrity credits have only grown since then. For example, some 55% of respondents to an April 2023 survey run by the Science-Based Targets Initiative (SBTi) stated that the risk of a greenwashing accusation was stopping them from buying more credits.²

Concerns over carbon credit integrity have been central to the creation of two major initiatives: the Integrity Council on the Voluntary Carbon Market (IC-VCM) and the Carbon Credit Quality Initiative (CCQI). The IC-VCM aims to create minimum standards of integrity with a set of Core Carbon

¹ "Taskforce on Scaling Voluntary Carbon Markets: Summary of the Public Consultation Report," ICVCM, June 3, 2021.

² "Beyond Value Chain Mitigation (BVCM) Research," SBTI_press_release, September 1, 2023.



Principles (CCPs), and the CCQI has developed a comprehensive scoring system for certain project types. Both initiatives primarily assess integrity at the project-type level (primarily based on a project's methodology used) or at the project-registry level (a project registry is an organization that registers mitigation activities and issues carbon credits for the emission reductions or removals achieved by the mitigation activities). Neither initiative assesses integrity at the individual-project level.

MSCI ESG Research's assessment methodology draws on the IC-VCM's and CCQI's approach to assessing integrity, building on their principles to apply a more in-depth evaluation of integrity at the individual-project level.

The key components of carbon project integrity assessment

Market approaches to assessing carbon project integrity typically focus on three main issues:

- A. Emissions impact integrity: How much CO2e has been reduced/removed?
- B. Implementation integrity: How did that project reduce/remove that CO2e?
- C. Usage integrity: How are the credits then reviewed and used?

Emissions impact integrity and implementation integrity can each be further broken down into three main areas of common concern. These are summarized in Figure 1 and outlined in detail below.

Emissions impact integrity, implementation integrity and usage integrity are each described in more detail in the overall methodology document "MSCI Carbon Project Ratings and Assessments Methodology."



Figure 1: Key components of carbon project integrity

Carbon Credit Integrity

A. <u>Emissions Impact Integrity:</u> How much CO_2e has been reduced/removed?

B. Implementation Integrity: How did that project reduce/ remove that CO,e?

1. Additionality	2. Quantification	3. Permanence	4. Co-Benefits	5. Legal and Ethical	6. Delivery Risks
How likely is it that the reduction/ removal of CO ₂ e would have occurred even in the absence of the incentives created by the carbon credit?	How likely is it that the actual CO ₂ e impact of the project has been accurately estimated?	How likely is it that the CO ₂ e reductions /removals achieved will not be reversed for a sufficiently long-term?	How likely is it that the project generated net sustainable development benefits beyond the CO ₂ e it reduced/ removed?	How likely is it that the project has been delivered by parties that have taken an ethical and legal approach to project implementation?	How likely is it that ex-ante credits will be issued in-line with expectations?
Additionality determines whether the carbon credits played a decisive role in the mitigation activity going ahead.	Quantification refers to how accurately and consistently (with other projects of a similar nature) the CO ₂ e impact of a project is measured.	Permanence refers to the likelihood that CO ₂ e reductions/ removals may be later reversed due to natural risks or human risks, such as project management.	Co-benefits considers the sustainable development (environmental and social) benefits and safeguards beyond the CO ₂ e it saves, that is its "externalities."	Legal and ethical risks assess whether a project is conducted in a way that is in full compliance with local and international law, and meets broadly accepted ethical standards.	The purchase of credits ex-ante introduces a delivery risk, that is the risk that a project does not deliver the CO ₂ e reductions/ removals it intends.

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3. Introduction to REDD+ projects

What are REDD+ projects?

Forests play a critical role in the global ecosystem by absorbing carbon dioxide (CO₂) and supporting biodiversity. Protecting them is essential.

Despite zero-deforestation pledges made by governments at COP26, in 2022 alone the tropics lost over 4 million hectares of primary rainforest – an area roughly the size of Switzerland – at a rate equivalent to 11 football fields per minute. This resulted in 2.7 gigatons (Gt) of CO₂ emissions, equivalent to the annual fossil fuel emissions of India.³

To incentivize forest protection, the United Nations Framework Convention on Climate Change Conference of the Parties established the concept of projects that aim to reduce emissions from deforestation and degradation due to human causes (REDD+ projects). By utilizing carbon finance, REDD+ projects can address the underlying drivers of deforestation and protect areas from any destruction that would lead to CO₂ being released and other negative environmental consequences (such as biodiversity loss). In this way, carbon revenues help to incentivize communities, companies and/or countries to protect forested areas.

REDD+ projects can be broadly split into two main subtypes that represent different drivers of deforestation:

- **Avoiding Unplanned Deforestation (AUD)** These constitute about 80% of REDD+ projects: Reducing emissions by protecting forested areas from illegal deforestation, whether from local communities or illegal commercial deforestation.
- **Avoiding Planned Deforestation (APD)** These constitute about 20% of REDD+ projects: Reducing emissions by preventing deforestation on forested lands where commercial agents have legally authorized plans to convert it to non-forest land. For example, where a local landowner is aiming to convert the land to an alternative use, such as a cattle ranch or timber plantation.

A third subtype of REDD+ project is jurisdictional REDD+. Unlike project-level REDD+ projects, jurisdictional REDD+ projects consider the entire forest in a national or subnational jurisdiction. This has important implications for how baselines are set, how leakage is accounted for and the impact of policy and regulation. Given these differences, jurisdictional REDD+ projects are evaluated through a separate methodological approach and not included in this methodology document, which only describes MSCI ESG Research's assessment of project-level REDD+ projects.

REDD+ projects should address their areas' specific drivers of deforestation, typically through a combination of two main types of activities. First, through protection measures, such as patrols or guards, that monitor and stop deforestation activities. Second, through community-building initiatives that provide financial support to communities, creating an attractive alternative livelihood compared to deforestation-related activities.

³ World Resources Institute (2022). "How much forest was lost in 2022?", https://research.wri.org/gfr/global-tree-cover-loss-data-2022



Market Overview

REDD+ projects have historically been one of the most important project types within the voluntary carbon market. As of the start of 2024, credits for nearly 550 megatons (Mt) of CO₂e have been issued by REDD+ projects, representing about 25% of total issued credits in the overall voluntary carbon market. This is illustrated in Figure 4.

REDD+ projects are typically much larger than other types of projects in the voluntary market. Indeed, the high total REDD+ issuance volume comes from fewer than 150 registered REDD+ projects. On average, REDD+ projects span 190,000 hectares and generate close to 1 Mt CO2e of credits annually.

The majority of REDD+ projects are located in tropical regions, with South America hosting by far the largest proportion of REDD+ projects (113 registered projects as of August 2023).

Figure 2: Cumulative REDD+ and total VCM issuances and retirements 2002-2023 (Mt CO2e)



Key Integrity Considerations

The integrity of REDD+ projects has come under significant scrutiny for a number of years, including with renewed vigor in early 2023.⁴ Assessing the integrity of REDD+ projects requires an holistic analysis of each project's activities and assumptions, with risks primarily found in five main areas:

- **Baseline Deforestation:** The emissions impact of a REDD+ project is calculated by comparing the actual amount of deforestation that occurs to the amount of deforestation that was expected to have occurred had there been no carbon credit revenue (i.e., the "baseline"). Estimating the deforestation rate in this counterfactual scenario is therefore a critical input, which, by definition, is impossible to measure with complete certainty.
- **Carbon Stock:** To convert an area of protected deforestation into a volume of emissions impact, projects must accurately estimate the amount of carbon stored in a forest.

⁴ Patrick Greenfield, "Revealed: More than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows," *The Guardian*, January 18, 2023.



Measuring the carbon within a single tree is complex. Measuring the carbon within an entire forest becomes even more challenging.

- **Leakage:** It is of limited value to protect one area of forest if this protection just leads the same agent of deforestation to deforest another neighboring area. If this occurs, then the net impact of the project remains (close to) zero. Projects must counter this risk of "leakage" by appropriately mitigating and compensating for the risk that deforestation simply moves outside the project area.
- **Permanence:** Nature-based projects carry inherent risk of reversal from both human and natural causes (e.g., from fire), as any protected forest area could be subject to later deforestation or destruction. As they do for leakage, in their design and operation, REDD+ projects must mitigate and compensate for this risk (e.g., by putting in place fire breaks).
- Alternative Livelihoods: REDD+ projects revolve around incentivizing communities towards protection, rather than deforestation. However, many local communities rely on deforestation-linked activities as part of their living. Therefore, communities must be sufficiently compensated and supported in alternative livelihoods to ensure they are not made materially worse-off by the project.

MSCI ESG Research assesses each of these five areas in detail when evaluating the integrity of a REDD+ project.



4. Approach to assessing the integrity of REDD+ projects

MSCI ESG Research's assessment of REDD+ projects builds on the overall MSCI Carbon Project Ratings methodology to provide more in-depth analysis of REDD+ projects. This project type-specific assessment includes sub-criteria that are additional to, and partially in replacement of, the subcriteria of assessment used in the overall MSCI Carbon Project Ratings methodology, as detailed below. These project type-specific sub-criteria evaluate a deeper set of questions, which are focused on the most important, specific drivers of integrity for REDD+ projects.

These project type-specific assessments are conducted at the individual project level, including a comprehensive review of each individual project's data and assumptions. In this way, these assessments represent a more granular, project-level review of REDD+ projects than what would be possible using the overall MSCI Carbon Project Ratings methodology alone.

In total, MSCI ESG Research assesses 11 sub-criteria and 20 metrics (see Figure 4) under this project type-specific methodology that are either not assessed or are assessed differently in the overall MSCI Carbon Project Ratings methodology, as illustrated in Figure 3. These sub-criteria are focused on addressing the key drivers of integrity for REDD+ projects. Each of these sub-criteria align with and replace corresponding sub-criteria scores in the overall MSCI Carbon Project Ratings methodology.





1.5 Baseline Reasonableness



Figure 4: REDD+ assessment framework





Assessment of all other criteria and sub-criteria, for example, Criterion 5, Legal and Ethical Risks, and Sub-criterion 1.2, Common Practice, within the REDD+ analysis use the same metrics and methodology as in the overall MSCI Carbon Project Ratings methodology framework. The granularity of the overarching framework for those sub-criteria, and the fact that their assessment is consistent across all project types (i.e., with no REDD+-specific characteristics), means that no further enhancement is required.



5. Criterion 1 – Additionality

If a mitigation activity is not additional, then purchasing carbon credits has not led to any additional reduction or removal of emissions. Additionality is therefore a crucial component of the integrity of carbon credits. A non-additional carbon credit has no direct net positive environmental impact given that the emission reductions/removals would have occurred anyway. However, it is worth noting that funding a non-additional credit may still indirectly help stimulate further investment in the same activity by raising its return.

The additionality of a project is not necessarily binary. Projects may be partly additional, where only a portion of emission reductions/removals are additional. For example, if, in the baseline scenario, some emission reductions would have been achieved anyway, but not as much as was achieved by the project, then only this difference in emission reductions is additional. If credits are issued for the total emission reductions rather than only the reductions that wouldn't have otherwise been achieved, then the credits are only partly additional.

There are two main components to assessing additionality: (i) is it likely a project's activities would have occurred without the incentive of a credit, and (ii) how accurately does a project's baseline scenario represent the amount of the CO₂e reduced/removed in the baseline scenario?

MSCI ESG Research's assessment of the additionality of REDD+ projects focuses on evaluating seven key topics. Figure 5 illustrates the sub-criteria and metrics through which the additionality of REDD+ projects is assessed, and the overall MSCI Carbon Project Ratings methodology sub-criteria that they refer to. The detailed sub-criteria are described in Figure 6.

Given the probabilistic nature of additionality, MSCI ESG Research scores projects based on the *likelihood* that their emission reductions or removals are additional. To achieve a high additionality score, a project's activities must be 'additional' (Sub-criteria 1.1, 1.2 and 1.3) and its baseline scenario reasonable (Sub-criteria 1.4 and 1.5).

An inverse weighting formula is used to determine a project's overall additionality score, where the combined scores of Sub-criteria 1.1, 1.2 and 1.3 are inversely weighted with the combined scores of Sub-criteria 1.4 and 1.5. As a result, a good score in any one criterion cannot offset a low score in another.

For example, a REDD+ project's conservation activities might be very additional given there would be few incentives for implementing patrolling and protection measures without carbon credits. However, if a project area is at no risk from deforestation, its baseline scenario should have been zero deforestation, and hence any emission reductions claimed by such a project are likely not additional.









Figure 6: MSCI ESG Research Additionality integrity assessment framework

Sub-c	riteria	Metrics	Rationale	REDD+	Renewables	ARR	Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Blue Carbon
credits	ractiveness	1.1.1.1 % of Revenue from Carbon Credits	The higher the proportion of a project's revenue that comes from carbon credits, the greater the importance of credits to its financial attractiveness.	~	~	~	~	~	~	~	~	*	~
Carbon C	incial Att	1.1.1.2 IRR Analysis	Credits should play a decisive role in making a project financially attractive that would otherwise have not been.	~	~	~	~	~	~	~	~	~	~
1.1 s without	1.1.1 Fina	1.1.1.3 Prior Consideration	Carbon credits should have been clearly considered at the time the decision to go ahead with a project was taken.	~	~	~	~	~	~	~	~	~	~
Incentive	1.1.2 Barrier Analysis	Strength of Barriers	Projects that face high barriers to implementation would be less likely to go ahead without the added incentives of carbon credits.	×	~	×	~	~	×	~	×	~	~
1.2 Common Market Practice Penetra		Market Penetration	If a practice is already common within a market, it indicates that these types of projects will go ahead without the introduction of carbon credits.	×	~	~	~	~	~	~	~	~	~
1.3 Le Consi	egal derations	Legal Requirements	Projects that are legally required or incentivized are unlikely to be additional. However, if laws are not enforced, then may still be additional.	x	x	x	×	x	~	z	~	~	~
1.4 B Appro	aseline bach	Baseline Approach	Each project methodology is scored on the extent to which it mitigates the key risks associated with establishing a baseline scenario.	~	x	x	x	x	x	x	~	sc	~
1.5 Baseline Reasonableness		Baseline Transparency	Transparent detail on a project's assumptions is required to make an objective assessment of a project's performance and additionality.	~	sc	~	x	sc	x	x	~	x	~
		Baseline Assumptions	ons MSCI ESG Research assesses the key baseline scenario assumptions for each project type – for example, for REDD+ projects we validate a project's baseline deforestation rates.		~	~	~	~	~	~	~	~	~
1.6 Re Green	ed and Flags	News scanning	Review of academic papers, industry sources and the news for Red or Green Flags to project's additionality.		✓ Standardized approach								

🗸 Assessed 🛛 😕 Not Assessed



1.1.1.1 % of Revenue from Carbon Credits

% of Revenue refers to the proportion of a project's total revenue that comes from the sale of carbon credits.

Rationale	The higher the proportion of a project's revenue that comes from carbon credits, the greater the likely importance of carbon credits to the financial attractiveness of the project. If credits only represent a fraction of the financial return for the project, but project can still claim credits representing 100% of the emission reductions or removals achieved, additionality is more uncertain.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is revenue comes only source of r	Each project is scored on a 1-5 scale, where 1 indicates that a very low proportion of revenue comes from carbon credits and 5 indicates that carbon credits are likely the only source of revenue for the project.						
Scoring Approach	MSCI ESG Research conducts a detailed review of project documentation to identify sources of revenue for a project. Where financial data on the size of these revenue sources is presented, the proportion of total revenue that is estimated to come from carbon credits is calculated based on their estimated annual emissions reductions a the average realized carbon credit price since the project started for REDD+ projects Where financial data is not present, the rough proportion of revenue from each rever source is estimated given the project's activities. Projects then receive a score from 1 to 5 based on the proportion of revenue that							
	carbon credits are estimated to represent.							

1.1.2 IRR⁵Analysis

It is important for REDD+ projects to demonstrate that without carbon credits there would have been more profitable alternative uses of that land that would have likely resulted in it being deforested or degraded. Projects can evidence this by transparently estimating the profitability of alternative land uses. Projects that conduct this analysis and illustrate a high degree of difference between the project scenario and the most profitable alternative land use support their additionality claims.

There are three metrics that are used to evaluate this sub-criterion:

- **1.1.2.1 Financial Tests:** Whether the project uses a detailed and transparent approach to their financial analysis.
- **1.1.2.2 Financial Differences**: Whether there is a significant difference in profitability between the most profitable alternative land use and the project's activities.
- **1.1.2.3 Financial Evidence**: Whether the project's financial analysis is supported by a range of high-quality evidence.

⁵ The Internal Rate of Return (IRR) is a financial method used to calculate an investment's rate of return and profitability. The IRR is the percentage return on each unit of investment across its lifecycle.



The overall score for this sub-criterion is reached by weighting each of these factors 25%, 50% and 25% respectively.

1.1.2.1 Financial Tests

Financial tests refer to whether the project uses a detailed and transparent approach to their financial analysis.

Rationale	A project that conducts a more comprehensive financial analysis, in which key information is transparently given, provides more support and credibility to the outcome of this analysis.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
Scoring Definition	Each project is conducted any Internal Rate of	Each project is scored on a 1-5 scale, where 1 indicates that the project has not conducted any financial analysis and 5 indicates that the project conducted a full Internal Rate of Return (IRR) or Net Present Value (NPV ⁶) analysis.						
Scoring Approach	ing Approach MSCI ESG Research reviews the approach that a project took regarding its financial analysis and the types of tests performed.							

1.1.2.2 Financial Differences

Financial differences relate to the magnitude of the difference between the expected profitability of the most profitable alternative use of the land, and the profitability of the project's activities without carbon credits.

Rationale	If the project area could have been used for a much more financially attractive land use other than the project's activities, then it indicates that the project activities would not have gone ahead in the absence of carbon credits. Alternatively, if no other more financially attractive land use existed for the project, then the project may have gone ahead even without carbon credits.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is thought to be e profitable land carbon credits)	Each project is scored on a 3-5 scale, where 3 indicates that the project's activities are thought to be equal to the most profitable land use and 5 indicates that the most profitable land use is more than 10x the profitability of the project's activities (without carbon credits).						

⁶ Net Present Value (NPV) is a profitability metric that measures how much an investment is worth throughout its lifetime, discounted to today's value.



Scoring Approach

MSCI ESG Research identifies the expected profitability of the different alternative land uses that the project presented. The profitability of the most profitable land use is then compared to the profitability of the project scenario without carbon credits.

Projects are then scored on a 3 to 5 scale based on this difference, with projects receiving a higher score the greater the difference in profitability.

1.1.2.3 Financial Evidence

Financial evidence relates to the range of evidence used by a project to estimate and justify its financial analysis.

Rationale	It is possible to place more confidence in a project's financial analysis if its key assumptions are supported by a range of high-quality evidence.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is scored on a 1-5 scale, where 1 indicates that the project does not transparently use any sources to evidence its financial analysis and 5 indicates that the project's financial analysis is supported by four or more sources.							
Scoring Approach	MSCI ESG Research identifies the specific sources used by the project as part of its financial analysis.							

1.1.3 Prior Consideration

Projects that can clearly demonstrate that carbon credits were considered prior to their decision to start, provide more evidence that credits acted as an important incentive in starting mitigation activities.

Two key sub-criteria are used to evaluate this:

- **1.1.3.1 Evidence of Consideration:** Whether any evidence exists that credits were considered prior to the project start.
- **1.1.3.2 Registration Gap:** Whether a significant gap exists between the start of the project's activities and the initial registration and issuance date.

The overall score for 1.1.3 Prior Consideration is determined by an equal weighting of these subcriteria.

1.1.3.1 Evidence of Consideration

Evidence of consideration refers to whether the project has specific evidence that demonstrates that the use of carbon credits was considered prior to the project start date.

Rationale Evidence that carbon credits were considered prior to the project start date indicates that credits played an important role in this decision process. On the other hand, if no

evidence of prior consideration exists, there is a higher chance that the decision to go ahead with the project occurred without any expectation of carbon credits.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is scored on a 3-5 scale, where 3 indicates that no evidence has been made available, and 5 indicates that good quality evidence of prior consideration exists.								
Scoring Approach	MSCI ESG Rese considered prio notification of in carbon credit co analyzed.	earch identifie r to the proje ntent sent to onsultant, or l	es whether any ev ct start date. Thi a registry (such a board meeting m	vidence exists s evidence ma as CDM or Ver ninutes indicat	that carbon cr ay include a lett ra), the employ ing that carbor	edits were er or ment of a credits were			
	The date of any project start da or not.	l to the ne start date							

1.1.3.2 Registration Gap

Registration gap evaluates the gap between the start date of the project activity and the project being registered with a crediting standard and able to issue credits.

Rationale	A longer gap between the start of project activity and the project's registration suggests the project was able to maintain, at least to an extent, activities, and investment even in the absence of carbon credits. If credits were very important and decisive in the project going ahead, then we would typically expect a project to work hard to minimize this time taken in the registration process.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark					\checkmark		
Scoring Definition	Each project is the initial decis inconsequentia	scored on a ´ ion date and Il gap.	1-5 scale, where ² the registration d	1 indicates a v late and 5 indi	very significant cates a short c	gap between or		
Scoring Approach	MSCI ESG Research analyzes project documentation to determine the project's start date and compared this to the date of registration and date of first issuance of the project using the MSCI Carbon Markets platform.							
	The project sta categorized the	ted start date gap betwee	e is compared to n these dates inte	the registratio o a 1 to 5 scal	n/issuance da [.] e.	te and then		



1.4 Baseline Approach

REDD+ methodologies usually allow multiple different approaches for a project to estimate its baseline deforestation rate. Projects that employ a baseline approach that is rigorous and suitable for the project's characteristics reduce the risk of using an unreasonable baseline.

There are two metrics that are used to evaluate this sub-criterion:

- **1.4.1 Recency of Data:** Whether the project uses recent, up-to-date data to estimate its baseline deforestation rate.
- **1.4.2 Type of Baseline Approach**: Whether the project employs a scientific best-practice approach which is suitable for that project.

The overall score for this sub-criterion is calculated by weighting these factors by 40% and 60% respectively.

1.4.1 Recency of Data

Recency of data refers to whether the project evaluates historic deforestation using recent and up-to-date data that accounts for any recent trends.

Rationale	Deforestation rates are subject to annual variability. Projects that assess historic deforestation for a significant period including the most recent years before the project start date will maximize the probability of recent deforestation trends being incorporated and accounted for.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark				\checkmark			
Scoring Definition	Each project is a deforestation and 5 indicates	scored on a 1 nalysis was c that very rec	-5 scale, where 1 conducted 10 yea ent historic defor	l indicates tha irs or more be restation analy	it a project's m fore the projec /sis was includ	ost recent t start date, led.		
Scoring ApproachMSCI ESG Research reviews in detail a project's deforestation analysis documentation to identify the time frame through which the project historic deforestation trends. This time frame is then compared to the project in which historic deforestation analysis was performed to the project The difference in years between these dates is then converted into					ion analysis wi e project evalua ared to the mo he project's sta ted into a 1 to	thin its ated its ost recent year art date. 5 scale, with		
	a higher score g	jiven where n	nore recent analy	sis is incorpo	rated.			

1.4.2 Type of Baseline Approach

Type of baseline approach refers to whether the project performed rigorous and best-practice techniques to estimate its baseline deforestation rates.



Rationale

Scientific best-practice approaches provide greater likelihood that baseline scenarios are appropriately and reasonably estimated. Approaches that are considered scientific best practice have a lower risk of manipulation and/or overestimation.

Key Sources	Project Documentation	Project Academic Third-party MSCI C Geospatial Methodology Literature Data Marl Documentation							
-	\checkmark			\checkmark					
Scoring Definition	Each project is scored on a 1-5 scale, where 1 indicates that a project uses an inappropriate and aggressive approach and 5 indicates that a project uses an appropriate, conservative approach that is highly suitable to the project's characteristics.								
Scoring Approach	MSCI ESG Rese documentation deforestation ra logistic approad incorporated wi	arch reviews to identify th ite. For exam ch. It is also c thin a nationa	in detail a projec e type of modelli ple, whether a pr onsidered wheth al Forest Referen	t's deforestat ng approach o oject used a h er the project ce Emission L	ion analysis wi used to measu historic average 's deforestation .evel (FREL). ⁷	thin its re its baseline e, linear or n analysis is			
	Through an analysis of academic literature on the relative appropriateness of different modelling approaches, approaches are then scored on a 1 to 5 scale. Projects that are aligned to their national FREL and incorporate spatial allocation and covariate analysis into their approaches on average received higher scores.								

1.5 Baseline Reasonableness

Estimating the baseline rate of deforestation that would have occurred if the project did not happen is the most important, but hardest-to-measure, assumption for REDD+ projects. As it is not possible to know for certain what would have happened in this counterfactual scenario, assessing the reasonableness of a project's baseline scenario assumptions must be done in a probabilistic way.

Further, given the uncertainties that exist, it is important that any estimates of baseline deforestation rates do not overly rely on one single approach. MSCI ESG Research therefore assesses the reasonableness of a REDD+ project's baseline scenario through a number of considerations that avoid placing an over-reliance on a single approach and build a rich picture of that project's individual context. Five sub-components are considered to evaluate a project's baseline reasonableness:

- **1.5.1 Plausible Deforestation Threats:** Whether the history and ownership of the project and surrounding area suggests that deforestation was a threat.
- **1.5.2 Reference Region Similarity:** Whether the project uses a reference region that shares similar key characteristics including topology (such as slope and elevation) and economic characteristics (such as population density and distance to roads).
- **1.5.3 Ex-Ante Baseline Reasonableness:** Whether the project's baseline deforestation rate assumptions appear reasonable given the deforestation that occurred around the project area prior to the project start.

⁷ Forest Reference Emission Level (FREL) is a national benchmark of baseline deforestation at the country-level that can be used by projects to assess performance against a country-level standard.



- **1.5.4 Ex-Post Baseline Reasonableness:** Whether the project's baseline deforestation rate assumptions appear reasonable given the deforestation that occurred in the region after the project start.
- **1.5.5 Planned Deforestation Baseline Reasonableness:** Whether a planned deforestation project's baseline deforestation rate assumptions appear reasonable given both the likelihood and rate of deforestation predicted.

Each of these criteria is assessed independently on a scale of 1 to 5.

For unplanned deforestation projects, only the first four criteria are considered. If the project start date is fewer than 5 years ago, criteria 1.5.4 Ex-Post Baseline Reasonableness is not evaluated due to insufficient time series data to make reliable conclusions. For planned deforestation projects, only 1.5.1 Plausible Deforestation Threats and 1.5.5 Planned Deforestation Baseline Reasonableness are considered.

1.5.1 Plausible Deforestation Threats

For REDD+ projects to be additional, it is important that the threat of deforestation is real, otherwise these areas are likely to have been protected anyway. For example, many NGOs and conservation agencies have preexisting commitments to protect forested areas, even before they consider carbon credits. The history and ownership structure of a project area act as an important input in determining the extent to which deforestation of the area was likely in the absence of carbon credits.

Three main factors are considered as part of this assessment:

- **1.5.1.1 Plausible Ownership Structure:** Whether deforestation is plausible given the ownership structure of the project area.
- **1.5.1.2 Deforestation History:** Whether deforestation is plausible given the historic levels of deforestation occurring in the surrounding regions.
- 1.5.1.3 Suitability of Project Activities to Deforestation Drivers: Whether the stated drivers of deforestation appear plausible given the suitability and relevance of the project's activities to addressing them.

Each of these sub-criteria is assessed on a scale from 1 to 5. The overall score for 1.5.1 History and Ownership is determined by weighting these three factors by 25%, 25% and 50% respectively.

1.5.1.1 Plausible Ownership Structure

Plausible Ownership Structure relates to the extent that deforestation of the project area was considered likely given the ownership structure of the project area.

Rationale	Some project areas may be owned by individuals or organizations that are unlikely to have allowed deforestation to take place, even without carbon credits. In this case, the sale of credits does not protect any additional area versus what would have otherwise occurred.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is deforestation a	each project is scored on a 1-5 scale, where 1 indicates very low plausibility of leforestation and 5 indicates very high plausibility of deforestation.					



Scoring Approach	MSCI ESG Research conducts a detailed review of project documentation to identify both the current landowner(s) and the previous landowner(s). The plausibility of deforestation is then assessed given these relevant owners and score projects on a 1 to 5 scale based on this plausibility.			
	For example, projects that have a long history of being owned by conservation agencies before the project started have low plausibility of deforesting the land and score a 1.			

1.5.1.2 Deforestation History

Deforestation History relates to the extent deforestation of the project area was considered likely given the historic levels of deforestation occurring in the surrounding region.

Rationale	Projects that take place far away from any recent deforestation events are less likely to have been facing a near-term threat of deforestation.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is previous defore indicates that t the surrounding	Each project is scored on a 1-5 scale, where 1 indicates that there has been no previous deforestation within 50km of the project area in the prior 10 years, and 5 indicates that there is clear evidence of recent deforestation within the past 10 years in the surrounding region.						
Scoring Approach	For each project deforestation ra boundary). Plea geospatial anal deforestation s	he surrounding region. For each project, geospatial analysis is conducted to estimate the historic deforestation rates of its surrounding area (within 10km and 50km buffer of the project boundary). Please refer to Section 9 of this document for more detail on MSCI's geospatial analysis. Each project is then scored from 1-5 based on the rate of deforestation surrounding the project area in the past 10 years.						

1.5.1.3 Suitability of Project Activities to Deforestation Drivers

Suitability of Project Activities to Deforestation Drivers refers to whether the stated drivers of deforestation appear plausible given the suitability and relevance of the project's activities to addressing them.

Rationale	If the project undertakes activities that are not suitably addressing and mitigating the stated drivers of deforestation, then it indicates that the activities of the project were not required or that the threat from the stated drivers of deforestation are somewhat limited.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	



Scoring Definition	Each project is scored on a 1-5 scale, where 1 indicates that the project activities do not appear to be that relevant for the stated drivers of deforestation and 5 indicates that the project activities appear highly appropriate to tackling the stated drivers of deforestation.
	MSCI ESG Research identifies the stated drivers of deforestation and the project activities undertaken from project documentation.
Scoring Approach	A suitability mapping is then created of project activities to deforestation drivers based on how effectively each activity addresses each deforestation driver. For example, building a new education or health center has low suitability if the driver of deforestation is commercial logging by a timber company that owns the land. In contrast, community investments are very suitable activities where the agents of deforestation are the local communities.
	Projects are then scored on a 1 to 5 scale based on the overall suitability of their project activities to the stated drivers.

1.5.2 Reference Region Similarity

Reference Region Similarity relates to the extent to which the project has based its baseline deforestation rate modelling on a reference region that shares similar key characteristics to the project area.

Projects use reference regions to help estimate what deforestation rate would likely have occurred in the project area. In simple terms, the deforestation rate that occurs in a similar nearby region is assumed to represent the deforestation rate that would have occurred in the project area in the absence of carbon credits. However, if a project uses a reference region that does not appear to share similar characteristics to its own area, then the project risks using an unrepresentative deforestation rate. For example, if the reference region faces higher deforestation threats due to a higher population density or greater proximity to roads, then the reference region deforestation rate may be higher than what would have occurred in the project area (without credits), resulting in a higher baseline and risk of over-crediting.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
		\checkmark						
Scoring Definition	Each project is reference regio reference regio characteristics	Each project is scored on a 1-5 scale, where 1 indicates that the project uses a reference region that appears significantly unrepresentative, and 5 indicates that the reference region appears to share high similarity with the project area across five key characteristics.						
Scoring Approach	MSCI ESG Research conducts a geospatial assessment of both the project area and reference region on six key characteristics: (i) elevation, (ii) slope, (iii) distance to forest edges, (iv) population density, (v) distance to protected areas, and (vi) forest cover and loss.							

Rationale



For each characteristic, the project area is compared to the reference region to produce a similarity score.

MSCI ESG Research also incorporates Red or Green Flags identified in academic literature, where reputable external studies have either strongly supported or refuted the similarity of a project's reference region to the project area.

Projects are then scored on a 1 to 5 score based on this similarity. Projects that have high similarity on all six variables will receive a score of 5. More information on this geospatial approach can be found in Section 9.

1.5.3 Ex-Ante Deforestation Reasonableness (Unplanned Deforestation Only)

Ex-Ante Deforestation Reasonableness relates to whether the project's baseline deforestation rate appears reasonable given the deforestation that occurred around and within the project area prior to the project start date.

Rationale	Typically, the baseline deforestation rate used by a project should not be dissimilar to the deforestation rate that the project area, and other representative surrounding areas, have experienced historically (i.e., prior to the project and/or crediting period start date). There is an increased risk of over-crediting if the project baseline deforestation rate is higher than that projected by historic trends.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark	\checkmark						
Scoring Definition	Each project is scored on a 1-5 scale based on ex-ante analysis, where 1 indicates that a project's baseline deforestation rate appears to be significantly overestimated and 5 indicates that a project's baseline appears to be conservative.							
	Given it is a counterfactual scenario, it is not possible to say with 100% certainty what would have happened in the project area in the absence of carbon credits. There are a multitude of different ways to try to estimate what would have happened in the counterfactual, each of which may produce a different baseline deforestation rate.							
	A project baseline can be considered reasonable if it sits within the middle of the range of baseline rates that different approaches produce. However, if multiple different methodologies/approaches all produce a lower baseline deforestation rate than that used by the project, it would suggest that the project has overestimated its baseline.							
Scoring Approach	In our assessment, a project's baseline is compared to ten alternative baseline scenarios, each based on a different ex-ante analysis. The ten scenarios take historical deforestation rates from one of five different areas, and two different projection methodologies.							
	Historic Defore five different ar - 1) Proj - 2) MSC defined	station Analyse eas is evalua ect Reference Cl Average, 3) l areas create	sis: The historic ted: e Region: The ref MSCI Min and 4 ed through our in-	rate of defores ference region 1) MSCI Max A -house geospa	station that has used by the pr reas: A range atial "pixel-base	s occurred in roject. of MSCI- ed		



approach." The geospatial methodology used to construct these reference areas is described in more detail in Section 9 of this document.5) 50km Surrounding Area: The 50km area surrounding the project boundary.

In summary, several biogeographic and socioeconomic geospatial datasets are combined that include information considered to be relevant drivers of deforestation or highly correlated to forest loss, including topography, biome, distance to forest edge and population density in the year of project creation. Point samples (or "pixels") from a search area around the project site that best match the geospatial characteristics of the project area are algorithmically selected, and their historic deforestation rate then calculated.

Projections: Historic rates of deforestation in each of these five geographic areas are then projected forward to estimate what would have been reasonably expected to have occurred in the project area in the absence of carbon credits. Two different projection methods are used: (i) a "historic average," and (ii) a "linear" approach. These two projection methods, combined with five geographic areas, result in ten projected deforestation rates.

Comparison and Scoring: Each of the ten projected deforestation rates are compared to the project's baseline deforestation rate to produce a 1 to 5 score based on the level of difference observed. The scoring naturally considers the inherent uncertainty in the geospatial dataset and machine learning-based pixel matching model by giving a score of 5 if a project's baseline is within 10% of a comparative baseline.

A project's overall score is then based on a weighted average of the ten individual comparative baseline scores. The weighting of these factors depends on the similarity assessment of the project's reference region to the project area. If the project's reference region is highly similar, then the project reference region receives a high weighting under the historic average and linear approach. Otherwise, the linear projection method and MSCI average/max/min areas are given a higher weighting.

1.5.4 Ex-Post Deforestation Reasonableness (Unplanned Deforestation Only)

Ex-Post Baseline Reasonableness refers to whether the project's baseline deforestation rate appears reasonable given the observed deforestation that has occurred in surrounding and/or similar regions since the project started.

Rationale	Typically, the baseline deforestation rate used by a project should not be dissimilar to the deforestation rate that other representative surrounding areas (that don't have carbon credit projects) experience during the project's crediting period. There is an increased risk of over-crediting if the project baseline deforestation rate is (significantly) higher than the rates of deforestation observed in similar surrounding areas during the project's operation.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark	\checkmark						



Scoring Definition	Each project is scored on a 1-5 scale, where 1 indicates that a project's baseline assumptions appear significantly overestimated (based on ex-post analysis) and 5 indicates that a project's baseline appears to be conservative (based on ex-ante analysis).
	The general process and steps of our ex-post baseline analysis is similar to that of our ex-ante analysis (described above under sub-criteria 1.5.3). MSCI ESG Research assesses multiple areas to avoid over-relying on a single approach and account for uncertainty in our scoring.
	In our assessment, a project's baseline is compared to observed deforestation in the same five geographic areas used in 1.5.3 Ex-Ante Deforestation Reasonableness.
Scoring Approach	The observed deforestation rates in these five areas are compared to the project's baseline rate. Each of these comparisons are scored on a 1 to 5 scale based on the level of difference observed. The scoring naturally considers the inherent uncertainty in the geospatial dataset and machine learning-based pixel matching model by giving a score of 5 if a project's baseline is within 10% the observed rate within a comparative area.
	A project's overall score is then based on a weighted average of the five individual comparative baseline scores. If the project's reference region appears highly representative of the project area as determined by 1.5.2 Reference Region Similarity, then this receives a higher weighting.

1.5.5 Planned Deforestation Baseline Reasonableness (Planned Deforestation Only)

Assessing planned deforestation baseline reasonableness is highly context- and project-specific. The baseline rate depends on both the likelihood that the planned deforestation would have gone ahead and the rate of deforestation that was planned. Four sub-criteria covering both the likelihood and rate of deforestation are therefore assessed:

- **1.5.5.1 Deforestation Likelihood Given Stage**: The likelihood of the planned deforestation occurring given the stage the agents of deforestation had reached in their deforestation plans.
- **1.5.5.2 Deforestation Likelihood Given Evidence:** The likelihood of the planned deforestation occurring given the evidence provided.
- **1.5.5.3 Deforestation Rate Benchmarking**: The similarity of the baseline rate of planned deforestation to the rate of deforestation observed in similar surrounding areas.
- **1.5.5.4 Deforestation Rate Evidence:** The strength of evidence provided to support the planned deforestation rate.

Each of these is scored on a 1-5 scale and then weighted to reach an overall score. 1.5.5.1 Deforestation Likelihood Given Stage and 1.5.5.2 Deforestation Likelihood Given Evidence are weighted 25% and 35% respectively, and 1.5.5.3 Deforestation Rate Benchmarking and 1.5.5.4 Deforestation Rate Evidence are weighted 20% each.

1.5.5.1 Deforestation Likelihood Given Stage

Deforestation Likelihood Given Stage relates to the extent to which the planned deforestation was likely given the stage the agents of deforestation had reached in their deforestation plans.



Rationale	If the agents of deforestation already had ownership of the land and permission to deforest it, then the likelihood of the deforestation happening in the baseline scenario is higher.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is a been little likelih was extremely l deforestation pl	Each project is scored on a 1-5 scale, where 1 indicates that there appears to have been little likelihood of imminent deforestation, and 5 indicates imminent deforestation was extremely likely had the carbon project not started based on the stage of that deforestation planning.						
Scoring Approach	MSCI ESG Research assesses the relation of the agent of deforestation to the project area at the start of the project and whether legal permissions were already secure to deforest the land.							
	Projects are then scored on a 1 to 5 scale based on how likely deforestation was to occur.							

1.5.5.2 Deforestation Likelihood Given Evidence

Deforestation Likelihood Given Evidence relates to the extent to which the planned deforestation was likely given the strength the evidence provided.

Rationale	High-quality evi support and co	High-quality evidence indicating that the planned deforestation was likely can help to support and confirm the threat of deforestation.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark								
Scoring Definition	Each project is project and 5 in provided.	Each project is scored on a 1-5 scale, where 1 indicates no evidence is provided by the project and 5 indicates that multiple, well-regarded pieces of evidence have been provided.							
Sooring Approach	MSCI ESG Research identifies the different evidence sources provided by the project. The main types of evidence considered are: attestations, legal documentation, management plans, evidence of history of deforestation and expert opinions.								
Scoring Approach	Projects are the evidence. Proje documentation	Projects are then scored on a 1 to 5 scale based on the variety and reliability of this evidence. Projects that provide at least four pieces of evidence including either legal documentation and/or evidence of previous deforestation receive a score of 5.							

1.5.5.3 Deforestation Rate Benchmarking

Deforestation Rate Benchmarking relates to the extent to which the rate of planned deforestation appears reasonable given the rate of deforestation observed in similar areas.



The time taken to fully deforest similar areas of land should be roughly the same. Projects that assume a rapid pace of deforestation relative to other similar areas will Rationale likely overestimate their near-term baseline deforestation rate, increasing the risk of over-crediting. Project Project Academic Third-party **MSCI Carbon** Geospatial Methodology Documentation Literature Data Markets Documentation **Key Sources** ~ ~ Each project is scored on a 1-5 scale, where 1 indicates that a project assumes an aggressive clear-cutting schedule relative to other similar surrounding areas, and 5 **Scoring Definition** indicates that a project's rate of baseline deforestation appears conservative relative to those areas. Each project's baseline rate of planned deforestation is extracted from its project documents. Two metrics are reviewed: (i) the baseline deforestation rate assumed in each year, and (ii) the number of years after which the area would have been fully deforested. Projects are then scored on a 1 to 5 scale based on how reasonable the time-period Scoring Approach until 100% deforestation appears, compared to other registered Planned Deforestation projects. Given the specific nature of each Planned Deforestation project, an average across all registered Planned Deforestation projects is used to minimize the impact of anomalous projects.

1.5.5.4 Deforestation Rate Evidence

Deforestation Rate Evidence relates to the extent to which the rate of planned deforestation appears reasonable given the strength of evidence provided.

Rationale	Projects that co more confidence assumptions.	ombine a rigc e in the reas	orous approach w onableness of th	vith strong sup eir baseline de	porting eviden eforestation rat	ce provide te		
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
Scoring Definition	Each project is any evidence fo provides multip assumptions.	Each project is scored on a 1-5 scale, where 1 indicates that a project does not provide any evidence for its baseline rate of deforestation and 5 indicates that a project provides multiple pieces of well-regarded evidence to support its baseline assumptions.						
Scoring Approach	MSCI ESG Rese baseline rate of approaches to	MSCI ESG Research identifies the key evidence that a project uses to estimate its baseline rate of deforestation. In general, planned deforestation projects use two approaches to evidencing their baseline: either (i) using a management plan to						



evidence what would have happened in the absence of carbon credits, or (ii) analyzing actual deforestation in proxy areas that share similarities to the project area.

Planned deforestation projects are then scored on a 1 to 5 scale based on the type and strength of evidence provided. Projects that use both approaches, including the use of a good sample of highly similar proxy areas, offer more evidence supporting their rate of deforestation and hence receive a score of 5.



6. Criterion 2 – Quantification

Quantification refers to the likelihood that the emission reduction or removals claimed by a project are accurate, assuming the baseline scenario is correct. It includes both emission reductions or removals within a project area and emissions released or generated outside the project area, known as leakage.

Along with the strength of baseline assessment, quantification is a key determinant of the risks of over-crediting: whether the number of credits issued by the project is equal to the CO2e actually reduced/removed. In theory, all carbon credits are worth the equivalent of 1 tonne of CO2e reduced or removed. A low carbon quantification score means that the emission reductions or removals delivered by the credit is likely to be less than 1 tonne. In this case, buyers should be cautious in using one credit to offset 1 tonne of their own emissions as they are unlikely to be equivalent.

Quantifying a REDD+ project's emission reductions, even assuming the baseline scenario has been accurately estimated, requires a complex estimation of two primary components: first, the project's carbon stock and, second, any project leakage. Both of these components are difficult to measure with a high degree of accuracy.

As natural living ecosystems spread over what is often a very large and sometimes inaccessible area of land, measurement of a REDD+ project's carbon stock inevitably involves a degree of estimation and inaccuracy. Historically, carbon stock was measured by teams on-the-ground taking occasional samples of the area's biomass, although geospatial datasets and analysis are increasingly being used to complement this manual sampling.

Accurately measuring leakage is even more difficult as evaluating factors such as what size leakage area to monitor and what proportion of any increase in (local) deforestation is attributable to the project inevitably involve a degree of subjectivity.

Figure 7 illustrates the sub-criteria through which MSCI ESG Research assesses the quantification of REDD+ projects, and the Integrity Assessment framework sub-criteria to which they refer. The detailed sub-criteria are described in Figure 8.



Figure 7: REDD+ Quantification assessment approach





Figure 8: MSCI ESG Research Quantification integrity assessment framework

Sub-criteria	Metrics	Rationale	REDD+	Renewables	ARR	Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Blue Carbon
2.1 Quantification Approach	2.1.1 Methodology Approach	Through setting the assumptions that projects must make, and the sources that can be used to estimate them, crediting program methodologies can play an important role in reducing or even increasing the level of quantification risk.	✓ Standardized approach									
	2.1.2 Project Transparency	Transparent documentation and detail on a project's assumptions are required to make an objective assessment of its approach to carbon quantification.	~	~	~	~	~	~	~	*	<	~
	2.1.3 Project Approach	Two projects with the same methodology may carry different quantification risks depending on the approaches that each uses.	~	~	4	~	~	~	~	~	<	~
2.2 Assumption Accuracy	Quantification Accuracy	Each project type has a set of key assumptions that determine the accuracy of their carbon quantification. Evaluating the reliability and accuracy of these key assumptions shows whether a project has over- or understated their emission reductions or removals.	~	~	~	~	~	~	~	~	*	~
2.3 Monitoring Performance	2.3.1 Monitoring Plan	Projects that have effective processes in place to regularly monitor and measure key quantification inputs and assumptions are more likely to accurately estimate and update their emissions impact.	~	~	~	~	~	~	~	~	~	~
	2.3.2 VVB Analysis	Projects that use a diverse mix of well- regarded verification and validation bodies (VVBs) will improve the likelihood that key quantification details are accurately checked and validated.	✓ Standardized approach									
2.4 Red and Green Flags	News scanning	Review of academic papers, industry sources and the news for Red or Green Flags relating to project's quantification.	✓ Standardized approach									



2.1.2 Project Quantification Approach

Projects that use scientifically best-practice techniques to estimate key components of their quantification increase the probability that CO₂e impact will be accurately measured.

There are two metrics that are used to evaluate this sub-criterion:

- **2.1.2.1 Sampling**: Whether the project uses suitable and representative sampling approaches to estimate its carbon stock.
- **2.1.2.2 Allometric Equations:** Whether the project employs a peer-reviewed and suitable allometric equation as part of its carbon stock calculations.

The overall score for this sub-criterion is reached by weighting each of these factors by 50%.

2.1.2.1 Sampling

Sampling relates to whether the project uses suitable and representative sampling to measure the carbon stock within the project area.

Rationale	To estimate the carbon stock within their project area, projects must use tree measurements from a sample of the project area as an input in their calculations. Given that these measurements are then extrapolated over the entire project area, the accuracy of the estimate is dependent on how representative the sampled area is to the entire project area. Projects that use more representative sampling techniques over a larger area increase the chances that this sampled area will be representative of the entire project area.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark				\checkmark				
Scoring Definition	Each project is scored on a 5-point scale from 1 to 5, where 1 indicates a relatively low sampling representativeness and 5 indicates a relatively high sampling representativeness.								
Scoring Approach	MSCI ESG Research conducts a detailed review of each project's key documents to understand its approach to carbon stock estimation and its sampling procedures during both its design and monitoring phases. For each project, two key factors are considered. First, if the project combined in-field sampling with any remote sensing. Second, the number and size of plots sampled to understand what proportion of the total project area had been sampled.								

2.1.2.2 Allometric Equations

Allometric Equations relates to whether the project uses peer-reviewed allometric equations that are appropriate for the region, forest type and biome type.

RationaleAllometric equations are used to convert tree measurements into the amount of
carbon they contain. The accuracy of this calculation is therefore dependent on the
appropriateness of the allometric equation used. The most scientifically appropriate



equations will be peer-reviewed and specifically chosen by a project based on their relevance to the project's key characteristics.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
-	\checkmark				\checkmark			
Scoring Definition	Each project is scored on a 5-point scale from 1 to 5, where 1 indicates that a non-peer reviewed allometric equation was used that does not appear to be appropriate for the region or species, and 5 indicates that a species/region/forest-type relevant equation from a peer-reviewed study was used.							
Scoring Approach	MSCI ESG Research identifies the specific allometric equation(s) a project uses in its carbon stock calculations. This specific study for the allometric equation is then researched to determine whether it was peer-reviewed and its relevance for the project's key characteristics.							

2.2 Accuracy of Assumptions

The accuracy of key project quantification assumptions is evaluated against a combination of internal and third-party estimates to determine whether they appear reasonable.

There are three components that are used to evaluate this sub-criterion:

- **2.2.1 Carbon Stock Validation:** Whether the project's carbon stock assumptions appear accurate and reasonable over the project lifetime.
- 2.2.2 Conservativeness: Whether the project has conservatively excluded certain sources of carbon pools from its calculations.
- **2.2.3 Leakage:** Whether the project appropriately accounts for and compensates for the threat of leakage.

Each of these criteria are evaluated on a 1 to 5 scale. **2.2.1 Carbon Stock Validation** and **2.2.3 Leakage** are weighted 40% each, while **2.2.2 Conservativeness** is weighted 20%.

2.2.1 Carbon Stock Validation

Alongside the area deforested in the baseline scenario, the estimation of the amount of carbon stored within a project area is a fundamental component of how a REDD+ project estimates their emissions reduction compared to the baseline scenario. Measurement of a REDD+ project's carbon stock inevitably involves a degree of estimation and inaccuracy.

There are two components that are used to evaluate this sub-criterion:

- **2.2.1.1 Carbon Stock Accuracy:** Whether the project's carbon stock per hectare assumptions appear accurate and reasonable.
- **2.2.1.2 Unaccounted Emission Removals:** Whether the project removed carbon during its lifetime through biomass growth above those included in their emissions calculations.

Each sub-criterion is evaluated on a percentage basis, where scores greater than a 100% indicate that the project's carbon stock is conservative and under-estimated. These sub-criteria are then


multiplied together, with the overall score for 2.2.1 Carbon Stock Validation then converted into a 1-10 scale, where any scores greater than 5 indicate project under-estimation.

2.2.1.1 Carbon Stock Accuracy

Carbon Stock Accuracy refers to whether the project's carbon stock per hectare assumptions appear reasonable.

Rationale	Carbon stock pe that overestima	Carbon stock per hectare assumptions are subject to calculation uncertainty. Projects that overestimate their carbon stock will overestimate their emission reduction impact.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
		\checkmark							
Scoring Definition	Each project is a estimates (once 50% indicates the assumption and over double the	Each project is scored on a continuous % scale, where 100% indicates that our estimates (once accounting for uncertainty intervals) match the project's estimate, 50% indicates that the project's carbon stock per hectare is only half of the project's assumption and 200% indicates that the project's carbon stock per hectare may be over double the project's assumption.							
	MSCI ESG Rese ground biomass only provide tot sources other th or regionally sp of a project's ca	arch evaluate s estimates v al carbon sto nan above-gre ecific default irbon stock.	es carbon stock when reported in ck estimates (i.e ound biomass), w values to estima	per hectare as project docun e., estimates p we use the rep ate the above-	sumptions usin nentation. For p otentially inclu- ported mix of ca ground biomas	ng above- projects that ding carbon arbon sources is component			
Scoring Approach	This carbon stock per hectare assumption is then compared to geospatial estimates through our partnership with Chloris Geospatial, who estimate the above-ground biomass within project areas and on a per-forested hectare basis using the latest geospatial techniques								
	A percentage score is then derived from the ratio difference between the geospatial estimate (using the lower-bound uncertainty interval) and the project assumption.								

2.2.1.2 Unaccounted Emission Removals

Unaccounted Emission Removals refer to whether the project removed carbon during its lifetime through biomass growth above those included in their emissions calculations.

Rationale	Though the prir existing forests remove addition may not accour emissions impa	nary objectiv , the forests nal carbon fro nt for this em act.	e of REDD+ proje that they protect om the atmosphe issions impact, t	ects is to avoid may experience ere. Project are herefore under	emissions by ce growth and cas that seques r-estimating th	protecting therefore ster carbon eir total
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets



 \checkmark

Scoring Definition	Each project is scored on a continuous percentage scale, where 100% indicates that there is no unaccounted for forest growth and 150% indicates that the carbon stock has grown 50% within the project area but none of this growth has been accounted for through claimed emission removals.
Scoring Approach	MSCI ESG Research uses geospatial estimates of the carbon stock within a project area through our partnership with Chloris Earth to estimate how the above-ground biomass within the project area evolved since the project start date.
	For projects that have experienced significant increases or reductions in carbon stock, we then evaluate whether these project removals or emissions have been accounted for.
	The difference between this carbon stock growth and the project removals is then used to derive the % score based on this ratio difference.

2.2.2 Conservativeness

Conservativeness relates to whether the project has conservatively excluded certain sources of carbon pools from its calculations.

Rationale	The carbon sto ground, but als dead wood. De these carbon p estimate the ca estimate their c pools in their c	The carbon stock of a forested area comprises not only the trees that are visible above- ground, but also the below-ground biomass, such as soil organic carbon and other dead wood. Deforestation and degradation can impact the carbon stored in each of these carbon pools but is not always accounted for by projects. Projects that do not estimate the carbon stock within certain pools, such as soil organic carbon, will estimate their emissions impact more conservatively than if they include all these pools in their calculations.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark	\checkmark		\checkmark				
Scoring Definition	Each project is pools were exc carbon pools w	scored on a s luded from a vere included	scale of 3.25 to 5 project's calculat in a project's carl	, where 3.25 in tions and 5 ind bon stock cald	ndicates no op dicates that on culations.	tional carbon ly biomass		
	MSCI ESG Rese documents to i calculation. The ground biomas	MSCI ESG Research conducts a detailed review of each individual project's key documents to identify which carbon sources were included in its carbon stock calculation. The carbon sources reviewed include: above-ground biomass; below-ground biomass; dead wood; wood products; soil organic carbon and litter.						
Scoring Approach	Given that each of these pools has different significance to the overall carbon stock, the proportion of the total carbon stock that any excluded pools likely represent are estimated based on analyzing a sample of similar projects. For example, soil organic carbon is on average 4x more important as a carbon source than dead wood or litter, so its exclusion is more conservative than the exclusion of dead wood or litter.							



2.2.3 Leakage

When reducing deforestation in a project area, there is a risk that the agents of deforestation simply deforest a surrounding area instead, resulting in little net climatic benefit. This concept of leakage must be appropriately accounted, monitored, and compensated for by projects.

To evaluate the appropriateness of a project's leakage deductions, both the threat of leakage and the extent to which it is appropriately accounted for is considered:

- **2.2.3.1 Leakage Threat:** The extent to which leakage represents a significant threat given the project's location and its drivers of deforestation.
- **2.2.3.2 Leakage Deduction Suitability:** Whether the project's accounting and compensation for leakage is appropriate given this threat.

These criteria are each assessed on a scale of 1 to 5, with the overall score based on weighting the leakage threat 35% and the leakage deduction suitability 65%.

2.2.3.1 Leakage Threat

The threat of leakage is determined by the specific circumstances of a project. Two factors in our assessment of a project's leakage threat are considered:

- 2.2.3.1.1 Leakage Driver Threat: The extent to which a project's activities and drivers of deforestation impact its leakage threat.
- 2.2.3.1.2 Project Area Leakage Threat: Whether the geographic characteristics of a project impact the threat of leakage.

2.2.3.1.1 Leakage driver threat

Leakage Driver Threat relates to the extent to which a project's activities and drivers of deforestation impact its leakage threat.

Rationale	Different underlyin activities can also address these driv	ng drivers of def impact this leal vers of deforesta	orestation carry dif kage threat through ation.	ferent leakage how compreh	threats. Furtherm ensively they miti	ore, project gate and		
Key	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
Sources	\checkmark							
Scoring Definition	Each project is sco indicates very low	ored on a scale or threat of leakag	of 1 to 5, where 1 in Je given the project	ndicates very h 's activities and	igh leakage threat d drivers of defore	and 5 estation.		
Scoring	MSCI ESG Research conducts a detailed review of each individual project's key documents to understand its underlying drivers of deforestation and the activities it is undertaking to prevent deforestation.							
Approach	Both "activity" and	l "market" leakag	ge are considered.					
	"Activity" leakage relates to the displacement of deforestation agents or activities to areas outside the project area, resulting in increased deforestation in another location. For example, where small-							



scale pastoral farming is the deforestation driver, and these activities are displaced, there is a high risk of leakage from these agents shifting their pastoral farming to a neighboring area.

"Market" leakage occurs when a project's activities lead to changes in market conditions, resulting in increased supply elsewhere in response to this market change. For example, where large-scale commercial logging is a deforestation driver, and these activities are displaced, risk of leakage is high because large-scale commercial logging will be more integrated into global markets and therefore be more likely to result in a response in market supply elsewhere.

A leakage threat table is then used to assess the threat of different sources of leakage given each driver of deforestation.

For each project, the overall leakage threat is calculated based on the relevance of each driver of deforestation to the project and the associated leakage threat of these drivers. A score is then assigned to the project via a mapping of its activities to its drivers of deforestation.

A score of 1 indicates that the underlying drivers of deforestation have a high leakage threat and have not been mitigated by the projects' activities. A score of 5 indicates that the leakage threat is low given the activities and drivers of deforestation of the project.

2.2.3.1.2 Project area leakage threat

Project Area Leakage Threat refers to whether the geographic characteristics of a project area impact the threat of leakage.

Rationale	Project areas with more forested borders have a larger leakage threat given there are more surrounding areas for the agents of deforestation to move to, and for the project to monitor.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark	\checkmark					
Scoring Definition	Each project is s threat and 5 ind characteristics.	Each project is scored on a scale of 1 to 5, where 1 indicates a relatively high leakage threat and 5 indicates a relatively low leakage threat given a project's geographic characteristics.					
Scoring Approach	MSCI ESG research conducts a geospatial circularity test of a project's area to estimate the proportion of its perimeter that is surrounded by forested land relative to the size of the project area.						

2.2.3.2 Leakage deduction suitability

The suitability and appropriateness of a project's leakage deduction is determined by the extent to which it appropriately accounts for its sources of leakage. Three main factors are considered in our assessment of the appropriateness of a leakage deduction:

- 2.2.3.2.1 Leakage Sources: Whether a project appropriately accounts for its relevant sources of leakage.
- **2.2.3.1.2 Leakage Deduction**: Whether the leakage deduction estimated by a project appears appropriate given its leakage threat.



- **2.2.3.1.3 Leakage Area Deforestation:** Whether any significant change in deforestation has occurred in a project's surrounding area since it started.

2.2.3.2.1 Leakage Sources

Leakage Sources relates to whether a project appropriately accounts for its relevant sources of leakage.

Rationale	There are two main sources of leakage: market leakage and activity-shifting leakage. A project must appropriately account for all the relevant sources of leakage it faces, otherwise it risks under-estimating its leakage effect.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is account for eith accounts for al	Each project is scored on a scale of 1 to 5, where 1 indicates that a project does not account for either of the two main sources of leakage, and 5 indicates that a project accounts for all the sources of leakage relevant to it.						
Scoring Approach	MSCI ESG Research conducts a detailed review of key project documents to identify which sources of leakage are accounted for. We then compare whether the project accounted for each source of leakage against our assessment of the threat of each leakage source based on that project's underlying drivers of deforestation.							
	Projects are then scored from 1 to 5 based on whether the project appropriately accounts for all relevant leakage sources.							

2.2.3.2.2 Leakage deduction

Leakage deduction refers to whether a project appropriately accounts (i.e., deducts) for leakage given its leakage threat.

Rationale	The size of a p it faces. Projec facing high lea	The size of a project's leakage deduction should reflect the specific leakage threat level it faces. Projects that deduct a low proportion of their credits due to leakage despite facing high leakage threats risk overestimating their total emissions reduction impact.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is appears to be indicates a rela low threat of le	Each project is scored on a scale of 1 to 5, where 1 indicates that a leakage deduction appears to be very low given the relatively high leakage threat that exists, and 5 indicates a relatively high leakage deduction has been made relative to the apparent low threat of leakage.						
Scoring Approach	MSCI ESG Research conducts a detailed review of key project documents, including monitoring reports and project design documents, to identify both a project's ex-ante and ex-post leakage deductions as a proportion of total baseline emissions.							



Ex-post leakage deductions are prioritized where it was available in monitoring reports, otherwise the ex-ante leakage deduction is used.

The size of the leakage deduction is then compared to the total leakage threat level as determined by 2.2.3.1 Leakage Threat. Projects are then scored from 1 to 5 based on the size of their leakage deduction relative to their leakage threat level.

2.2.3.2.3 Leakage Area deforestation

Leakage Area Deforestation relates to whether any significant change in deforestation has occurred in a project's surrounding area since it started. If an increase in deforestation is observed in surrounding areas, it suggests there might be activity-shifting leakage occurring. This is generally perceived as a negative, although it does serve to indicate additionality.

Rationale	After a project starts, increasing deforestation rates in its surrounding areas may indicate the presence of activity-shifting leakage.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
		\checkmark						
Scoring Definition	Each project is surrounding are indicates that n areas.	Each project is scored on a scale of 1 to 5, where 1 indicates that deforestation rates in surrounding areas have increased by over 200% since the project start date, and 5 indicates that no increase in deforestation has been observed within the surrounding areas.						
	Annual deforestation rates within a 10km and 50km area (the 'leakage belt') around each project area are analyzed through geospatial modelling. More information on our geospatial modelling approach can be found in Section 9 of this document.							
Scoring Approach	The average deforestation rate in each leakage belt is then compared to deforestation rates in the same areas during the 10 years before and after the project start date (or during the time since the start date if it started less than 10 years ago). Projects are then scored from 1 to 5 based on the change in leakage belt deforestation since the project started.							



7. Criterion 3 - Permanence

Permanence refers to the likelihood that the emission reductions or removals achieved by a project will be sufficiently long-term and not released back into the atmosphere. There is growing consensus that 100 years represents a good benchmark for projects to be classified as 'permanent'. The IC-VCM's Core Carbon Principles require a monitoring and compensation period of at least 40 years for nature-based projects.

A permanent reduction or removal can only be guaranteed where it is physically impossible for a reversal to occur. However, for most projects, a risk of reversal does, to some extent, exist. This risk may be due to natural risks, such as wildfires, or human risks, such as poor project management.

REDD+ projects involve both inherent human and natural permanence risks. For example, on the latter, protected forests may be later destroyed by wildfires or other natural disasters. The significance of this permanence risk depends on both the level of natural and human risks, and the extent to which these have been mitigated by the project's activities. This net risk must then be sufficiently compensated for in the project's crediting methodology.

Figure 9: Permanence integrity assessment approach illustrates the sub-criteria through which MSCI ESG Research assesses the permanence of the emissions reductions achieved by REDD+ projects, and the Integrity Assessment framework sub-criteria that they refer to. The detailed sub-criteria are described in Figure 10.



Figure 9: Permanence integrity assessment approach⁸

⁸ The approach to assess 3.2.2 Local Stakeholder Engagement is outlined in Section 4.3.2, Local Stakeholder Engagement.



Figure 10: MSCI ESG Research Permanence integrity assessment framework

Sub-c	riteria	Metrics	Rationale	REDD+	Renewables	ARR	Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Blue Carbon
rmanence	3.1.1 Project Type Risk	Project Type Significance	Different project types have inherently different levels of non-permanence risk.		✓ Standardized appr					proad	roach		
Non-Pe Risk	212	3.1.2.1 Natural Risks	The risk of fire, drought, landslide and other natural risks in that project area.	~		~					~		~
3.1 Level of	Project Risk	3.1.2.2 Human Risks	Human-related permanence risks include the strength of land tenure rights or a project developer's experience.	~		~					~		~
2 2 M	itigation	3.2.1 Mitigation Activities	Projects can mitigate non-permanence risks through implementing activities that focus on addressing key risks.	~		~	~	~		~	~		~
3.2 Mitigation 3.2.2 Local Stakeholder Engagement		3.2.2 Local Stakeholder Engagement	Successfully engaging with local stakeholders lowers the risk of human-based non-permanence.	~		~	~	~		~	~		~
	3.3.1 Project Contributions		A project's buffer pool contributions should appropriately account for the non-permanence risk.	~		~	~	~		~	~		~
3.3 Comp and	ensation	3.3.2 Buffer Pool Capitalization	An under-capitalized buffer pool may have insufficient credits to cover future losses.	✓ Standardized approach									
Contributions 3.3.3 Buffer Pool Mechanics		3.3.3 Buffer Pool Mechanics	A buffer pool should have mechanisms in place to ensure projects appropriately account for and estimate their buffer pool credits.	✓ Standardized approach									
3.4 Ev Non-F	idence of Permanence	Non-Permanence Events	If significant reversals have occurred without being accounted for, then carbon stock reversals have already occurred.	* *									
3.5 Re Green	ed and Flags	News scanning	Review of academic papers, industry sources and the news for Red or Green Flags relating to project's permanence.	Standardized approach									

3.1.2.1 Natural Risks

Natural risks refer to the significance and likelihood that such risks within a project area might lead to a reversal in the emission reductions/removals achieved.

RationaleNatural disturbances, such as drought, fire or landslides, can threaten the CO2e stored
in land-based carbon pools. These risks are most relevant for nature-based projects,
where the CO2e is stored in carbon pools that are susceptible to a range of natural

risks. For example, wildfires may burn down trees within a REDD+ project, resulting in CO2 being released into the atmosphere.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
		\checkmark			\checkmark	
Scoring Definition	Each project is indicates no pe	scored on a strmanence ris	5-point scale fron k and 1 indicates	n 1 to 5 for ea s a very signifi	ch natural risk cant permaner	type, where 5 nce risk.
	MSCI ESG Rese (i) fire, (ii) droug by wind); (v) bio Research's geo MSCI ESG Rese type. For many	earch has cor ght, (iii) lands otic. These ris spatial analys earch only as types, natura	nsidered five main lide; (iv) windthro sks are assessed sis. sesses natural ris I risks do not rep	n types of natu ow/tropical cyo independently sks where they resent a perm	ural risk in our a clone (or uproc y using MSCI E y are relevant to anence risk as	assessment: oting of trees ESG o that project the CO_2e is
Scoring Approach	 Najor natural risks are assessed for each individual project through geospatial analys of its boundary, as shown in Table 1. For each risk, MSCI ESG Research looks at the historical trends and patterns of natural risk. Then, we forecast these risks using our house climate models that account for the projected change in likelihood as temperatures and climates change. More detail on MSCI ESG Research's geospatial permanence methodology can be found in separate methodology note: "MSCI Carbon Project Ratings - Geospatial Methods in Assessing Permanence" 					

Table 1: Analytical Approach for each natural risk

Wildfire	Forecast of the future frequency and severity of fires based on a geospatial analysis and our own modelling.
Drought	Forecast of the intensity and frequency of drought risk for each project.
Landslide	Assess the percentage of project areas that are currently susceptible to landslides based on the NASA landslide susceptibility map. ⁹
Windthrow	Estimate the tropical cyclone return interval for each project area based on a 10,000-year synthetic dataset.
Biotic	Assess biotic outbreaks (% of area at risk/not at risk), based on the National Insect and Disease Risk Map (NIDRM) 2018. ¹⁰

⁹ Thomas Stanley and Dalia B. Kirschbaum, "A Heuristic Approach to Global Landslide Susceptibility Mapping," *Natural Hazards*, 87.1 (2017), 145–64, https://doi.org/10.1007/s11069-017-2757-y, 2017.

¹⁰ US Forest Service, "National Insect and Disease Risk Map (2018 NIDRM)," 2018.



3.1.2.2 Human Risks

Protected forests are also subject to human-based risks of reversal, given that the areas may be deforested at a later date. If a REDD+ project successfully protects an area for 20 years, but the area is then deforested anyway, the project's emissions impact will only be transitory. While even a transitory reduction is helpful in providing the climate some short-term "relief," it is less valuable than a more permanent reduction/removal and cannot be said to be a "true" offset of a fossil fuel emission (which stays in the atmosphere for a very long time).

To comprehensively assess human-based permanence risks, the different underlying drivers of human-based deforestation are considered. As part of this assessment, four primary components of human risk are analyzed:

- **3.1.2.2.1 Land Tenure:** Whether disputable or unsecure land tenure may impact the stability of the project area's governance and protection.
- **3.1.2.2.2 Crediting Period:** Whether plans are in place to protect the forest beyond the project lifetime to ensure ongoing protection of the area.
- **3.1.2.2.3 Activity-Driver Suitability:** Whether the project's activities suitably address and mitigate the underlying drivers of deforestation for that project area.
- 3.1.2.2.4 Opportunity Cost: Whether a deforestation-linked alternative land use represents a high opportunity cost of the project activities and therefore may incentivize deforestation in the future.

3.1.2.2.1 Land Tenure

Land Tenure refers to whether any land tenure issues or uncertainties exist in the project area which impact the potential for deforestation in the future.

Rationale	Project areas that have secure land tenure are less prone to illegal settlements or the threat of communities being removed from their land. In this way, agents of deforestation from outside the project area are less likely to inhabit and control the project area.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark			\checkmark	\checkmark				
Scoring Definition	Each project is and 5 indicates agents of defor	scored on a s very secure a estation.	scale of 1 to 5, wl and stable land to	here 1 indicate enure with low	es very high lar risk of being s	nd tenure risks seized by			
Scoring ApproachMSCI ESG Research conducts a detailed review of each individual documents to identify the security and strength of land tenure rig of any current or historic land disputes. This analysis is combined on the regional stability of property and land rights.						's key the existence ird-party data			
	First, we consider the stability and security of land tenure and whether any disputes for the project area existed.								



Second, we assess the security of property and land rights within the relevant region using third party data from the World Economic Forum and World Bank. For larger countries, such as Brazil, regional state-level data is used.

3.1.2.2.2 Crediting Period Impact

Crediting Period Impact relates to whether plans are in place to protect the forest beyond the project lifetime to ensure ongoing protection of the area.

Rationale	A REDD+ project may not be oblic activities are he legally commit	A REDD+ project may have a lifetime of 30 years, beyond which the project proponents nay not be obligated to protect the area. Therefore, the risk of abandonment of project activities are heightened after the end of this project lifetime. In contrast, projects that egally commit to preserving the area beyond the project's lifetime reduce this risk.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark					\checkmark			
Scoring Definition	Each project is abandonment a period.	scored on a s and 5 indicate	scale of 1 to 5, wl es very limited ris	here 1 indicate k of abandon	es very high ris ment within a 1	k of 00-year			
Scoring Approach	MSCI ESG Rese beyond this to p projects in which higher abandor deforestation p the end of this p The total score legal commitme	MSCI ESG Research identifies the project lifetime and whether any commitments exist beyond this to protect the area. The drivers of deforestation are also considered, as projects in which the agents of deforestation are also the project participants may have higher abandonment risk after the crediting period ends. For example, planned deforestation projects with 30-year crediting periods may simply deforest the area at the end of this period. The total score is therefore determined through a consideration of both the length of legal commitment and project subtype.							

3.1.2.2.3 Activity-Driver Suitability

Activity-Driver Suitability relates to whether the project's activities are suitably targeted at addressing and countering the project's drivers of deforestation.

Rationale	Project activitie deforestation t not suitably ad ongoing threat	Project activities must be specific and relevant to the underlying drivers of deforestation to be effective. If a project area's underlying drivers of deforestation are not suitably addressed by that project's activities, then these same drivers represent ongoing threats to the project area over the project lifetime (and beyond).								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets				
,	\checkmark									
Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates very low suitability of the project's activities to the key drivers of deforestation in that project area, and 5									



indicates the project activities are highly suited to the key drivers of deforestation in that project area.

Cooring Approach	MSCI ESG Research conducts a detailed review of each individual project's key documents to understand both the underlying drivers of deforestation in the project area and the project's activities.
Scoring Approach	Each project activity is mapped to relevant deforestation drivers. The aggregated mapping of deforestation drivers across all project activities is used to score the project's suitability.

3.1.2.2.4 Opportunity Cost

Opportunity Cost refers to whether a deforestation-linked activity represents a very attractive alternative land use compared to the project scenario.

Rationale	If a deforestation-linked activity represents a significantly more attractive activity for the local community compared to the project's activities, then agents of deforestation may still be incentivized to deforest the area rather than protect it.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is opportunity cos	scored on a s st and 5 indic	scale of 1 to 5, w ates that forest p	here 1 indicate protection app	es a very high a ears relatively	apparent attractive.		
Scoring Approach	MSCI ESG Research conducts a detailed review of each individual project's key documents, including its project design document and non-permanence risk reports, to understand the financial attractiveness of alternative land uses compared to the project scenario.							
	The relative financial attractiveness of alternative land uses is compared to the project to assign a score on a 1 to 5 scale.							

3.2.1 Mitigation Activities

Mitigation Activities refers to the extent to which the project's activities address and mitigate permanence risks.

Rationale	Both human- a implementatio protection plar mitigation acti	Both human- and nature-based permanence risks can be addressed through the implementation of relevant project activities. For example, fire monitoring and protection plans can help to reduce the threat of wildfires. In this way, effective mitigation activities can reduce the significance of permanence risks.									
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets					



Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that very limited and ineffective mitigation procedures appear to be in place and 5 indicates evidence of very effective mitigation plans.
	MSCI ESG Research conducts a detailed review of each individual project's key documentation to identify the mitigation activities that the project has put in place.
Scoring Approach	Projects are then scored based on both the variety and strength of their mitigation activities. The variety of mitigation activities refers to the number of mitigation-related activities and the range of human and natural-based permanence risks that they address. The strength of mitigation activities refers to the effectiveness of each of these activities.
	The mitigation activities assessed included anti-poaching activities, fire mitigation techniques, alternative livelihood support, guards and patrols, the protection of native species and adaptive management plans.
	Projects that leverage a high variety of mitigation activities including the most effective mitigation techniques score a 5. Projects that implement limited mitigation techniques or only less effective techniques receive a score of 1.

3.4 Evidence of Non-permanence

Evidence of Non-permanence relates to whether any recent non-permanence events have been identified within the project area.

Rationale	Evidence that non-permanence events have occurred within a project area indicate the reversals have recently occurred. Though non-permanence events should in theory be accounted for in subsequent monitoring reports through the calculation of project emissions or buffer pool contributions, there is a risk that these events are not sufficiently compensated for in future.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
		\checkmark						
Scoring Definition	Each project is deforestation h report.	scored on a s has been iden	scale of 0 to -1, w tified within the p	/here -1 indica project area si	tes that a signi nce the last mo	ificant spike in onitoring		
Scoring Approach	Using geospatial analysis, MSCI ESG Research evaluates the land use change within the project area over time. For the most recent 5 years, the percentage deforestation rate within the project area is assessed to identify any recent spikes in deforestation compared to what had previously occurred.							

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8. Criterion 4 - Co-benefits

Co-benefits reflect the sustainable development benefits (and safeguards) of a project beyond the CO2e it saves – i.e., its "externalities". These are typically positive but can, on occasion, be negative.

Carbon projects have the potential to reduce/remove CO2e and simultaneously have a broader positive societal impact via issues such as development, adaptation and biodiversity.

REDD+ projects have the potential to deliver significant social and environmental outcomes outside of their emissions impact. Through protecting forested areas, REDD+ projects naturally preserve the biodiversity that lies within those areas, which can regularly be composed of rich and diverse fauna and flora. Further, given the importance of community-building initiatives to REDD+ project design, these initiatives can help to support social development goals. Though, to have a net positive social impact, it is important that these initiatives provide support beyond that which the community would have achieved from any deforestation-linked activities in the baseline scenario.

Our approach to co-benefit assessment builds on the UN's Sustainable Development Goals (SDG) framework. We focus on understanding both the SDG significance of a project and the extent to which the project provides evidence of these outcomes being achieved through effective monitoring.

Figure 11 illustrates the sub-criteria through which MSCI ESG Research assesses the co-benefits of REDD+ projects, and the Integrity Assessment framework sub-criteria that they refer to. The detailed sub-criteria are described in **Figure 12**.

Figure 11: Co-benefits integrity assessment approach





Figure 12: MSCI ESG Research Co-benefits integrity assessment framework

Sub-criteria Metrics			Rationale	REDD+	Renewables	ARR	Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Blue Carbon
ĕ	4.1.1 Project	4.1.1.1 Relevance to Project Type	Different project types have an inherently different impact on each sustainable development impact.			~	´ Stan	dardiz	zed ap	oproa	ch		
efits Relevand	Type Relevance	4.1.1.2 Contribution to Net Zero	Some project types create 'carbon lock-ins' of technologies or practices that are not compatible with a net zero economy.			~	´ Stan	dardiz	zed ap	oproa	ch		
4.1 Co-ben	4.1.2 Project	4.1.2.1 Project Intentions to Activities	The specific design and implementation of a project's activities are critical drivers for whether a project generates positive sustainable development impact.	~	~	~	~	~	~	~	~	~	~
	Relevance	4.1.2.2 Biodiversity Value	Nature-based projects that enhance or protect areas of rich biodiversity have greater environmental value.	~		~					~		~
4.2	Co-benefits	4.2.1 Certification	Achieving certification involves more stringent project verification. This improves the likelihood that a project's co-benefits have been realized.	✓ Standardized approach									
Evidence 4.2.2 Quantification of Outcomes		4.2.2 Quantification of Outcomes	Projects can increase the confidence that co-benefits are attributed to their actions through measuring, monitoring, and quantifying the outcome.	~		~	~	<		<	~		~
4.3.1 Registry Safeguards 4.3 Safeguards 4.3.2 Local Stakeholder Engagement		4.3.1 Registry Safeguards	More effective environmental and social safeguards required by registries reduce the likelihood of projects causing harm.			~	´ Stan	dardiz	zed ap	oproa	ch		
		4.3.2 Local Stakeholder Engagement	Projects that successfully engage with local stakeholders reduce the likelihood of any negative impacts occurring.	~	~	~	~	~	~	~	~	~	~
4.4 Gree	Red and en Flags	News scanning	Review of academic papers, industry sources and the news for Red or Green Flags relating to project's co-benefits.	✓ Standardized approach									

4.1.2.1 Project Intentions to Activities

While REDD+ projects can impact a range of social or environmental goals, the significance of these co-benefits is heavily determined by the project's design and implementation. A deep understanding of a project's activities and design is required to fully assess its co-benefit impact.

There are four categories of sustainable development impacts that are evaluated as part of this subcriterion:



- **4.1.3.1 Alternative Livelihoods:** Whether the project provides a superior alternative livelihood to stakeholders beyond that which would have been achieved with the previous land use.
- **4.1.3.2 Diversity and Inclusion**: Whether the project promotes and drives increased diversity and inclusion within the project area, supporting the needs of any disadvantaged groups.
- **4.1.3.3 Education and Infrastructure:** Whether the project supports and invests in local education, health and infrastructure.
- **4.1.3.4 Biodiversity:** Whether the project protects an area of high biodiversity value, supporting continued ecosystem value and resilience.

Each project is scored on a scale of 1 to 5 based on the evaluation of these metrics.

4.1.3.1 Alternative Livelihoods

When REDD+ projects change the land use within a project area, they are also changing the source of income for the households within the project area. Many communities may have financially relied on deforestation-linked activities, and therefore REDD+ projects must aim to reduce their reliance on these activities by substituting them with alternative activities that provide equal or greater benefits to the communities. If project activities do not sufficiently compensate communities, then the households may suffer a reduction in their incomes compared to what would have otherwise happened.

An assessment of Alternative Livelihoods therefore requires both understanding the opportunity cost of a project and the project's support mechanisms aimed to substitute for this opportunity cost:

- **4.1.3.1.1 Alternative Livelihoods Risk:** The extent to which the baseline scenario would have created high financial outcomes for local communities.
- **4.1.3.1.2 Alternative Livelihoods Support**: Whether the project provides attractive and sustainable opportunities and support to local communities.

Both sub-criteria are assessed on a scale of 1 to 5, with the overall score based on an equal weighting of each.

4.1.3.1.1 Alternative Livelihoods Risk

To assess alternative livelihood risk, we consider two factors are considered related to a project's opportunity cost:

- **4.1.3.1.1.1 Opportunity Cost:** Whether an alternative land use represents a financially attractive scenario for project participants.
- **4.1.3.1.1.2 Driver Relevance to Alternative Livelihood Risk**: Whether the underlying drivers of deforestation supported local community livelihoods through deforestation-linked activities.

These criteria are assessed on a scale of 1 to 5, where 1 represents high risk and 5 low risk. The overall score for 4.1.3.1.1 Alternative Livelihoods Risk is then reached by weighting these two factors 60% and 40% respectively.

4.1.3.1.1.1 Opportunity Cost

Opportunity Cost relates to whether the most profitable alternative land use is significantly more financially attractive than the project scenario.

Rationale	The extent to which projects' activities impact the financial opportunities and support
Rationale	for local communities is determined by how else the land could have been used. If this



alternative land use would have delivered high financial benefits to local communities, then the risk that the project leads to lower community support and incomes is higher.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is opportunity co	Each project is scored on a scale of 1 to 5, where 1 indicates that there is a very high opportunity cost and 5 indicates that the opportunity cost risk is very low.						
Scoring Approach	MSCI ESG Research assesses the financial attractiveness of alternative land uses for the project area. Based on the relative size of the most profitable land use compared to the project scenario, projects are categorized on a 1 to 5 scale.							

4.1.3.1.1.2 Driver Relevance to Alternative Livelihood Risk

Driver Relevance to Alternative Livelihood Risk relates to whether the underlying drivers of deforestation supported local community livelihoods through deforestation-linked activities.

Rationale	If the underlying driver of deforestation relates to a deforestation-linked activity that would have provided financial opportunities and support to local communities, then the financial opportunity cost of removing this activity is higher.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is livelihood risk a	Each project is scored on a scale of 1 to 5, where 1 indicates very high alternative livelihood risk and 5 indicates very low alternative livelihood risk.							
	MSCI ESG Research conducts a detailed review of the underlying drivers of deforestation for the project and assesses the relevance of these drivers to alternative livelihood risk.								
Scoring Approach	Each driver of deforestation is then scored based on the risk to local communities' alternative livelihoods. For example, if the underlying driver of deforestation is small-scale agriculture, then this represents a very high risk for alternative livelihoods. While commercial logging represents a lower risk.								
	The drivers of deforestation for each project are identified and combined with their relevance to alternative livelihoods risk to reach an overall score.								

4.1.3.1.2 Alternative Livelihoods Support

To assess the extent to which a project supports its local community's financial opportunities, five factors are considered:



- **4.1.3.1.2.1 Target SDGs:** Whether a project targets specific Sustainable Development Goals related to the employment and financial opportunities for local communities.
- **4.1.3.1.2.2 Overall Support Initiatives:** The extent to which a project's activities involve support initiatives directly aimed at alternative livelihoods.
- **4.1.3.1.2.3 Benefit Sharing:** The extent to which a project shares the proceeds of its revenue from carbon credits directly with local communities.
- 4.1.3.1.2.4 Job Creation: Whether a project creates quantified employment outcomes.
- **4.1.3.1.2.5 Secure Land Rights:** Whether a project secures or provides land rights to local communities to strengthen their ownership over the project area.

These criteria are assessed on a scale of 1 to 5. The overall score is based on a weighting of each of the first three sub-criteria and the maximum of the last two sub-criteria. The maximum of job creation and secure land rights is used as projects do not necessarily need to provide both to achieve a high score. A high score in one may be sufficient to providing this direct support.

4.1.3.1.2.1 Target SDGs

Whether the project targets specific Sustainable Development Goals that relate to alternative livelihood opportunities.

Rationale	Explicitly targeting certain development goals increases the chance that these goals and impacts will be emphasized and focused on by the project. That chance is further increased by the need to complete SDG goal verification process during a project's registration process.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark								
Scoring Definition	Each project is s Sustainable Dev relevant sustain	scored on a s velopment G able develop	scale of 1 to 5, w oals have been ta oment goals to al	here 1 indicate argeted and 5 ternative liveli	es that no relev indicates that t hoods have be	rant :he three most en targeted.			
Scoring Approach	MSCI ESG Rese indirectly Susta Work and Econo	arch assess inable Develo omic Growth	es whether the pr opment Goal 1 (N).	roject has targ Io Poverty), 2	eted either dire (Zero Hunger)	ectly or or 8 (Decent			
	Projects are the development im	n scored bas ipacts.	sed on the numbe	er of relevant t	argeted SDGs	or sustainable			

4.1.3.1.2.2 Overall Support Initiatives

Whether alternative livelihood support represents a clear and central part of the project.

Rationale	The extent to which the project's design and activities involve and focus on supporting alternative livelihoods indicate how relevant and significant that support is likely to be.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		

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Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that alternative livelihood activities seem to be limited to patrolling jobs, while 5 indicates that alternative livelihood activities appear to be a central part of the project.
Scoring Approach	MSCI ESG Research conducts a detailed review of key project documents to build up a comprehensive view of a project's activities. All of the activities that supported the development of alternative livelihoods are then identified, with the project scored based on the range and depth of these activities.

4.1.3.1.2.3 Benefit Sharing

Whether the project transparently shares the proceeds of carbon credit revenues with local communities.

Rationale	The proceeds of carbon credit revenues can sometimes be directly shared with local communities to ensure that they financially benefit from the project.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is appears to be in agreements, pu local communit international ch	scored on a s n place and 5 irsuant to wh ties rather tha narities) or go	scale of 1 to 5, w i indicates evider ich a significant an to larger institu overnments.	here 1 indicate nce of transpa proportion of p utions (e.g., pr	es that no bene rent benefit-sha proceeds are d rivate companio	efit sharing aring elivered to es or			
	MSCI ESG Research assesses the use of proceeds of carbon credits, and whether benefit-sharing agreements were in place.								
Scoring Approach	Both the significance and transparency of benefit-sharing agreements are assessed, and whether cash payments were provided by organizations with a transparent governance structure.								

4.1.3.1.2.4 Job Creation

Job creation relates to whether the project creates quantified employment for local communities.

Rationale	Project activities can directly provide employment opportunities to local communities and thereby contribute to sustainable alternative livelihoods.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							



Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that no employment opportunities appear to have been created and 5 indicates that a high number of jobs are likely to have been created (relative to the volume of credits issued).
	MSCI ESG Research conducts a detailed review of key project documents, including project design documents and monitoring reports, to identify the number of employment opportunities created by the project. This is then divided by the project's estimated annual emission reductions to assess the relative proportion of job creation.
Scoring Approach	This job creation is assessed through an analysis of project monitoring and verification reports, but where not available the assessment is made probabilistically based on the project design documents.
	This ratio of job creation per credit is then categorized into a 1 to 5 score. This same scoring system for jobs created per ktCO2e is used across all project types to ensure consistency.

4.1.3.1.2.5 Secure Land Rights

Secure Land Rights refers to whether the project helps to secure or provide land rights and asset ownership to local communities.

Rationale	Project activities can directly support local communities' ownership of land through helping to secure land rights or transferring rights.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark								
Scoring Definition	Each project is opportunities a are likely to have	Each project is scored on a scale of 1 to 5, where 1 indicates that no employment opportunities appear to have been created and 5 indicates that a high number of jobs are likely to have been created (relative to the volume of credits issued).							
Scoring Approach	MSCI ESG Research assesses the extent to which projects had secured land rights for local communities or engaged in transfers of asset ownerships through a detailed review of project documentation.								

4.1.3.2 Diversity and Inclusion

REDD+ projects are regularly located in rural, less developed communities in which inequality may be high and certain parts of the population disadvantaged. For example, women may hold limited governance power and have low participation in community activities. REDD+ projects can help improve the diversity and inclusion within project areas by directly promoting positive outcomes for disadvantaged groups.

To assess a project's impact on diversity and inclusion, four sub-criteria are considered:

- 4.1.3.2.1 Target SDGs: Whether a project targets specific Sustainable Development Goals related to diversity and inclusion.
- **4.1.3.2.2 Inequality Outcomes**: Whether a project explicitly improves equality within the region and local community through specific project activities.



- **4.1.3.2.3 Inclusion and Power:** Whether a project supports improved and more equal power dynamics within the region and local community.
- **4.1.3.2.4 Gender Outcomes:** Whether a project supports more equal gender outcomes through active and representative inclusion of women in project activities.

Each of these sub-criteria is assessed on a scale of 1 to 5, with the overall score based on a weighting of each. 4.1.3.2.2 Inequality Outcomes is weighted 35%, 4.1.3.2.3 Inclusion and Power and 4.1.3.2.4 Gender Outcomes are weighted 30% and 4.1.3.2.1 Target SDGs is weighted 5%.

4.1.3.2.1 Target SDGs

Target SDGs refers to whether the project explicitly targets Sustainable Development Goals related to diversity and inclusion.

Rationale	Explicitly targeting certain development goals increases the chance that these goals and impacts will be emphasized and focused on by the project. That chance is further increased by the need to complete SDG goal verification process during a project's registration process.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is Sustainable Dev the most releva	scored on a velopment G int Sustainab	scale of 1 to 5, w oals appear to ha le Development (here 1 indicate ave been targe Goals have be	es that no relev ted and 5 indic en targeted.	ant ates that both			
Scoring Approach	MSCI ESG Research conducts a detailed review of project documentation to identify whether the project has targeted either Sustainable Development Goal 5 (Gender Equality) or 10 (Reduced Inequalities).								
	Each project is sustainable dev	s then score elopment im	ed based on the pacts.	e number of	relevant targe	ted SDGs or			

4.1.3.2.2 Inequality Outcomes

Inequality Outcomes refers to whether the project supports equality in the region and local community through specific activities.

Rationale	Projects can su explicit project	Projects can support lower income, marginalized or disadvantaged groups through explicit project activities that target the wellbeing and opportunities of these groups.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark								
Scoring Definition	Each project is appear to supp are likely to hav	Each project is scored on a scale of 1 to 5, where 1 indicates that activities do not appear to support more equal financial outcomes and 5 indicates that project activities are likely to have a significant, positive impact on more equal financial outcomes.							





Scoring Approach

MSCI ESG Research assesses the extent to which project activities improve economic inequality through a detailed assessment of key project documents. Common relevant activities may include the extent to which projects provide financial incentives to local communities as part of their implementation, or the supporting of land rights.

4.1.3.2.3 Inclusion and Power

Inclusion and Power refers to whether the project supports improved and more equal power dynamics within the region and local community.

Rationale	Projects can support more equal power dynamics in a local community by ensuring all groups are included in decision-making and have equal representation in governance structures.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is appear to impro be substantially	scored on a s ove power dy / improved th	scale of 1 to 5, w namics and 5 inc rough the projec	here 1 indicate licates that po t's activities.	es that activitie wer dynamics	s do not are likely to			
Scoring Approach	A detailed assessment of project documentation and local media is conducted to assess whether all minority groups have been included in governance and the degree to which the project seems to give power to local governance.								
	Projects are scored the extent of log	ored on a 1 to cal governan	o 5 scale based o ce power.	on both the inc	lusion of spec	ial groups and			

4.1.3.2.4 Gender Outcomes

Gender Outcomes refers to whether the project supports more equal gender outcomes in the region and local community through the involvement and participation of women in the project activities.

Rationale	Projects can support more equal gender outcomes by involving women in key project activities and decisions.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark								
Scoring Definition	Each project is appear to supp seem to signifie	Each project is scored on a scale of 1 to 5, where 1 indicates that activities do not appear to support more equal gender outcomes and 5 indicates that project activities seem to significantly involve the participation of women.							
Scoring Approach	A detailed revie women in proje improved healt	A detailed review of key project documents is conducted to assess the participation of women in project activities. In particular, the proportion of people with employment, improved health and/or training that are women is identified. This assessment is							



primarily conducted through an analysis of project monitoring and verification reports, but where not available we make the assessment probabilistically based on the project design documents.

Projects are then scored based on the proportion of the project's beneficiaries that are women.

4.1.3.3 Education and Infrastructure

As well as supporting direct, near-term social impacts, REDD+ projects can lay the foundations for future development by investing in local education, health, and infrastructure.

To assess a project's impact on education and infrastructure, four sub-criteria are considered:

- **4.1.3.3.1 Target SDGs:** Whether a project targets specific Sustainable Development Goals related to education and infrastructure.
- **4.1.3.3.2 Education Impact**: Whether a project explicitly improves educational outcomes through its activities.
- **4.1.3.3.3 Health Impact:** Whether a project explicitly improves health outcomes through its activities.
- **4.1.3.3.4 Infrastructure Impact**: Whether a project explicitly improves local infrastructure through its activities.

Each of these sub-criteria is assessed on a scale of 1 to 5, with the overall score based on a weighting of each. 4.1.3.3.2 Education Impact and 4.1.3.3.3 Health Impact are each weighted 35% respectively, while 4.1.3.3.4 Infrastructure Impact is weighted 15% and 4.1.3.3.1 Target SDGs is weighted 5%.

4.1.3.3.1 Target SDGs

Target SDGs refers to whether the project explicitly targets Sustainable Development Goals (SDGs) related to education and infrastructure.

Rationale	Explicitly targeting certain development goals increases the chance that these goals and impacts will be emphasized and focused on by the project. That chance is further increased by the need to complete SDG goal verification process during a project's registration process.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark								
Scoring Definition	Each project is Sustainable De Sustainable De targeted.	Each project is scored on a scale of 1 to 5, where 1 indicates that no relevant Sustainable Development Goals have been targeted and 5 indicates that five or more Sustainable Development Goals relevant to education and infrastructure have been targeted.							
Scoring Approach	MSCI ESG Rese whether a proje education), 6 (o innovation & in	earch conduc ect has target clean water & frastructure),	ts a detailed revie ed either SDG 3 (sanitation), 7 (af 11 (sustainable)	ew of key proj (good health & fordable & cle cities & comm	ect documents wellbeing), 4 (an energy), 9 (unities), 12 (re	to identify (quality industry, sponsible			



consumption and production), 16 (peace, justice & strong institutions) or 17 (SDG partnerships).

Projects are then scored based on the number of relevant targeted SDGs or sustainable development impacts.

4.1.3.3.2 Education Impact

Education Impact refers to whether the project supports improved education outcomes through its activities.

Rationale	Projects can dir educational out	Projects can directly invest in and support local education in order to improve educational outcomes in the local community.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
_	\checkmark							
Scoring Definition	Each project is appear to impa the education o	Each project is scored on a scale of 1 to 5, where 1 indicates that the project does not appear to impact education and 5 indicates that a projects' activities seem to impact the education of a significant proportion of local households.						
Scoring Approach	MSCI ESG Rese the activities th the project sup schools). Both households tha Projects that ha at least 0.5% of	earch conduct at a project ir ports local ed the relevance t benefit from ave activities the local pop	ts a detailed revie nplements and t lucation through of activities to e n these activities that are highly re pulation achieve	ew of key proj heir relevance construction ducation and are assessed levant to impr a score of 5.	ect documents to education (of or investmer the quantified oved education	to identify e.g., whether nts in proportion of n and impact		

4.1.3.3.3 Health Impact

Health Impact refers to whether the project's activities support improved health outcomes.

Rationale	Projects can di community.	Projects can directly invest in and support improved health outcomes in their local community.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is appear to posit positively impa	scored on a s ively impact l ct the health	scale of 1 to 5, w local health and 5 of a significant p	here 1 indicate 5 indicates tha roportion of lo	es that activitie t projects' acti ocal household	es do not vities seem to s.			
Scoring Approach	MSCI ESG Rese the activities th project support	earch conduc at a project i s local health	ts a detailed revie mplements and t n through the trai	ew of key proj heir relevance ning of local d	ect documents to health (e.g. octors and nur	s to identify , whether the ses or			



investments in hospitals). Both the relevance of activities to health and the quantified proportion of households that benefit from these activities are assessed.

Projects with activities that are highly relevant to improving health outcomes and can demonstrate that they impact at least 5% of the local population achieve a score of 5.

4.1.3.3.4 Infrastructure Impact

Infrastructure Impact refers to whether the project supports the development and improvement of local infrastructure through its activities.

Rationale	Projects can directly invest in and support local infrastructure, such as roads and internet connectivity.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is appear to posit activities are lik	Each project is scored on a scale of 1 to 5, where 1 indicates that activities do not appear to positively impact local infrastructure and 5 indicates that the project's activities are likely to have a significant positive impact local infrastructure.						
Scoring Approach	MSCI ESG Research conducts a detailed review of project documents to identify the activities that the project implements and their relevance to infrastructure (e.g., whether the project supports the construction of roads or internet connectivity).							
3 1	Projects that have activities that are highly relevant to improved local infrastructure achieve a score of 5.							

4.1.3.4 Biodiversity

By protecting forested areas, REDD+ projects not only preserve the carbon captured by the forests but also the habitats and ecosystems within them. In this way, REDD+ projects have potential environmental benefits beyond their emissions impact. The significance of this impact depends on the biodiversity context (i.e., richness) of the specific project area and the activities undertaken by the project to protect, enhance and monitor that biodiversity.

To assess a project's impact on biodiversity, four sub-criteria are considered:

- **4.1.3.4.1 Target SDGs:** Whether a project targets specific Sustainable Development Goals related to biodiversity.
- **4.1.3.4.2 Geospatial Biodiversity Value:** Whether a project is located within an area of high biodiversity value.
- **4.1.3.4.3 Species Richness:** The extent to which high importance species live in a project area and are protected by the project.
- **4.1.3.4.4 Biodiversity Monitoring:** Whether a project monitors biodiversity within its project area and actively engages in activities to support and protect biodiversity.

Each of these sub-criteria are scored on a 1 to 5 scale and weighted to reach an overall score for 4.1.3.4 Biodiversity. 4.1.3.4.4 Biodiversity Monitoring is weighted 35%, 4.1.3.4.2 Biodiversity



Ecoregion and 4.1.3.4.3 Species Richness are weighted 30% and 4.1.3.4.1 Target SDGs is weighted 5%.

4.1.3.4.1 Target SDGs

Target SDGs refers to whether the project explicitly targets Sustainable Development Goals (SDGs) related to biodiversity.

Rationale	Explicitly targeting certain development goals increases the chance that these goals and impacts will be emphasized and focused on by the project. That chance is further increased by the need to complete SDG goal verification process during a project's registration process.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
	\checkmark					
Scoring Definition	Each project is sustainable dev land and water	scored on a s relopment go biodiversity s	scale of 1 to 5, wh als appear to hav sustainable devel	here 1 indicate ve been target opment goals	es that no relev ed and 5 indica have been targ	ant ates that both geted.
Scoring Approach	MSCI ESG Rese whether the pro water) and 15 (earch conduc oject has tar life on land).	cts a detailed re geted either Sus	view of key p stainable Deve	roject docume lopment Goal	nts to identify 14 (life under
	Projects are then scored based on the number of relevant targeted SDGs or sustainable development impacts.					

4.1.3.4.2 Geospatial Biodiversity Value

This criterion refers to whether the project conserves an area of high biodiversity value.

Rationale	The biodiversity impact and conservation value of a nature-based project is likely to be higher if it is located in an area of high biodiversity and species richness.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
-		\checkmark					
Scoring Definition	Each project is limited biodiver of very high bio	Each project is scored on a scale of 1 to 5, where 1 indicates the project has very limited biodiversity value, and 5 indicates the project supports and conserves an area of very high biodiversity value.					
Scoring Approach	MSCI ESG Research conducts detailed geospatial analysis on the project area to assess four components: (i) ecosystem scarcity; (ii) biodiversity intactness; (iii) biodiversity threat; (iv) biodiversity support.						
5	More detail on the approach is found in the MSCI Carbon Project Ratings Overall Methodology Note.						



4.1.3.4.3 Species Richness

Species Richness relates to the extent to which the project area hosts a range of high importance species within its ecosystem.

Rationale	Projects that preserve areas of high species richness will play a more pivotal role in protecting vital ecosystems.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
Scoring Definition	Each project is information is p that the project	Each project is scored on a scale of 1 to 5, where 1 indicates that no transparent information is provided on the animal species within the project area, and 5 indicates that the project activities are designed to support a wide range of threatened species.					
Scoring Approach	MSCI ESG Research conducts a detailed review of a project's key documents to understand the range of fauna species within the project area. In particular, both the animal species within the area and the proportion of them that are endangered or on the IUCN Red List are identified.					ents to ar, both the gered or on	

4.1.3.4.4 Biodiversity Monitoring

Biodiversity Monitoring refers to the extent to which the project engages in ongoing monitoring of the biodiversity within its area.

Rationale	Monitoring and training initiatives can help to not only track the biodiversity within a project area but also identify biodiversity opportunities and risks that a project can focus on.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is monitoring or to and tracks biod	Each project is scored on a scale of 1 to 5, where 1 indicates that no biodiversity monitoring or training activities are present and 5 indicates that the project monitors and tracks biodiversity outcomes related to at least 5 key indicators.					
Scoring Approach	MSCI ESG Research conducts a detailed review of a project's key documents to understand whether it monitors and tracks biodiversity within its area. In particular, all the key metrics that a project monitors and tracks as part of its activities are identified. These metrics include the number of flora species, number of fauna species and the importance value index of the main species.						

4.2.2 Quantification of Outcomes

Quantification of outcomes relates to whether the project monitors and/or quantifies the impact of the project on targeted Sustainable Development Goals.



Rationale

Assessing the evidence of co-benefit impacts is crucial to evaluating the degree to which co-benefits are achieved and can be attributed to a project. Projects that measure, quantify, and monitor their co-benefit impacts provide greater evidence in support of the targeted social and environmental benefits being achieved.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
Scoring Definition	Each project is or monitoring o	Each project is scored on a scale of 1 to 5, where 1 indicates there is no quantification or monitoring of SDGs and 5 indicates that benefits are quantified and monitored.					
Scoring Approach	MSCI ESG Research assesses the level to which co-benefits have been quantified and/or monitored.				uantified		

4.3 Local Stakeholder Engagement

The quality of engagement by REDD+ project organizers with local stakeholders plays a key role in ensuring communities benefit from their activities while helping to mitigate human-based permanence risk. Projects that put additional resources and time into consulting with local communities and modify project design/operations to suit locals are more likely to realize their social objectives.

This is evaluated through the following sub-criteria:

- 4.3.2.1 Effective Consultation: How effective was the project consultation process?
- **4.3.2.2 Representation and Inclusivity:** Has the project ensured proper and inclusive representation of stakeholders?
- 4.3.2.3 Access to Information: Has the project relayed relevant information to stakeholders?
- **4.3.2.4 Feedback and Grievances:** Does the project display effective feedback and grievance redressal mechanisms?

Each project is scored on a 1 to 5 scale for each of these sub-criteria. An overall score for criterion 4.3.2 is then reached by weighting effective consultation and representation and inclusivity by 35% each and access to information and feedback and grievance 15% each. Projects scoring a 5 are those that undertake substantial stakeholder consultations.

4.3.2.1 Effective Consultation

Effective consultation relates to whether the project uses best-practice techniques to engage and consult with stakeholders.

Rationale	Projects that engage with stakeholders toward the start of a project's conception and use multiple methods of in-person consultation provide more open and effective channels to engage with stakeholders and receive any feedback.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets



Scoring Definition	Each project is scored on a scale of 1 to 5, where 5 indicates that the project appeared to conduct effective in-person engagements prior to its start, and 1 indicates that very limited in-person stakeholder consultation seemed to have been performed prior to the start of the project or thereafter.
Scoring Approach	Through a detailed review of key project documents, three main components of stakeholder consultation effectiveness are assessed.
	First, the first date of stakeholder consultation is compared to the project start date. Second, the types and range of consultation conducted are considered. Third, the frequency with which ongoing consultation is conducted is assessed.

4.3.2.2 Representation and Inclusivity

Representation and Inclusivity relates to whether the project has ensured that it consults with a representative and inclusive range of stakeholders.

Rationale	Projects which consult a greater number of stakeholders tend to incorporate more representative feedback and ensure that they are designed with a representative set of stakeholder interests in mind.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is transparently co while 1 indicate consulted.	Each project is scored on a scale of 1 to 5, where 5 indicates that a project transparently consults with a representative group of stakeholders, including women, while 1 indicates that no information is provided on the which stakeholders were consulted.					
Scoring Approach	MSCI ESG Research assesses the number of stakeholders in attendance, and the proportion of attendees that are female.						

4.3.2.3 Access to Information

Access to Information refers to whether the project provides transparent and comprehensive information to local stakeholders regarding its activities.

Rationale	By providing greater access to information, stakeholders will be better informed on a project's activities and more able to provide feedback to the project.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets



Scoring Definition	Each project is scored on a scale of 1 to 5, where 5 indicates that a project provides very transparent access to information through both documentation and in-person meetings, and 1 indicates that limited access to information is provided to stakeholders.
Scoring Approach	MSCI ESG Research conducts a detailed review of relevant project documentation to understand whether in-person meetings were conducted to present project information to stakeholders and whether clear documentation was provided to stakeholders.

4.3.2.4 Feedback and Grievance

Feedback and Grievance refers to whether the project has procedures in place to receive and act on feedback received from stakeholders.

Rationale	By providing local stakeholders with a clear feedback mechanism and committing to disclose and act on this feedback, then projects are more likely to satisfy the needs of stakeholders by both listening and responding to their feedback.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
Scoring Definition	Each project is scored on a scale of 1 to 5, where 5 indicates that a project provides very transparent access to information through both its documentation and in-person meetings and 1 indicates that stakeholders appear to have only limited access to information.							
	Three aspects of a project's feedback procedure are assessed:							
Scoring Approach	 Feedback Mechanism: Whether a project has a feedback and grievance procedure in place. Feedback Disclosure: Whether a project transparently discloses any feedback received. Feedback Response: Whether a project has clearly acted on any feedback received. 							



9. Appendix – Geospatial pixel-based approach

9.1 Introduction

Evaluating the success of a REDD+ conservation effort requires the establishment of an appropriate baseline deforestation rate — i.e., what deforestation would have occurred within a project area in the absence of the conservation effort. Lately, the reasonableness of REDD+ project baselines has been called into question in both academic studies and the press.

Remote sensing, field measurements, and modelling can help establish an appropriate baseline. But this is not straightforward, with challenges including accurately measuring forest cover and changes over time, determining what constitutes deforestation, and selecting relevant layers of information about factors that are deemed to be drivers of deforestation (e.g., elevation, distance to population, etc.).

MSCI ESG Research has leveraged the latest geospatial technologies and research to develop an inhouse "pixel-based" baseline-setting tool. This tool combines geographic and demographic geospatial datasets (which contain data on relevant drivers of deforestation and/or that is highly correlated to forest loss) in order to identify similar "pixels" of land in the surrounding region that should fairly and reliably proxy the level of deforestation threat that the protected area faces.¹¹

Pixel-level matching is a standardized evaluation approach used to assess the impact of conservation policies. It takes a different approach to that found in Verra's historical REDD+ methodologies, which use actual areas of land as a reference region. In contrast, a pixel-based approach utilizes a large sample of points spread out around the surrounding region, with either a regular or random pattern, instead of a single area. While not perfect (e.g., it does not entirely account for spatial correlation, and doesn't currently include factors such as land ownership), this pixel-level approach is effective in selecting control pixels that are exposed to similar levels of deforestation threats as the REDD+ project sites, in terms of geographical and socioeconomic covariates.¹²

9.2 Inputs

9.2.1 REDD+ project boundaries

MSCI ESG Research collects the boundaries of REDD+ project and reference areas either directly from a project's carbon crediting registry or by digitizing maps found in a projects' documentation. As of September 1, 2023, 93 REDD+ project areas had been collected and analyzed, the majority of which were based in South America.

9.2.2 Environmental and socioeconomic data

MSCI ESG Research has collated data on forest cover and forest cover loss together with various socioeconomic and geographic characteristics that have been commonly linked to deforestation

¹¹ Guizar-Coutiño, A. et al. (2022). "A global evaluation of the effectiveness of voluntary REDD+ projects at reducing deforestation and degradation in the moist tropics." *Conservation Biology*.

¹² Schleicher, J. et al. (2019). "Statistical matching for conservation science." Conservation Biology.



activities, including: country boundaries, biome type, elevation, slope, distance to forest edge (as proxy for distance to roads), and population density.¹³

The Tropical Moist Forest (TMF) dataset is used to calculate deforestation rates.¹⁴ This dataset provides information on forest extent and yearly forest loss in tropical regions with annual temporal coverage from 1990 to 2022. Over 80% of REDD+ projects located in South America and 65% of the projects globally as of July 2023 are fully covered by the TMF dataset. Deforestation rates at remaining REDD+ projects are assessed using the Global Forest Change (GFC) dataset, which details forest cover and yearly forest losses and provides an annual temporal coverage from 2000 to 2021.¹⁵

The 10m resolution Countries boundaries are accessed from Natural Earth Data, and are used to ensure that pixels are selected only when located within the same political boundaries as a REDD+ project area.

Similar to the Countries boundaries, the WWF Ecoregions of the World dataset is used to delineate 16 biomes in the pixel sampling approach to ensure that pixels are selected only when located in the same climatic and environmental context as a REDD+ project area.¹⁶

Elevation and its derivative, slope, are obtained from WorldPop.¹⁷ These are extracted from the Shuttle Radar Topography Mission (SRTM) data from the year 2000.¹⁸

Population density (people/km²) data for the years 2000-2021 is collected from WorldPop. This layer estimates population density based on country-level Food and Agriculture Organization of the United Nations census data and ancillary data (e.g., land cover data) through Random Forest approach.¹⁹ To match the population pressure at a location as closely as possible to the time when the project was implemented, the population layer of the year prior to a project's starting date is selected.

Distance to forest edge (DFE) is another explanatory variable, particularly relevant for frontier deforestation.²⁰ DFE is calculated annually based on TMF forest loss data in 100 m intervals for all projects overlapping with the TMF layer. Elsewhere, DFE is based on forest loss estimates from local land use and land cover change-detection models. The DFE covariate is also extracted for the year prior to a conservation effort's starting date, to recreate a DFE as similar as possible to the conditions of the forest when a REDD+ project was implemented. As spatiotemporal road data is not

¹⁸ de Ferranti, J. (2017). Digital Elevation Data based on NASA's Shuttle Radar Topography Mission (SRTM) data.

¹³ Ford, S. (2020). "Deforestation leakage undermines conservation value of tropical and subtropical forest protected areas." Global Ecology and Biogeography.

¹⁴ Vancutsem, C. et al. (2021). "Long-term (1990–2019) monitoring of forest cover changes in the humid tropics." Science Advances.

¹⁵ Hansen M.C. et al. (2013). "High-resolution global maps of 21st-century forest cover change." Science.

¹⁶ Olson D. M. et al. (2001) *"Terrestrial Ecoregions of the World: A New Map of Life on Earth: A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity", BioScience, Volume 51, Issue 11, November 2001, Pages 933–938, <u>https://doi.org/10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.C0;2</u>*

¹⁷ University of Southampton. (2024) "WorldPop." Hub. https://hub.worldpop.org/.

¹⁹ Stevens, F. et al. (2015) "Disaggregating Census Data for Population Mapping Using Random Forests with Remotely-Sensed and Ancillary Data." PLOS ONE 10(2): e0107042. https://doi.org/10.1371/journal.pone.0107042

²⁰ Silva Junior et al. (2020). "Persistent collapse of biomass in Amazonian forest edges following deforestation leads to unaccounted carbon losses." Science Advances 6(40). DOI:10.1126/sciadv.aaz8360



commonly publicly available due to the high costs associated with continuous high-resolution (<2 m) remote sensing data, DFE is also used as a proxy for distance to roads.

9.3 Approach

9.3.1 Sampling design

Various sampling designs have been developed to evaluate the effects of REDD+ projects on protected lands, ranging from area-based to pixel-based approaches.²¹ The MSCI ESG Research baseline assessment follows a pixel-based approach to characterize the project area, as this approach has been found to accurately represent the geographic and socioeconomic conditions of the REDD+ project area.²² The selected covariates (i.e., biome type, elevation, slope, distance to forest edges, and population density) are sampled on a regular 250 x 250 m grid. The entire workflow is illustrated in Figure 13.

The baseline assessment follows a consistent sampling design to extract points from both the project area and the reference regions. To account for spatial correlation, only reference pool points in proximity of the REDD+ project location are sampled. The size of the sampling zone is a function of the size of the project area, that is, the size of the sampling zone is five times the diagonal of the bounding box surrounding the project area (but no more than 1,400 km in diameter). This ensures that the number of reference pool points is 10 or more times greater than the number of points within the project area.

Figure 13: Workflow illustrating the methodology developed by MSCI ESG Research for assessing REDD+ baselines using a pixel-based approach



²¹ Ehara, M. et al. (2021). "Allocating the REDD+ national baseline to local projects: A case study of Cambodia." Forest Policy and Economics.

²² Guizar-Coutiño, A. et al. (2022). "A global evaluation of the effectiveness of voluntary REDD+ projects at reducing deforestation and degradation in the moist tropics." Conservation Biology.



9.3.2 Matching analysis

This section describes the selection process of suitable pixels to construct a REDD+ project baseline. The matching design consists of five steps:

- 1. Preprocessing,
- 2. Distribution assessment,
- 3. Nearest neighbor (NN) training and search,
- 4. Quality and similarity assessment of matches, and
- 5. Deforestation rate calculation.

Step 1: Preprocessing

Each project is analyzed independently. As preprocessing steps, points intersecting a 10 km spillover belt, other REDD+ project areas, or protected areas are discarded to account for possible displacement of land-use activities in the proximity of protected areas.²³

Step 2: Distribution assessment

The distribution of the project points and reference pool points for each of the four continuous covariates –distance to forest edges, population density, elevation and slope – are compared through a Kolmogorov-Smirnov test.²⁴ In cases where the distribution of the points falling within the project area does not match the distribution of the reference pool points for one or more covariates, additional sets of reference pool points are sampled and extracted by extending the buffer for the reference area.

Step 3: Nearest neighbor (NN) training and search

The continuous covariates are standardized using a min-max normalization. A nearest neighbor (NN) model is used for performing statistical matching:²⁵ exact matching is used for the discrete covariates, including country and biome type, while the Mahalanobis distance metric is used for the continuous covariates.²⁶

For those REDD+ project areas intersecting with multiple terrestrial biomes, the project points are subdivided to generate *n* sets of points belonging to the same biome and country so as to ensure consistent bioclimatic conditions and environmental policies.

Step 4: Quality and similarity assessment of matches

The quality of the matches is assessed using the normalized distance between the reference pool points and the project points (Equation 9.1.). Only matches within the 95% confidence interval are

²³ Ford, S. (2020). "Deforestation leakage undermines conservation value of tropical and subtropical forest protected areas." Global Ecology and Biogeography.

²⁴ A Kolmogorov-Smirnov test assesses the maximum absolute difference between two cumulative distributions.

²⁵ Pedregosa, F. et al. (2011). "Scikit-learn: Machine Learning in Python." Journal of Machine Learning Research.

²⁶ The Mahalanobis distance metric measures the similarity between the treatment and matched control points.



considered suitable for defining the pixel-based reference region. The remaining matched reference pool points are discarded. All the points within the project area are kept.

$$dist = \frac{|x_c - x_t|}{\sigma_t} \qquad 9.1.$$

Where x_c is the value of the reference pool point matched with the project area point x_t ; while σ_t is the standard deviation calculated using all the project area points.

In cases where, after the application of the quality filter, matches need to be excluded from the analysis, an additional similarity assessment ensures that the remaining selected reference points maintain the representativeness of the project area's variance.

Thereby, a similarity score from two NN models is calculated. First, a NN model is trained on the remaining control pool points and used to find a match for each point within the project area. Then, a second NN model is trained on the project area points and a match is found for each of the remaining reference region points. The degree of intersection between the two models is then transformed to a score from 1 to 5, the similarity score (Equation 9.2.). All projects' areas for which our MSCI ESG Research-defined reference region has a score lower than 5 out of 5 are excluded from our analysis.

Similarity score $= \frac{RintP + PintR}{2} * 100$	9.2.
$RintP = \frac{R_{accepted points}}{P_{all points}}$	9.3.
$PintR = \frac{P_{accepted points}}{R_{all points}}$	9.4.

Where *RintP* represents the intersection between the reference region accepted points ($R_{accepted \ points}$) and the all the project area points ($P_{all \ points}$). Consequently, *PintR* represents the intersection between the project area accepted matches ($P_{accepted \ points}$) and all the reference region selected points ($R_{all \ points}$).

Step 5: Deforestation rate calculation

Based on the selected reference points, the deforestation rate for the reference region, including uncertainties, is calculated (Equation 9.5.).²⁷

$$r = \left(\frac{A_2}{A_1} * \frac{1}{t_2 - t_1}\right) - 1$$
 9.5.

Where t_1 and t_2 refer to points in time, e.g., the years 2000 and 2001, and A_1 and A_2 represent the forest cover extent at t_1 and t_2 , respectively.

²⁷ Puyravaud, J.-P. (2003). "Standardizing the calculation of the annual rate of deforestation." Forest Ecology and Management.


9.3.3 Uncertainty assessment

The two main sources of uncertainty in the MSCI ESG Research baseline assessment are sample matching algorithm uncertainty and dataset uncertainty. These uncertainties propagate through the analysis into the baseline calculation and are reflected in the deforestation rate uncertainty range presented.

As illustrated in Equation 9.1, the quality of the matches is assessed by considering a normalized distance between the points. A match is discarded if the points are too far apart, more specifically, if their normalized distance does not fall within a 95% confidence interval. The accepted points constitute the pixel-based reference region from which the deforestation rate is calculated. To assess the uncertainty in this approach, a pixel-based reference region that is more or less similar to the project area is established by tightening and relaxing the confidence interval. The deforestation rate from those reference areas is then calculated and the maximum and minimum annual deforestation rates are taken as a measure of uncertainty of the predicted deforestation rate.

Each of the datasets in this assessment comes with an inherent uncertainty as outlined in

Table 2. Datasets do not provide uncertainty assessments on a grid-cell level and only in a few cases (land cover, elevation) a global uncertainty measure is provided. Therefore, to assess how dataset uncertainty affects the selection of the reference region, a random variation in the values of each continuous covariate, based on its uncertainty, is introduced. The reference matching process is then repeated and the deforestation rate for those new reference regions is calculated. The variation of the resulting deforestation rate due to the randomness introduced in the initial input points is taken as a measure of uncertainty and added to the deforestation baseline bounds.

For categorical variables (such as biomes), random variations are not well defined. To assess how uncertainty in those variables (i.e., misclassified biomes) affect the project matching, and therefore the deforestation rate assessment, two scenarios are created. In the first scenario, a strict match is enforced; for example, a match is only accepted if their biome type is the same. In the second scenario, matches are allowed independent of the biome type. The variation in deforestation rates resulting from both scenarios is an adequate indication of the model's sensitivity towards this variable.

Covariate	Uncertainty	Assessment method
Land cover	Potential forest/non-forest misclassification; classification probability = 97%.	Not assessed.
Biome	Potential biome misclassification.	Variation of reference region with respect to a two-scenarios input variation.
Population density	Biases in population density, geographical and temporal patterns.	Variation of reference region with respect to a variation of input.
Elevation	SRTM root mean square = 9.73 m.	Variation of reference region with respect to a variation of input.

Table 2: Dataset uncertainty and uncertainty assessment approach



Slope	Elevation error propagated to	Variation of reference region with	
	slope and influenced by latitude.	respect to variation of input.	

9.3.4 Baseline calculation

A total of three baseline scenarios are modelled for the MSCI ESG Research-defined reference region; these depend on the time interval between the year of project start and latest available year for the land cover dataset.

The first scenario applies to the projects where the observational time interval is five or more years (90% of the analyzed projects as of September 1, 2023). In those cases, enough data is available for calculating an actual ex post deforestation rate from which to extract a baseline. In this scenario, the baseline is here defined as "ex post actual," and it is calculated by averaging five or more years of ex post deforestation rates.

The remaining projects do not have sufficient temporal coverage for actual ex post rates. Therefore, for this group of projects the ex ante – or historical – deforestation rates are used to extrapolate two baseline scenarios: the first ex post modelled baseline is calculated by averaging 10 years of historical deforestation rates, and assuming the resulting rate to be representative of future deforestation.²⁸ This modelled baseline is here defined as the "ex post modelled average." An alternative modelled baseline is assessed by fitting a line over historical rates and extrapolating the model results over the following 10 years, including the year of project start. Thus, the baseline is calculated by averaging the modelled 10 years of ex post values. This baseline is here defined as "ex post modelled linear."

²⁸ Conservation International (2013). "Project Developer's Guidebook to VCS REDD Methodologies."



10. Appendix – Key References

Schleicher, J. et al. (2019). "Statistical matching for conservation science." Conservation Biology.

Guizar-Coutiño, A. et al. (2022). "A global evaluation of the effectiveness of voluntary REDD+ projects at reducing deforestation and degradation in the moist tropics." *Conservation Biology*.

Vancutsem, C. et al. (2021). "Long-term (1990–2019) monitoring of forest cover changes in the humid tropics." *Science Advances*.

Hansen M.C. et al. (2013). "High-resolution global maps of 21st-century forest cover change." *Science*.

Pedregosa, F. et al. (2011). "Scikit-learn: Machine Learning in Python." *Journal of Machine Learning Research*.

Puyravaud, J.-P. (2003). "Standardizing the calculation of the annual rate of deforestation." *Forest Ecology and Management*.

Olson D. M. et al. (2001). "Terrestrial Ecoregions of the World: A New Map of Life on Earth: A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity", BioScience, Volume 51, Issue 11, November 2001, Pages 933–938

Hengl T, W. M. (2018). "Global mapping of potential natural vegetation: an assessment of machine learning algorithms for estimating land potential." *Biodiversity and Conservation*.

Harrison, S. (2017). BIOME 6000 DB classified plotfile version 1 (Dataset). University of Reading.

Marcel Buchhorn, B. S.-E. (2020). Copernicus Global Land Service: Land Cover 100m: collection 3: epoch 2019: Globe (V3.0.1).

de Ferranti, J. (2017). Digital Elevation Data based on NASA's Shuttle Radar Topography Mission (SRTM) data.

Columbia University. (2018). Global High Resolution Population Denominators Project. https://dx.doi.org/10.5258/SOTON/WP00674.

United Nations. (2018). Environment World Conservation Monitoring Centre and International Union for Conservation of Nature's World Commission on Protected Areas. Protected Planet.

Ehara, M. et al. (2021). "Allocating the REDD+ national baseline to local projects: A case study of Cambodia." *Forest Policy and Economics*.

Ford, S. (2020). "Deforestation leakage undermines conservation value of tropical and subtropical forest protected areas." *Global Ecology and Biogeography*.

Stevens, F. et al. (2015) Disaggregating Census Data for Population Mapping Using Random Forests with Remotely-Sensed and Ancillary Data. PLOS ONE 10(2): e0107042. https://doi.org/10.1371/journal.pone.0107042

Silva Junior et al. ,Persistent collapse of biomass in Amazonian forest edges following deforestation leads to unaccounted carbon losses.Sci. Adv.6,eaaz8360(2020).DOI:10.1126/sciadv.aaz8360



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