



MSCI Carbon Project Ratings - Mangrove Methodology

MSCI ESG Research

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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 mangrove 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 methodology also applies to MSCI ESG Research's assessment of Carbon Project Ratings and Pipeline Carbon Project Ratings for mangrove projects unless explicitly excluded in this document.

This methodology is subject to MSCI ESG Research's methodology governance and update process, as outlined in the overall methodology note. This ensures that updates and refinements to the methodology align with evolving best practices, stakeholder input, and data updates. For details on the governance process, methodology updates, and review timelines, please refer to Section 12 of the MSCI Carbon Project Ratings methodology 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 mangrove 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 mangrove projects.

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, the word integrity is used 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 Principles (CCPs), and the CCQI has developed a 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:

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

² "Beyond Value Chain Mitigation (BVCM) Research," SBTI press release, September 1, 2023.

- 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 Figure 1 and outlined in detail below.

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

Figure 1: Key components of carbon project integrity

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Introduction to mangrove projects

What are mangrove projects?

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Mangroves are coastal ecosystems found in tropical and subtropical regions, characterized by salttolerant trees and shrubs that thrive in intertidal zones. These ecosystems can provide a range of environmental, social and economic benefits. Mangroves are particularly important in the context of climate change due to their ability to sequester and store large amounts of carbon in both their biomass and soil. Indeed, as shown in Figure 2, mangroves are estimated to store up to four times more carbon per hectare than terrestrial forests.³

However, mangrove forests have faced considerable pressure over the past decades, primarily driven by human activities such as coastal development, agriculture and aquaculture. Estimates from the FAO and UNEP indicate that up to 50% of the world's mangrove cover has been lost.⁴

Mangrove projects encompass both the conservation of existing mangrove forests that are at risk from deforestation, and the restoration of mangrove forests, through creating new mangrove forests or restoring old forests. In this way, mangrove projects interconnect REDD+, afforestation, reforestation, and revegetation (ARR) and wetland restoration and conservation subtypes. Mangrove projects can be classed as REDD+ or ARR, depending on if their primary activity is the conservation of existing mangrove sites or the restoration of former mangrove sites.



Figure 2: Carbon stock density by natural ecosystem⁵

³ Alongi, D.M. (2012). "Carbon sequestration in mangrove ecosystems." Environmental Pollution 159 (8-9): 2575-2581.

⁴ Food and Agriculture Organization of the United Nations. (2023, July 26). *Global effort to safeguard mangroves steps up*. FAO. <u>https://www.fao.org/newsroom/detail/global-effort-to-safeguard-mangroves-steps-up/en</u>

⁵ Alongi, D.M., (2020). "Global significance of mangrove blue carbon in climate change mitigation." Sci 2 (3): 67.



Market Overview

As of December 2024, mangrove projects represent a relatively small, but fast-growing project type within the voluntary carbon market. As of December 2024, there were over 50 registered and pipeline projects and the 21 registered mangrove projects had issued over 12 Mt CO₂ of carbon credits.⁶ In 2019, there were only four registered projects, with over 15 registered since then, illustrating the significant growth of this project subtype.

As shown in Figure 3, the majority of mangrove ARR projects are located in Southeast Asia, while a greater proportion of mangrove REDD+ projects are located in Latin America.





Key Integrity Considerations

While mangrove projects share many of the integrity considerations of terrestrial ARR and REDD+ projects, they face several unique risks due to the nature of coastal ecosystems. In particular:

• **Coastal Permanence Risks:** Coastal ecosystems are subject to tidal fluctuations, saltwater inundation and changes in water salinity and temperature that can directly impact mangrove health and survival. Mangroves are increasingly at risk from rising sea levels caused by climate change. Therefore, mangrove projects are subject to specific natural risk factors which are less relevant for terrestrial forests. On the other hand, mangrove projects are less susceptible to risks such as drought and fire, which are particularly pertinent for terrestrial forest projects.

⁶ Registries included: Verra, Gold Standard, Climate Action Reserve, American Carbon Registry, Puro Earth, Plan Vivo, Clean Development Mechanism (NDC Eligible), BioCarbon, EcoRegistry, Climate Forward, Pacific Carbon Standard, and UK Woodland Carbon Code.

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- Soil Organic Carbon: Mangrove projects store a significantly greater proportion of carbon below ground and within soil than terrestrial forest projects. Accurate measurement of carbon stocks within soil is therefore of greater importance. However, estimation of soil carbon is both difficult and costly, and relies heavily on very effective and representative sampling strategies.
- Harvesting Potential: Mangroves are typically not as directly subject to the same threats as terrestrial forests regarding tree harvesting for timber or other wood products. While mangrove wood can be used for construction, fuel or charcoal in some regions, it is less widely harvested than terrestrial forests. However, mangroves face different threats related to human activity, such as aquaculture and coastal urban development, rather than large-scale logging.
- Nature of Human Activity: Like all nature-based projects, mangrove projects rely on the careful consideration of human activities and incentives. Effective community engagement and incentives are critical to a mangrove project. However, the nature of this human activity can be very different. In particular, mangroves may lie in coastal areas without the typical land tenure structures of terrestrial areas, where they may be considered either public or community-owned lands and be subject to overlapping claims by governments, local communities and other private entities. As land tenure is less easily defined in their areas, mangrove projects must aim to secure broad agreement across actors, including local or national governments.

MSCI ESG Research assesses each of these topics in detail when evaluating the integrity of for a mangrove project.



Approach to assessing the integrity of mangrove projects

MSCI ESG Research's assessment of mangrove projects builds on the overall MSCI Carbon Project Ratings methodology to provide more in-depth analysis of mangrove projects. This project typespecific assessment includes sub-criteria that are additional to, and partially in replacement of, the sub-criteria 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 mangrove projects.

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

In total, MSCI ESG Research assesses 14 sub-criteria and 27 metrics (see Figure 5) 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 4. These sub-criteria are focused on addressing the key drivers of integrity for mangrove projects. Each of these sub-criteria align with and replace corresponding sub-criteria scores in the overall MSCI Carbon Project Ratings methodology.

Figure 4: MSCI ESG Research Overall Carbon Project integrity assessment





Figure 5: Mangrove assessment framework



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Assessment of all other criteria and sub-criteria, for example, Criterion 5, Legal and Ethical Risks, within the mangrove 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 mangrove-specific characteristics), means that no further enhancement is required.

For a detailed explanation of MSCI ESG Research's approach to data quality and update processes — including measures to ensure data accuracy, handle missing data, and update data in a frequent and recurring manner — please refer to our overall methodology note. This document outlines the steps MSCI ESG Research takes to verify data reliability and address any data gaps, ensuring consistency and accuracy across all project types.



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 mangrove projects focuses on evaluating nine key topics. Figure 6 illustrates the project-type specific sub-criteria and metrics through which the additionality of mangrove 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 7.

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 mangrove project's tree planting activities might be very additional given there may have been few incentives for planting without carbon credits. However, if the project area was likely to experience significant plant regrowth anyway, then the project's removals may not be (fully) additional.







Figure 7: MSCI ESG Research Additionality integrity assessment framework

Sub-cı	iteria	Metrics	Rationale	REDD+ Renewables ARR Cookstoves Biochar					Landfill Gas	Safe Water	IFM	Waste Mgmt.	Mangroves
redits	ditionality	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.	~	~	~	<	~	~	~	~	~	~
1 t Carbon C	nancial Ad	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. ⁻ res withour	1.1.1 Fi	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.	~	~	~	~	~	~	~	~	~	~
Incentiv	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.	x	~	x	<	~	×	~	×	~	~
1.2 Common Market Practice Penetration			If a practice is already common within a market, it indicates that these types of project are more likely to go ahead without the introduction of carbon credits.	x	~	~	~	~	~	~	~	~	~
1.3 Le Consid	1.3 Legal Legal Considerations 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	~	~	~
1.4 Ba Approa	seline ach	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	~	x	~
1.5 Baseline		1.5.1 Baseline Transparency	Transparent detail on a project's assumptions is required to make an objective assessment of a project's performance and additionality.	~	×	~	ĸ	×	x	×	~	x	~
reaso	napieness	1.5.2 Baseline Assumptions	MSCI ESG Research assesses the key baseline scenario assumptions for each project type.	~	~	~	~	~	~	~	~	~	~
1.6 Re Green	d 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 th project still claims 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 revenue com only source	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.								
	MSCI ESG R the sources	esearch conduc of revenue of a	ets a detailed revi project.	ew of project (documentation	to identify				
	Where financial data is not present, the rough proportion of revenue is estimated for each revenue source given the project's activities. For example, for projects that engage in timber harvesting, information on the percentage of the land area that is planned to be harvested is used in order to estimate the significance of this revenue source compared to carbon credits, given estimated annual issuances and average									
	Projects then receive a score from 1 to 5 based on the proportion of revenue that carbon credits are estimated to represent in the following way:									
Scoring Approach	-	<u>5</u> = 100% of rev	enue comes from	n carbon credi	ts					
3 11 11	- <u>4.5</u> = A very high (95%+) proportion of revenue is estimated to come from carbon credits									
	-	<u>4</u> = A high (80-9 carbon credits	95%) proportion o	f revenue is es	stimated to cor	ne from				
	-	<u>3</u> = A medium (carbon credits	50-80%) proportio	on of revenue	is estimated to	come from				
	-	<u>2</u> = A low (10-50 carbon credits	0%) proportion of	revenue is es	timated to com	ne from				
	 <u>1</u> = A very low (<10%) proportion of revenue is estimated to come from carbon credits 									



1.1.1.2 IRR Analysis

It is important for mangrove projects to demonstrate that without carbon credits there would have been more profitable alternative uses of that land than conservation or tree planting. 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:

- **1.1.1.2.1 Financial Tests and Transparency**: Whether the project uses a detailed and transparent approach to their financial analysis.
- **1.1.1.2.2 Financial Differences:** Whether there is a significant difference in profitability between the most profitable alternative land use and the project's activities.
- **1.1.1.2.3 Palm Oil Plantation:** Whether the project is located in close proximity to a palm oil plantation, increasing the attractiveness of deforestation-related activities to that area.

The overall score for the sub-criterion is reached depending on project sub-type. For REDD+ based projects each of these factors are weighted at 60%, 20% and 20% respectively. Whereas for ARR projects, 1.1.1.2.3 Palm Oil Plantation is not included and the other two factors are weighted 70% and 30% respectively.

1.1.2.1 Financial Tests and Transparency

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

Rationale	A project that conducts a more detailed 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		
	\checkmark							
Scoring Definition	Each project is appear to have conducted a fu transparently in	scored on a 1 conducted ar II IRR or NPV its documen	I-5 scale, where ⁻ ny financial analy analysis, and inc itation.	1 indicates tha /sis and 5 indi luded detailed	at the project d cates that the j l cost assumpt	oes not project ions		
Secting Approach	MSCI ESG Research reviews the approach that a project took (if any) regarding its financial analysis, the types of tests performed and the transparency of financial data provided (such as regarding project costs).							
Scoring Approach	Projects are then scored on a 1 to 5 scale, with projects that have transparently disclosed all assumptions and conducted a full IRR or NPV analysis scoring the maximum score.							



1.1.2.2 Financial Differences

Financial analysis 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 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 a high opportui	scored on a qual to the m nity cost (with	1-5 scale, where ⁻ lost profitable lar hout carbon cred	1 indicates thand use and 5 in its).	at the project's ndicates that th	activities are ne project has		
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 1 to 5 scale based on this difference, with projects receiving a higher score the greater the difference in profitability.							

1.1.2.3 Palm Oil Plantations (Mangrove REDD+ only)

Palm Oil Plantations relates to the distance of the project from the nearest palm oil plantation at project start date.

Rationale	If the project is located close to palm oil plantations it suggests a higher risk of deforestation in the area and therefore the project is more likely to need additional financial incentive to prevent deforestation. Alternatively, if the project is located further from palm oil plantations it is of lower risk of deforestation and therefore less additional.							
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 the project is not located near to a palm oil plantation and 5 indicates the project is within close vicinity of a palm oil plantation.							



MSCI ESG Research identifies determines the distance from palm oil plantations using geospatial and third-party data from a global palm oil data set accounting from 1990 to 2021.⁷

Scoring Approach Projects are then scored on a 1 to 5 scale based on the distance from a palm oil plantation as follows:

-	5 = Palm oil plantation within 50 km
-	<u>4</u> = Palm oil plantation within 50 - 150 km
-	<u>3</u> = Palm oil plantation within 150 - 250 km
-	<u>2</u> = Palm oil plantation within 250 - 350 km
-	<u>1</u> = Palm oil plantation over 450 km away

1.1.3 Prior Consideration

Projects that can 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.

1.1.3.2 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.							
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 decisi inconsequentia	Each project is scored on a 1-5 scale, where 1 indicates a very significant gap between the initial decision date and the registration date and 5 indicates a short or inconsequential gap.						
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.							

⁷ Descals, A. 2024. "Global oil palm extent and planting year from 1990 to 2021" (v1.1) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.11034131



The project stated start date is compared to the registration/issuance date and then categorized the gap between these dates into a 1 to 5 scale:

- <u>5</u> = 3 years or fewer
- <u>4</u> = 3 to 5 years
- <u>3</u> = 5 to 7 years
- <u>2</u> = 7 to 10 years
- $\underline{1} = 10$ years or higher

1.1.2 Barrier Analysis

Barrier Analysis refers to whether the project accurately justifies its case that significant barriers to implementation exist that carbon credits helped to overcome.

Rationale	Projects that offer detailed evidence that carbon credits played a decisive role in them going ahead inspire greater confidence in their additionality. Projects that have conducted additionality tests, provided detailed information on their barriers, and used various, high-quality sources to support these, are more likely to be additional. High- quality sources may come through academic references or detailed surveys of the local population.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark				\checkmark	\checkmark			
Scoring Definition	Each project is a barriers to entry that there are se quality evidence	scored on a which are n everal barrier e.	1-5 scale, where ⁻ ot supported with s to entry which l	1 indicates tha n high-quality (have been sup	at there are insi evidence and 5 oported by a rai	gnificant i indicates nge of high-			
	MSCI ESG Research reviews the barrier analysis performed by a project within its key documentation.								
Scoring Approach	The strength of this barrier analysis was then evaluated based on its range and quality of evidence. For range, the number of barriers identified (such as investment, social awareness, technological) are assessed. For quality of evidence, the key sources used by the project to justify the existence of these barriers, such as primary research, financial data expert input or third-party data are assessed.								
	The number of barriers and sources of evidence are both scored on a 1 to 5 scale, with the overall score reached through weighting these factors 60% and 40% respectively.								

1.2 Common Practice

If planting initiatives were already common practice within a region at the time a project started, then it suggests that the project's activities could have been implemented without carbon credits.

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

- **1.2.1 Evidenced Common Practice:** Whether the project clearly evidences that the project was not common practice in that region.



- **1.2.2 Geospatial Common Practice:** The extent to which forest cover and growth is common in the area surrounding the project, as determined through a geospatial assessment of forest fragmentation.

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

The overall score is then based on weighting 1.2.1 Evidenced Common Practice 25% and 1.2.2 Geospatial Common Practice 75%.

1.2.1 Evidenced Common Practice

Evidenced Common Practice relates to whether the project clearly evidences that the project was not common practice in that region.

Rationale	By prov activity the nua	viding a v is not co ances of	vell-evidence ommon pract their activitie	ed justification an tice in that specif es are unique and	d evaluation t fic region, proj I not common	hat the specific ects can demo	e mitigation nstrate that		
Key Sources	Proje Docume	ect ntation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
_]							
Scoring Definition	Each pi was co reveale	roject is nducted d no sim	scored on a [·] and 5 indica illar projects	1-5 scale, where ⁻ tes a well-eviden exist in that regio	1 indicates no ced common on.	common prac practice was c	tice analysis onducted that		
	MSCI ESG Research reviews project documentation to assess what type of common practice analysis was performed and, if any, how many similar projects were identified.								
	The type of common practice analysis is scored on a four-point scale from 1 to 5 as follows:								
	- $1 = No$ common practice analysis was performed								
Scoring Approach	 <u>2</u> = Reference of common practice is only made through a simple attestation or statement with some similar activities identified 								
	-	<u>4</u> = Det similar	ailed commo activities ide	on practice analys ntified	sis was perfor	med with a nur	nber of		
	- <u>5</u> = Detailed common practice analysis was performed, incorporating a combination of primary and secondary research, and no similar activities were identified.								

1.2.2 Geospatial Common Practice

Geospatial Common Practice assesses the extent to which forest growth is common in the area surrounding the project, as determined through a geospatial assessment of forest fragmentation.

	A geospatial analysis of the areas surrounding the project can reveal whether similar
Rationale	reforestation or afforestation initiatives are common practice in the area. If the
	surrounding areas have experienced significant recent forest growth and/or have very



high forest cover, it indicates that these types of initiatives may already be common practice in that locality.

Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
-	\checkmark	\checkmark						
Scoring Definition	Each project is levels and grow have been no c	scored on a /th in forest c hanges in for	1-5 scale, where ⁻ over, and 5 indica est fragmentatio	l indicates the ates that fores n.	e surrounding a st cover is low a	area has high and there		
	Analyzing trenc to assess whet credits. If a pro- levels of forest credits may not	Is in mangrow her the proje- ject is locate cover this m t have been re	ve forest cover ch ct activity is alrea d in an area with ay suggest the ac equired for this a	aanges in surre dy common p increasing ma ctivity is comm ctivity to go ał	ounding states ractice withou ingrove forest non practice, a nead.	can be used t carbon cover or high nd carbon		
Scoring Approach	Using data from Global Mangrove Watch (2022), ⁸ both the extent of mangrove forest cover and changes in mangrove forest cover surrounding the project is assessed, where data is available.							
3 1	Each project is then scored on a 1-5 scale based on the change in forest cover as follows:							
	 <u>1</u> = For <u>2</u> = For <u>3</u> = For <u>4</u> = For <u>5</u> = For 	est cover has est cover has est cover has est cover has est cover has	s increased by mo s increased by 0.1 s had no significa s decreased by 0. s decreased by m	ore than 5% -5% nt change. 1-5% ore than 5%.				

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 of that credits plate that credits plate evidence of private ahead with the	carbon credits nyed an impor or considerat project occu	s were considered tant role in this d tion exists, there i rred without any	d prior to the p lecision proce is a higher cha expectation o	project start da ss. On the othe ance that the de f carbon credit	te indicates er hand, if no ecision to go s.
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
	\checkmark					

⁸ Bunting P., Rosenqvist A., Hilarides L., Lucas R.M., Thomas N., Tadono T., et al., "Global Mangrove Extent Change 1996–2020: Global Mangrove Watch Version 3.0." *Remote Sens*. 2022, 14: 3,657; doi.org/10.3390/rs14153657



Scoring Definition	Each project is scored on a 1-5 scale, where 1 indicates that no evidence has been made available, and 5 indicates that good quality evidence of prior consideration exists.
Scoring Approach	MSCI ESG Research identifies whether any evidence exists that carbon credits were considered prior to the project start date. This evidence may include a letter or notification of intent sent to a registry (such as CDM or Verra), the employment of a carbon credit consultant, or board meeting minutes indicating that carbon credits were analyzed.
	The date of any evidence of carbon credit consideration is then compared to the project start date to determine whether credits were considered prior to the start date or not.

1.3 Legal Considerations

Legal Considerations refers to whether projects are located in an area where the country has a high level of legislation or policy initiatives encouraging mangrove planting or protection.

Rationale	Projects implen policies or legis to be implemen targets or polici go ahead, regar	nented in cou lation or with ted without o les may incer dless of the f	Intries with a lack n low levels of en carbon credits du ntivize a mangrov financial conside	k of mangrove forcement on le to legal cons ve restoration rations of the	protection or a country level siderations. In or conservation project.	olanting are less likely contrast, legal n activity to			
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
					\checkmark				
Scoring Definition	Each project is mangrove legis and enforceme	scored on a f lation and en nt in the cour	1-5 scale, where ⁻ forcement and 5 ntry.	1 indicates the indicates a la	e country has h ck of mangrov	igh levels of e legislation			
	MSCI ESG Research reviews country legislation and policy regarding carbon market incentives, mangrove protection and increasing mangrove cover.								
	This assessment focuses on three main types of legislation and policy: (i) country or jurisdictional targets increasing mangrove forest cover; (ii) policy mandates regarding mangrove forest conservation and protection; and (iii) policies or incentives for carbon markets.								
Scoring Approacn	These policies a compared to co political instabil	are then asse ountry-level ei lity and clima	essed based on tl nforcement risks ite policy uncerta	he details of th such as corru ainty.	ne incentives. T Iption, weak ru	This is le of law,			
	This is scored c	on a scale fro	m 1 to 5 as follo	ws:					
	- <u>1</u> = Country has significant policy incentives or mandates regarding mangrove protection or restoration, which are supported by high levels of enforcement.								



- <u>2</u> = Country has material policy incentives or mandates regarding mangrove protection or restoration, though they may not be supported by high levels of enforcement.
- <u>3</u> = Country has some mangrove or carbon market policies with some level of enforcement.
- <u>4</u> = Country has limited mangrove or carbon market policies with a low level of enforcement.
- <u>5</u> = No country level mangrove or carbon market policies on the year of enforcement.

1.4 Baseline Approach (Mangrove REDD+ only)

The baseline approach is only assessed for mangrove projects which apply REDD+ activities. 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 (Mangrove REDD+ Only)

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 ra deforestation for start date will n incorporated ar	eforestation rates are subject to annual variability. Projects that assess historic leforestation for a significant period including the most recent years before the project start date will maximize the probability of recent deforestation trends being neorporated 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 deforestation a and 5 indicates	scored on a ´ nalysis was c that very rec	1-5 scale, where f conducted 10 yea ent historic defor	1 indicates that ars or more be restation anal	at a project's m fore the projec ysis was incluc	ost recent t start date, led.	
Scoring Approach	MSCI ESG Rese documentation historic defores in which histori	earch reviews to identify th station trends c deforestation	in detail a projec le time frame thro s. This time frame on analysis was p	ct's deforestat ough which th e is then comp performed to t	ion analysis wi e project evalu pared to the mo he project's sta	thin its ated its ost recent year art date.	



The difference in years between these dates is then converted into a 1 to 5 scale, with a higher score given where more recent analysis is incorporated.

1.4.2 Type of Baseline Approach (Mangrove REDD+ Only)

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

Rationale	Best-practice a appropriately a best practice has best practice ha	pproaches prov nd reasonably e ave a lower risk	ide greater lik estimated. Ap of manipulat	elihood that b proaches that ion and/or ove	aseline scenari are considered restimation.	os are scientific	
Key Sources	Project Documentation	Geospatial [Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark			\checkmark			
Scoring Definition	Each project is inappropriate a appropriate, co characteristics.	scored on a 1-5 nd aggressive a nservative appro	scale, where approach and oach that is h	1 indicates th 5 indicates th ighly suitable	at a project use at a project use to the project's	es an s an	
	MSCI ESG Research reviews in detail a project's deforestation analysis within its documentation to identify the type of modelling approach used to measure its baseline deforestation rate. For example, whether a project used a historic average, linear or logistic approach.						
Social Approach	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 incorporate spatial allocation and covariate analysis into their approaches on average received higher scores.						
			Use	of Spatial Alloc	ation and Covaria	ates	
			Neither	Spatial Allocation	Covariates Only	Both	
		Not Defined	1	2	2	3	
	Modelling	Historic Avg	1.5	2.5	2.5	3.5	
	Approach	Non-linear	2	3	3	4	
		Linear	3	4	4	5	

1.5 Baseline Reasonableness

The factors that determine how accurately a project's baseline scenario represents the amount of the CO₂e reduced/removed differ for ARR and REDD+ projects.

In the case of ARR, coastal ecosystems may experience natural biomass regrowth or regeneration even without the project's activities. The amount of carbon sequestered through these alternative non-carbon credit land uses (the baseline scenario) should be deducted from the total carbon sequestered by the project to derive the amount of carbon credits that it can issue. Therefore, it is important that ARR projects appropriately assess the potential uses of their project area, and the



associated biomass regrowth of each, in their baseline scenarios (i.e., the counterfactual scenario without the project's activities).

Whereas for REDD+, it is crucial to determine if the baseline scenario is plausible through the assessment of how appropriate the deforestation rate appears, given the history and ownership of the area and recent deforestation trends.

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.

Two sub-components are considered to evaluate a project's baseline reasonableness:

- **1.5.1 History and Ownership:** Whether the history and ownership of the project and surrounding area suggests that afforestation (for ARR) or deforestation (for REDD+) was likely.
- **1.5.2 Baseline Reasonableness:** For ARR projects, whether the project appropriately accounts for carbon removals that would have occurred without the project, given the baseline scenario. For REDD+ projects, whether the deforestation rate aligns with values from relevant academic literature and with surrounding areas.

Each of these criteria is assessed independently on a scale of 1 to 5. For mangrove ARR projects, the overall score is reached through an 80% weighting on 1.5.1 History and Ownership and a 20% weighting on 1.5.2 Baseline Reasonableness. For mangrove REDD+ projects, the overall score is reached through a 33% weighting on 1.5.1 History and Ownership and a 67% weighting on 1.5.2 Baseline Reasonableness.

1.5.1 History and Ownership

The history and ownership structure of a project area are an important input in determining the extent to which reforestation or deforestation of that area was likely in the absence of carbon credits.

Two main factors are considered as part of this assessment:

- **1.5.1.1 Plausible Ownership Structure:** Whether ARR or REDD+ activity (without credits) is plausible given the ownership structure of the project area.
- **1.5.1.2 Project Activity Suitability:** Whether project activities align with the deforestation drivers stated.
- **1.5.1.3 Forested Area History:** Whether natural reforestation is plausible given the historic levels of forest cover in the project area.

Each of these sub-criteria is assessed on a scale from 1 to 5. The overall score for ARR projects is determined based on the following weightings: 1.5.1.1 Plausible Ownership Structure 40%, 1.5.1.2 Project Activity Suitability 25% and 1.5.1.3 Forested Area History 35%. The overall score for REDD+ projects is determined on the following weightings: 1.5.1.1 Plausible Ownership Structure 55% and 1.5.1.2 Project Activity Suitability 45%.



1.5.1.1 Plausible Ownership Structure

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

Rationale	Some project a to have planted is the case, the would have oth	reas may be I trees or enfo sale of credi erwise occur	owned by individ orced forest prote ts does not remo red.	uals or organi ection, even w we any additic	zations that are ithout carbon c onal carbon ver	e more likely credits. If this sus what			
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark	\checkmark							
Scoring Definition	Each project is reforestation of reforestation of	scored on a ² r protection w r protection w	1-5 scale, where vithout credits an vithout credits.	1 indicates that d 5 indicates	at very high pla very low plausi	usibility of bility of			
	MSCI ESG Research reviews a project's documentation to identify the current landowner(s) and project proponent(s). The plausibility of reforestation or protection given that owner/proponent is then assessed with projects scored on a 1 to 5 scale based on this plausibility.								
Scoring Approach	For example, ARR projects that are run by timber companies that have a long history of growing and harvesting land are more likely to have reforested the project area anyway (and hence score a 1) versus projects that are community-owned or owned by small-scale agricultural farmers.								
	REDD+ 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. Projects that are community-owned or owned by a timber company have high plausibility and score a 5.								

1.5.1.2 Project Activity Suitability

Project Activity Suitability refers to whether the stated drivers of deforestation or causes of the baseline appear plausible given the suitability and relevance of the project's activities addressing them.

or that the	threats in the bas	seline scenario ar	e activities of re somewhat l	the project wer imited.	e not required
Project Documentat Key Sources	on Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
Scoring Definition Each proje not appea activities	ect is scored on a r to be that releva appear highly app	1-5 scale, where nt for the baseling ropriate to tackling	1 indicates that e scenario and ig the baseline	at the project a d 5 indicates th e scenario.	ctivities do at the project



MSCI ESG Research identifies the stated baseline threats and the project activities undertaken from project documentation.

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 **Scoring Approach** 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.

1.5.1.3 Forested Area History (Mangrove ARR Only)

Forested Area History relates to whether natural reforestation is plausible given the historic levels of forest cover in the project area.

Rationale	Projects that t forest regrow throughout its	ook place on r h and regenera recent history	ecently forested la ation. In contrast, i , the likelihood of i	nd are more li f the project a natural regrow	kely to exper rea has rema th is lower.	ience natural ained barren				
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets				
	\checkmark	\checkmark								
Scoring Definition	Each project i forest cover ir harvesting, an	each project is scored on a 1-5 scale, where 1 indicates that there has been very high orest cover in the project area over the past 10 years and a recent history of arvesting, and 5 indicates that there is no recent history of forest cover or forest loss.								
	For each proje based on lanc start date, 5 y date).	ect, geospatial I use cover mo ears prior to th	analysis is conduc delling of the proje e project start dat	cted to estimatect area (10 ye ect area (10 ye e, and 2 years	te the historio ars prior to the p prior to the p	c forest cover he project project start				
Scoring Approach	For projects the assessed through a see the constant of the cover trends in the previous lands of the cover trends in the cover trends in the cover trends in the cover trends in the cover trends are cover trends to the cover trends the cover trends are cover trends to the cover trends are cover tred are cover trends are cover tred are cover trends are cover tre	nat have experi ough a combina ange in land ov s also consider owner. In this v not penalized	enced recent fore ation of project do wnership that may red to control for a vay, developers tha for actions taken b	st loss, the driv cumentation a represent a de any human def at purchase lan by the previous	vers of this fo and geospatia eparture fron orestation cr nd to conserv s landowner.	orest loss are al analysis. n recent forest reated by ve and				
	Each project i years, 5 years follows:	s then scored f and 2 years pr	from 1-5 based on ior to the project s	the level of his start) and the c	storic forest drivers of fore	cover (10 est loss as				
			10 Years Prior	5 Years Pr	ior 2 Y	ears Prior				
		50%+	1	1		1				
	Recent	40-50%	2	2		2				
	forest	30-40%	3	3		3				
	cover	20-30%	4	4		4				
		<20%	5	5		5				



1.5.2 Baseline Reasonableness (Mangrove ARR only)

For ARR projects Baseline Reasonableness refers to whether the project appropriately accounts for carbon removals that would have occurred without the project, given its baseline.

Rationale	For ARR project of the project's growth through calculations. Pu their total net re	ts, an area ma activities. Pro an accountir rojects that d emovals impa	ay experience na ojects should app ng of these remo o not appropriate act.	tural biomass propriately acc vals in their ba ely account fo	growth even in count for this ca aseline scenaria r this will likely	i the absence arbon stock o over-estimate	
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark	\checkmark					
Scoring Definition	Each ARR proje high levels of b calculations, ar for baseline rer	ect is scored o aseline remo nd 5 indicates novals given	on a 1-5 scale, wh vals but does not that the project the forest cover a	here 1 indicate t accounting f appears to ha at project star	es that the project or them in their ve appropriated t date.	ect area has ^r emission ly accounted	
	For ARR project dependent on t geospatial fore which is not ac	ts the reason he amount of st cover in th counted for t	ableness of the p forest cover the e project start ye he project risks c	project's basel project accou ar. If there is a overestimation	ine removal acc unts for. This is a high level of fo	counting is compared to orest cover	
Scoring Approach	Projects are sc	ored on a sca	lle of 1 to 5 as fo	llows:			
	 <u>1</u> - Baseline forest cover is 70% or above and are not accounted for. <u>2</u> - Baseline forest cover is between 60-70% and are not accounted for. <u>3</u> - Baseline forest cover is between 50-60% and are not accounted for. <u>4</u> - Baseline forest cover is between 40-50% and are not accounted for. <u>5</u> - Baseline forest cover is below 40% or are appropriately accounted for. 						

1.5.2 Baseline Reasonableness (Mangrove REDD+ only)

For REDD+ projects Baseline Reasonableness refers to whether the project's baseline deforestation rate appears reasonable compared to literature and surrounding areas.

Rationale	For REDD+ projects, the baseline deforestation rate should be similar to that of surrounding areas without carbon projects during the crediting period. If it is significantly higher than the deforestation rates in surrounding areas it poses a risk of over-crediting.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
	\checkmark	\checkmark				



Scoring Definition	Each REDD+ project is scored on a 1-5 scale, where 1 indicates that the deforestation rate is considerably higher than surrounding area or literature values, and 5 indicates that the deforestation rate is lower than surrounding areas or literature values.					
Scoring Approach	 For REDD+ projects the baseline reasonableness is assessed through how accurately the deforestation rate is estimated. The deforestation rate is evaluated against two primary methods (i) values from relevant academic literature for mangrove deforestation rates in that region, (ii) historic deforestation trends in the surrounding (10 km) coastal region. Projects are scored on a scale of 1 to 5 as follow: <u>1</u> = Project estimated deforestation rate is significantly higher than that of literature and surrounding areas <u>3</u> = Project estimated deforestation rate is moderately higher than that of literature or surrounding areas. <u>5</u> = Project estimated deforestation rate is aligned or below that of literature and surrounding areas 					

Criterion 2 – Quantification

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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 those that have occurred 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 mangrove project's emission reductions or removals requires a complex estimation of both aboveground and soil carbon stock estimates over time. As ecosystems spread over an often very large and sometimes inaccessible areas, measurement of mangrove projects' carbon stock inevitably involves a degree of estimation and inaccuracy. The accurate assessment of soil carbon stocks is particularly important for mangrove projects, given the higher proportion of total carbon stocks that soil organic carbon represents for mangrove projects. However, accurately measuring soil organic carbon (and changes over time) is challenging and costly for developers.

Figure 8 illustrates the sub-criteria through which MSCI ESG Research assesses the quantification of mangrove projects, and the Integrity Assessment framework sub-criteria that they refer to. The detailed sub-criteria are described in Figure 9.



Figure 8: Mangrove quantification assessment approach

Figure9: MSCI ESG Research Quantification integrity assessment framework

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Sub-criteria	Metrics	Rationale	REDD+	Renewables	ARR	Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Mangroves
2 1	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 Quantification Approach 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	2.1.3 Project Approach	Two projects with the same methodology may carry different quantification risks depending on the approaches that each uses.		~	~	~	~	~	~	~	~	~
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	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.	~	~	~	~	~	~	~	~	~	~
Performance	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.			~	Stan	dardiz	zed ap	oproa	ch		

2.1.2 Project Quantification Approach

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

There are three 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.
- **2.1.2.3 Stratification**: Whether the project appears to employ an appropriate stratification of the project area.

The overall score for this sub-criterion is reached by weighting each of these factors differently depending on project sub-type. For REDD+ projects only sampling and allometric equations are included accounting for 45% and 55% respectively. Whereas, for ARR all three components are included where sampling is weighted 50%, allometric equations are weighted 35% and stratification 15%.

2.1.2.1 Sampling

Sampling relates to whether the project uses representative sampling to measure the carbon stock within the project area. For mangrove projects it is also important to use soil samples to determine soil carbon stock as this is the largest carbon pool.

Rationale	To estimate the carbon stock within their area, projects must use tree measurements from a sample area as an input in their calculations. Given these measurements are then extrapolated over the entire project area, the accuracy of them is dependent on how representative the sampled area is to the entire project area. Projects should also ensure soil samples are taken to estimate soil carbon rather than relying on default values. 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 s sampling repres representativen	scored on a S entativeness ess.	5-point scale fror s and 5 indicates	n 1 to 5, where a relatively hi	e 1 indicates a gh sampling	relatively low
Scoring Approach	MSCI ESG Research conducts a detailed review of each project's documents to understand its approach to carbon stock estimation and its sampling procedures during both its design and monitoring phases. For each project three 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. Third, the project's approach with regards to soil sampling, specifically including the number of samples and sampling depth that is conducted. Projects that sample over 0.1% of their area and support this with remote sensing and soil sampling receive the highest score of 5. Projects that sample less than 0.01% of their project area or do not provide any transparent information on their sampling receive the lowest score of 1.					



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.

Rationale	Allometric 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.							
	Projects that use a peer-reviewed equation receive 2 points. Projects receive an additional point if their equation is relevant to each of the region, tree species and forest type.							

2.1.2.3 Stratification (Mangrove ARR only)

Stratification refers to whether the project appears to employ an appropriate stratification of the project area.

Rationale	Stratification relates to the layers of different vegetation within a forest. Appropriately stratifying the project's land into areas of distinct vegetation is an important part of accurately estimating and recording the carbon stock within a project area. Projects that do not appropriately stratify their land may use samples from one vegetation layer to make estimates for another vegetation layer, which may have very different characteristics.					
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 5-point scale from 1 to 5, where 1 indicates that no stratification appears to be used despite clear differences in tree species, age and forest type, and 5 indicates that an appropriate amount of stratification has been used by the project.					



Scoring Approach	MSCI ESG Research reviews in detail each project's documentation to understand if and how they have created different strata within the project area. The number of strata is then compared to the number of tree species planted to validate whether the stratification appears appropriate based on tree types.
	Projects receive one point for stratifying their area based on species, age and region respectively (with a maximum score of 3).
	Projects then could receive an additional 2 points if the number of strata was more than the number of tree species planted in the area.
	These individual scores were then summed, with all projects receiving a score of between 1 and 5.

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 four 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 Site Preparation Project Emissions:** Whether the project has appropriately accounted for any emissions caused by preparing the site for planting.
- **2.2.4 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 and weighted differently depending on project sub-type. For mangrove REDD+ projects only carbon stock validation, conservativeness and leakage are considered, with carbon stock validation weighted 60% and conservativeness and leakage each weighted 20%. For mangrove ARR projects, all four components are considered, with carbon stock validation weighted 50%, leakage and conservativeness weighted 20% and site preparation 10%.

2.2.1 Carbon Stock Validation

Given the importance of soil carbon to the overall carbon stock within mangrove forests, an accurate assessment of the carbon stock (and changes in carbon stock) within a project area must consider in particular both above-ground biomass and soil organic carbon. Two factors are therefore considered:

- **2.2.1.1 Above-ground Biomass Validation:** Whether the project's above-ground biomass assumptions appear accurate and reasonable over the project lifetime.
- **2.2.1.2 Soil Organic Carbon Validation:** Whether the project's soil organic carbon assumptions appear accurate and reasonable over the project lifetime.

Each of these sub-criteria is assessed independently, with the overall score reached through a weighting of these two sub-criteria. For REDD+ projects, 2.2.1.1 Above-ground Biomass Validation is weighted 50% and 2.2.1.2 Soil Organic Carbon Validation is weighted 50%. For ARR projects, 2.2.1.1
MSCI 🐡

Above-ground Biomass Validation is weighted 30% and 2.2.1.2. Soil Organic Carbon is weighted 70%.

2.2.1.1 Above-ground Biomass Validation

Above-ground Biomass Validation refers to whether the project's carbon removal estimates appear accurate and reasonable.

Rationale	Estimation of the above-ground carbon stock within a project area is subject to calculation uncertainty. Estimating the change and growth in above-ground carbon stock is a key input for mangrove projects to estimate the total amount of carbon removals or reductions they have achieved. Projects that over-estimate this component of carbon stock will therefore over-estimate their emission removal/reduction impact.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
	\checkmark	\checkmark		\checkmark					
Securing Definition	Each project is s above-ground ca aboveground ca	cored on a 1 arbon stocks rbon stocks.	to 8 scale, whe and 8 indicates	re 1 indicates significant un	significant over derestimation	restimation of of			
	Any projects that appear likely to underestimate the above-ground carbon stock in the project area will therefore score above a 5 to account for the potential under-estimation.								
	MSCI ESG Research identifies the project's assumptions for above-ground biomass, including the initial above-ground carbon stock (for REDD+ projects) and the changes and growth in above-ground carbon stock (for ARR projects). As projects do not provide changes in carbon stock in a standardized way, two main inputs are considered in the following order of priority:								
Scoring Approach	- Carbon above-g	Stock Estima round carbor	ates: Project ass n stock within th	sumptions on t le project area	the total or per- over time.	hectare			
3 11 11	- Project l above-g	Removals: P round carboi	roject's claimed n stock (before a	amount of em accounting for	nission remova any baseline re	ls due to emovals).			
	The project estimated above-ground biomass values are then compared to geospatial estimates, using third-party mangrove above-ground biomass data from 2019 to compare to project estimations. ⁹ This difference is then estimated as a percentage and scored accordingly.								

⁹ Simard, M., T. Fatoyinbo, C. Smetanka, V.H. Rivera-monroy, E. Castaneda, N. Thomas, et al. 2019. *Global Mangrove Distribution, Aboveground Biomass, and Canopy Height*. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1665



2.2.1.2 Soil Organic Carbon Validation

Soil Organic Carbon Validation refers to whether the project's soil organic carbon reduction or removal estimates appear accurate and reasonable.

Rationale	Given soil organic carbon represents the largest source of carbon for most mangrove projects, accurate estimation of the soil organic carbon within a project area is also critical. Estimating the change and growth in soil organic carbon is therefore a key input for mangrove projects to estimate the amount of carbon removals or reductions they have achieved. However, soil organic carbon can be highly challenging (and costly) to measure.									
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets				
	\checkmark	\checkmark		\checkmark						
Scoring Definition	Each project is soil organic carl underestimation	scored on a 1 bon stocks (f n of soil orga	to 8 scale, when or REDD+) or gro nic carbon.	re 1 indicates owth (for ARR)	significant ove and 8 indicate	restimation of es significant				
	Any projects that appear likely to underestimate the carbon stock in the project area will therefore score above a 5 to account for the potential under-estimation.									
	MSCI ESG Research identifies the project's assumptions and estimates for both the soil organic carbon (SOC) at the project start date, and the change over time. In particular, the estimated rate of change of SOC or SOC accumulation rate is identified for each project.									
Scoring Approach	An assessment of SOC and changes over time has considerable uncertainty. Therefore, the accuracy and reasonableness of a project's SOC estimates are assessed in three ways to avoid any overreliance on a single piece of analysis: (i) validation of initial SOC levels against third-party soil carbon datasets; ¹⁰ (ii) comparison of soil organic carbon rates of change against a range of academic literature estimates for the rate of change observed in mangrove forests; (iii) comparison of SOC rates of change against other similar mangrove projects									
	As many project comparing the p literature, where project. Projects higher as they a	ts use a defa project's assu available, ca s with rates o re more cons	ult rate of chang imption against in help to determ f change below servative estimat	e to estimate country-specif nine the suitab the literature a tes.	soil carbon inc fic values from ility of the defa assumptions ar	rease, academic ault rate to the e scored				
	This is also compared to country-specific values, where available, across other projects as a benchmark to determine if there are any clear outliers.									

¹⁰ Sanderman, J., Hengl, T., Fiske, G., Solvik, K., Adame, M.F., Benson, et al., 2018. "A global map of mangrove forest soil carbon at 30 m spatial resolution. *Environmental Research Letters*," 13 (5): 055002.





2.2.2 Conservativeness

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

Rationale	The carbon stock of a forested area comprises not only the trees that are visible above- ground, but also below-ground biomass, 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. For mangrove projects the key carbon pools are above-ground biomass, below-ground biomass and soil carbon. If projects only include these pools they can be seen as more conservative and at lower risk of over-estimation.								
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 scale of 4.5 to 5, where 4.5 indicates no optional carbon pools were excluded from a project's calculations and 5 indicates that, conservatively, only biomass carbon pools were included in a project's carbon stock calculations.								
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; be ground biomass; dead wood; wood products; soil organic carbon and litter.Given that each of these pools has different significance to the overall carbon the proportion of the total carbon stock that any excluded pools likely represe estimated based on analyzing a sample of similar projects. For example, dead litter account for a very small percentage of carbon stock and therefore are a to over-estimation.									
	All projects receive a score of at least 4.5 for including mandatory above-ground, below-ground biomass and soil carbon sources. Projects then receive an additional 0.2 point if they conservatively excluded dead wood or litter, and 0.1 points if they conservatively excluded wood products.								



2.2.3 Site Preparation Project Emissions (Mangrove ARR only)

Site Preparation Project Emissions refers to whether the project has appropriately accounted for any emissions caused during the preparation of its land for planting.

Rationale	When preparing land prior to planting, the site preparation activities involved may release carbon into the atmosphere. Therefore, it is important that projects that conduct site preparation activities that risk creating project emissions appropriately account for these in their net emission calculations.								
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 no project emissions are accounted for despite material site preparation risk and 5 indicates that project preparation emissions are appropriately accounted for.								
	MSCI ESG Research conducts a detailed review of each individual project's key documents to understand the type of site preparation conducted prior to the project start date, including the proportion of soil disturbed and if this explained and accounted for.								
Scoring Approach	 Each project is then scored as follows: <u>1</u> = Projects with high soil disturbance with no explanation or accounting for related project emissions. <u>3</u> = Projects with some soil disturbance but with no explanation or accounting. <u>5</u> = Projects with no soil disturbance or which have minimal soil disturbance and provide an explanation and account for it within project emissions. 								

2.2.4 Leakage

Leakage relates to whether the project appropriately accounts for and compensates for the threat of leakage.

Rationale	Leakage can occur when a project's activities cause an increase in emissions elsewhere. In the case of mangroves, the risk of leakage are relatively low due to the fact that the market for mangrove harvesting is significantly smaller than for terrestrial forests.									
Kationale	Although less r areas there ma fishing, which o surrounding ar	elevant for m y be a relianc could be sprea ea.	angrove projects e on the project a ad elsewhere and	, it is still a ke area for an alt d lead to defor	y consideratior ernative livelind restation of ma) as in some bod, such as ngroves in the				
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 no leakage deduction is made despite a material leakage threat and 5 indicates that leakage is appropriately accounted for.									
	MSCI ESG Research conducts a detailed review of each individual project's key documents to understand what the previous land use was and whether any leakage consideration and deduction had been made.									
	Leakage is assessed based on the risk of leakage given the baseline scenario, if there has been a reduction on forest cover in the surrounding area since the project start and if the project has considered and made any deductions for leakage threats.									
	Each project is then scored as follows:									
Scoring Approach	 <u>5</u> = Very limited leakage threat exists, or leakage appears to have been appropriately accounted for in project calculations. <u>3</u> = Leakage threats may exist but have only been partially considered or accounted for in project leakage deductions. <u>1</u> = High leakage threats but with no consideration in project calculations. 									
	Academic literature has demonstrated that the effects and risks of leakage for ARR projects are generally significantly lower than for other nature-based projects (such as REDD+). Hence, the minimum score ARR projects can achieve for this sub-criterion is a 3.									

2.3 Monitoring Performance

The frequency and accuracy of the project's monitoring plan is important to ensure carbon stock is increasing as expected throughout the crediting period. Project data is compared to relevant literature to determine whether the monitoring performance appears reasonable.

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

- 2.3.1 Monitoring Frequency: Whether the monitoring frequency appears reasonable.
- 2.3.2 Mortality and Survival Rates: Whether the project monitors and provides details of mortality and survival rates.

This criterion is assessed differently depending on the project type. For mangrove REDD+ projects it is solely based on 2.3.1 Monitoring Frequency. Whereas for mangrove ARR projects 2.3.1 Monitoring is weighted 65% and 2.3.2 Mortality and Survival Rates are weighted 35%.



2.3.1 Monitoring Frequency

Monitoring relates to whether the project frequently monitors carbon stock.

Rationale	As tree growth may vary over time, it is important to ensure this is monitored throughout the project activity to ensure any changes in carbon stock are accounted for. Therefore, a project regularly monitoring its carbon stock will provide a more accurate account of the CO ₂ sequestered over time. A more effective monitoring plan will ensure monitoring occurs annually to accurately estimate carbon stock changes.								
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
Scoring Definition	Each project is scored on a 5-point scale from 1 to 5, where 1 indicates monitoring every five years and lacks transparency regarding monitoring reports. Where 5 indicates regular monitoring is completed by the project and monitoring reports are made publicly available.								
Scoring Approach	MSCI ESG Research assesses the frequency of carbon stock monitoring from each project's documentation and the number of monitoring reports since project start date.								

2.3.2 Mortality and Survival Rates (Mangrove ARR only)

Mortality and survival rates are key elements to monitor throughout a mangrove ARR project to ensure the project is performing as expected and, if not, then this is being considered in quantifying carbon stock.

Rationale	Not all mangrove trees planted will survive and develop to maturity. Therefore, it is critical that mangrove projects continuously monitor survival rates, as this will help to ensure reliable estimates of carbon stock within the project area at a point in time. Monitoring survival and mortality also helps to identify whether the selected species are suited to the specific site conditions, such as salinity, hydrology and soil type. High survival rates and low mortality rates may therefore suggest that the mangrove ecosystem is developing as planned, which is essential for long-term permanence.								
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 5-point scale from 1 to 5, where 1 indicates no disclosure of mortality or survival rates has been found within project documentation, and it is therefore unclear if it has been incorporated in carbon stock calculations. A score of 5 indicates mortality or survival rates are monitored over time and are used to determine carbon stock.								
Scoring Approach	MSCI ESG Research extracts mortality and survival rates from project documentation, in particular, in a project's monitoring reports to assess whether projects regularly monitor their mortality and survival rates.								



Projects that do not provide any information on the number of trees, mortality rates or survival rates receive a score of 1. Projects that do track at least one of these metrics through successive monitoring reports receive a score of 5.

For projects that have not completed their first monitoring period, this sub-criterion is not scored.



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.

Mangrove projects can involve permanence risks in both successfully establishing a forest and in maintaining and protecting it. For ARR based projects in the early stages, as trees grow and forest cover increases, it is imperative that projects undertake planting strategies to ensure planted trees survive. When significant forest cover is established, both REDD+ and ARR mangrove projects involve both inherent human and natural permanence risks in protecting the area. For example, forests may be at risk of being damaged by coastal flooding or other natural disasters.

The significance of the overall permanence risk to a project 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 compensated for through either buffer pool contributions or alternative mechanisms (such as insurance).

Given the interplay of permanence risk, mitigation and compensation activities, the overall permanence assessment is conducted in three main steps:

- **Significance of Risks:** Each relevant risk factor is primarily assessed on a 1 to 5 scale that signifies the proportion of credits at risk of reversal and the likelihood of this occurring. These 1 to 5 scores are also converted into a percentage of carbon stock at risk, which represents a more quantitative measure the percentage of carbon stocks that are expected to be at risk, mitigated for or compensated for. These risks are then individually summed to reach an overall permanence risk, reflecting the percentage of all achieved emissions reductions that would be expected to be reversed without any mitigation or compensation activities.
- Net Permanence Risk: The extent to which applied mitigation activities address the nonpermanence risks defined in the significance of risk. This is to ensure that the relevant mitigation activities are used to reduce the relevant components of non-permanence risks for the project.
- **Post-Compensation Risk:** Comparing the net permanence risk score to the buffer pool contribution to ensure any risks that are not mitigated are accounted for.

The remaining % of credits therefore represents either the proportion of credits that are either undercompensated for or over-compensated for. A negative post-compensation risk score indicates that the buffer pool appears over-sufficient given the net permanence risk of the program. While a positive post-compensation risk score indicates that the buffer pool appears under-sufficient given the net permanence risk of the program.



The assumptions regarding the percentage of carbon stock at risk from each risk component, as well as the percentage of risk components that each mitigation activity can reduce, are outlined in Appendix A.

Figure 10 illustrates the sub-criteria through which MSCI ESG Research assesses the permanence of the emissions reductions achieved by mangrove projects, and the Integrity Assessment framework sub-criteria that they refer to. The detailed sub-criteria are described in Figure 11.





Figure 11: MSCI ESG Research Permanence integrity assessment framework

Sub	ıb-criteria Metrics Rationale						Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Mangroves
evel of Non-	3.1.1 Project Type Risk	Project Type Significance	Different project types have inherently different levels of non-permanence risk.	✓ Standardized approach									
3.1 Le Dorm		3.1.2.1 Natural Risks	The risk of fire, drought, landslide and other natural risks in that project area.	~		~					~		~

¹¹ The approach to assess 3.2.2 Local Stakeholder Engagement is outlined in Section 4.3.2, Local stakeholder engagement.



	3.1.2 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.	~		~					~		~
3.2 Mitigation		3.2.1 Mitigation Activities	Projects can mitigate non-permanence risks through implementing activities that focus on addressing key risks.	~		~	~	~		~	~		~
		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 Comj and	pensation	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	A buffer pool should have mechanisms in place to ensure projects appropriately account for and estimate their buffer pool credits.	✓ Standardized approach										
3.4 E Non- Perm	3.4 Evidence of Non- Permanence		If significant reversals have occurred without being accounted for, then carbon stock reversals have already occurred.	✓		~					~		
3.5 Red and Green Flags		News scanning	Review of academic papers, industry sources and the news for Red or Green Flags relating to project's permanence.	s g ✓ Standardized approach									

3.1.2: Significance of Risks

Significance of Risks describes the extent to which natural or human risks will lead to a reduction in permanence of the project activity.

In order to assess this, it is key to consider the following two criteria:

- **3.1.2.1 Natural Risks**: The significance to which natural risks such as drought, landslides, sea level rise or soil salinity may risk the loss of carbon sequestered in mangrove forests.
- **3.1.2.2 Human Risks**: The significance to which human risks such as land tenure, crediting periods or opportunity costs may risk the loss of carbon sequestered in mangrove forests.

The significance of risk is scored on a 1 to 5 basis which is then converted into a percentage risk to assess the proportion of credits which must be accounted for through either mitigation or buffer pool contribution to ensure the project is permanent.

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.

	Natural disturbances, such as drought, landslides, sea level rise or soil salinity, can
Rationale	threaten the CO_2e stored in mangrove carbon pools. These risks are most relevant for
	nature-based projects, where the CO_2e is stored in carbon pools that are susceptible to



a range of natural risks. For example, drought may put the trees' survival at risk within a mangrove ARR or 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			\checkmark						
Scoring Definition	Each project is scored on a 5-point scale from 1 to 5 for each natural risk type, where 5 indicates no permanence risk and 1 indicates a very significant permanence risk.										
	MSCI ESG Research considers four main types of natural risks for mangrove projects: (i) drought, (ii) landslide, (iii) sea level rise; and (iv) soil salinity. These risks are assessed independently using MSCI ESG Research's geospatial analysis.										
Scoring Approach	Major natural ri of its boundary, historical trend in-house climat temperatures a within that proj	sks are asses as shown in s and pattern e models tha nd climates c ect boundary.	ssed for each inc Table 1 . For eac s of natural risk. t account for the change. This mod	lividual project h risk, MSCI Es Then, these ris projected cha delling results	t through geos SG Research lo sks are forecas ange in likeliho in a specific es	patial analysis oks at the st using our od as stimate of risk					
	More detail on MSCI ESG Research's geospatial permanence methodology can be found in a forthcoming separate methodology document: "MSCI Carbon Project Ratings - Geospatial Methods in Assessing Permanence"										

Table 1: Analytical approach for each natural risk

	Drought	Forecasts the intensity and frequency of drought risk for each project.
L Natural Risks	Landslide	Assesses the percentage of project areas that are currently susceptible to landslides based on the NASA landslide susceptibility map. ¹²
	Sea Level Rise	Global sea level rise predictions under 2°C and 3°C warming scenarios. ¹³
	Soil Salinity	Soil salinity changes assessed from 1986 to 2016 to determine if the project area is susceptible to changes in soil salinity. ¹⁴

3.1.2.1.3 Sea Level Rise

Sea Level Rise refers to the significance of rising sea levels to the project area. This is a risk specific to coastal projects where they are more susceptible to sea level rise.

¹² 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.

¹³ Garner, G. G., Hermans, T., Kopp, R. E., Slangen, A. B. A., Edwards, T. L., Levermann, A., et al. (2021). IPCC AR6 Sea Level Projections (Version 20210809) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.6382554

¹⁴ Ivushkin, K., Bartholomeus, H., Bregt, A.K., Pulatov, A., Kempen, B. and De Sousa, L., 2019. "Global mapping of soil salinity change." *Remote Sensing of Environment* 231: 111260.



Rationale	Due to the coas due to the risk long-term perm soil salinity whi	Due to the coastal nature of the projects, mangroves are at higher risk of sea level rise due to the risk of flooding and reduced project area. This is a particular risk for the long-term permanence of the project. The rise in sea level may also lead to increased soil salinity which puts projects with salt-tolerant species at lower risk.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark	\checkmark			\checkmark		
Scoring Definition	Each project is rise and 5 indic	scored on a s ates very low	scale of 1 to 5, wl v risk of sea level	here 1 indicate rise.	es very high ris	k of sea level	
	MSCI ESG Rese Change (IPCC) project area to and +3°C from	earch leverag AR6 Sea Leve assess likely 2000 to 2100	es data from the el Global Projecti sea level rises ba). ¹⁵	Intergovernmo ons to conduc ased on globa	ental Panel on ct geospatial a l warming scer	Climate nalysis on the narios of +2°C	
The score is based on the expected average annual increase in sea level r Scoring Approach both scenarios. Each project is then scored as follows:					ise under		
	 <u>1</u> = Expected Sea level rise above 6 mm per year <u>2</u> = Expected Sea level rise from 5 to 6 mm per year <u>3</u> = Expected Sea level rise from 4 to 5 mm per year <u>4</u> = Expected Sea level rise from 3 to 4 mm per year <u>5</u> = Expected Sea level rise below 3 mm per year 						

3.1.2.1.4 Soil Salinity

Soil Salinity refers to the extent to which the project area is at risk of increasing soil salinity over time.

Rationale	Increasing sea Mangroves are health of some projects involvi	Increasing sea level rise may lead to increased soil salinity in coastal areas over time. Mangroves are at particular risk of increases in soil salinity, which can impact the health of some mangrove tree species. This risk is therefore especially relevant for projects involving mangrove species which have low salt tolerance.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
		\checkmark			\checkmark		
Scoring Definition	Definition Each project is scored on a scale of 1 to 5, where 1 indicates very high risk of increased soil salinity and 5 indicates very low risk of increased soil salinity.				k of increased		

¹⁵ Garner, G. G., Hermans, T., Kopp, R. E., Slangen, A. B. A., Edwards, T. L., Levermann, A., et al. (2021). IPCC AR6 Sea Level Projections (Version 20210809) [Data set]. Zenodo. <u>https://doi.org/10.5281/zenodo.6382554</u>



MSCI ESG Research leverages data from the Global Soil Salinity Map on a timeseries from 1986 to 2016 to conduct detailed geospatial analysis on the project area.¹⁶ Through this analysis, areas of higher risk to soil salinity change can therefore be identified.

In general, projects which are at risk of becoming slightly saline are of higher risk than those in areas with non-saline soil.

Scoring Approach Each project is then scored as follows:

- <u>1</u> = Soil salinity increases by greater than 0.0006 decisiemens per meter $(dS/m)^{-1}$ each year.
- $\underline{2}$ = Soil salinity increases by 0.0004 to 0.0006 dS/m⁻¹ each year.
- 3 = Soil salinity increases by 0.0002 to 0.0004 dS/m⁻¹ each year.
- $\underline{4}$ = Soil salinity increases by 0 to 0.0002 dS/m⁻¹ each year.
- <u>5</u> = There is no expected soil salinity over time.

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. For example, if an ARR project successfully grows a forest in an area for 20 years, but the area is then deforested anyway, the project's emissions impact will only have been 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 fossil fuel emissions (which stay in the atmosphere for a very long time).

To assess human-based permanence risks, one must consider the different underlying drivers of human-based deforestation. As part of this assessment, three 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 Project Lifetime:** 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 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.

RationaleProject 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.

¹⁶ ISRIC Data Hub. 2019. "Global Soil Salinity Map." https://data.isric.org/geonetwork/srv/api/records/c59d0162-a258-4210-af80-777d7929c512z.



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	Each project is scored on a scale of 1 to 5, where 1 indicates very high land tenure risks and 5 indicates very secure and stable land tenure with low risk of being seized by agents of deforestation.					
	MSCI ESG Rese to identify the s current or histo regional stabilit	MSCI ESG Research conducts a detailed review of each individual project's documents to identify the security and strength of land tenure rights and the existence of any current or historic land disputes. This is then combined with third-party data on the regional stability of property and land rights.					
Scoring Approach	First, the stability and security of land tenure and whether any disputes for the project area existed is considered. Projects with very secure and stable rights received a score of 5. While projects with insecure land rights and known disputes received a score of 1.						
	Second, the security of property and land rights within the relevant region is assessed using third party data from the World Economic Forum and World Bank. For larger countries, such as Brazil, regional state-level data is used. Each area was scored on a 1 to 5 scale based on the stability of property rights and land rights recognition.						
	The overall project score is based on a straight average of these two scores.					es.	

3.1.2.2.2 Project Lifetime

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Project Lifetime relates to whether plans are in place to protect the forest beyond the immediate crediting period to ensure ongoing protection of the area.

Rationale	A mangrove project may have a lifetime of 30 years, beyond which the project proponents may not be obligated to protect the area. Particularly for ARR focused projects if they are run by timber companies, it is crucial that the crediting period extends beyond the normal harvesting cycle practiced by the project developer. The risk of abandonment of the project activities are heightened after the end of this project lifetime. In contrast, projects that legally 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.	Each project is scored on a scale of 1 to 5, where 1 indicates very high risk of abandonment and 5 indicates very limited risk of abandonment within a 100-year period.					
Scoring Approach	MSCI ESG Rese beyond this to considered, as participants ma	earch identific protect the ar projects in w ay have highe	es the project life ea. Further, the d hich the agents c er abandonment r	time and whe Irivers of defo of deforestatic risk after the c	ther any comm restation are al on are the proje rediting period	itments exist so ct 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.

		Leng	Length of legal commitment (No. of years)				
		0-29	30-39	40-99	100+		
Project	Conservation	2	3	4	5		
type	Commercial	1	2	3.5	5		

3.1.2.2.3 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 an alternative community con be incentivized	f an alternative land use 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 grow and protect it.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is cost seems to e	scored on a s exist and 5 inc	scale of 1 to 5, w dicates that fore	here 1 indicate st protection a	es a very high c appears relative	opportunity ely attractive.	
	MSCI ESG Rese including its pro the financial att	MSCI ESG Research conducts a detailed review of each individual project's 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.					
Scoring Approach	ring Approach Based on the relative financial attractiveness of this alternative land use compared the project scenario, projects are scored on a 1 to 5 scale.					compared to	
	For example, if the most profitable land use would have been 100% or more financi attractive compared to the project scenario then the project receives a score of 1.				re financially ore of 1.		

3.2.1 Mitigation Activities

Projects can mitigate both natural and human-based permanence risks through their project design and implementation. Though it is not possible for project developers to completely eliminate risks of reversals which lie outside of their control, risks can be reduced and contained through careful project design and implementation.

Based on the strength of each mitigation activity, mitigation activities are then assumed to mitigate a percentage of each relevant risk. Each project is then scored as a percentage of remaining risk after the mitigations have been considered.

In order to assess the effectiveness of mitigation activities, one must consider the full spectrum of activities that affect the underlying natural or human-based drivers of permanence risk.

As part of this assessment, seven primary components of mitigation are analyzed:



- **3.2.1.1 Ecosystem Diversity and Resilience:** Whether the project's planting strategy supports a biodiverse and resilient ecosystem within the project area.
- **3.2.1.2 Site Selection**: Whether the project has considered inherent natural risks to the project location.
- **3.2.1.3 Salt Tolerance:** Whether the is planting or protecting salt-tolerant species to reduce the risk of soil salinity and sea level rise to the project.
- **3.2.1.4 Alternative Livelihoods:** Whether the project creates sustainable and attractive alternative livelihoods for communities that incentivize the continuation of the project's activity and forest maintenance.
- **3.2.1.5 Ownership and Management:** Whether the project's owners and managers have a track record of successfully running similar projects.
- **3.2.1.6: Long Term Commitment:** Whether the project has a long-term commitment in place to prevent the risk of short crediting periods.
- **3.2.1.7: Legal Considerations:** Whether the country has legislation in place to prevent the risk of mangrove deforestation.

3.1.2.1 Ecosystem Diversity and Resilience

Ecosystem Diversity and Resilience refers to whether the species planted or protected supports a biodiverse and resilient ecosystem within the project area.





MSCI ESG Research reviews key project documentation to identify the number and type of mangrove species planted or protected to determine whether these species are suited to the environment planted.

Projects are then scored based on both the types and range of tree species planted:

			Νι	umber of tree specie	es
Scoring			Not found	Monoculture	Multi-species
Approach		Not found	1	1	1
	Types of	Non-native species	1	1	3
tree	tree species	Partially native species	1	2	4
		Fully native species	1	3	5

3.2.1.2 Site Selection

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Site Selection refers to whether the project has considered inherent natural risks to the project location.

Rationale	By considering the site conditions prior to project implementation, project developers can reduce the risk of applying project activity to areas which have enhanced natural risks and may not be suitable for the full crediting period.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is transparently as for the project of factors to deter	Each project is scored on a scale of 3 to 5, where 3 indicates that the project has not transparently assessed any site conditions to determine whether the site is appropriate for the project design, and 5 indicates that the project has considered all identified factors to determine the conditions of the site area.						
	MSCI ESG Rese conditions asse the project con type, (iii) annua level of erosion	earch reviews essed during siders the fol I rainfall, (iv) and (vii) if fa	key project docu the project develo lowing seven fac minimum temper arming has taken	imentation to opment proce tors: (i) the he ratures, (v) ma place on the p	identify the release. This includ right of tides, (i aximum temper project area.	evant site es whether i) the soil ratures, (vi)		
Scoring Approach	Projects are then scored based on the number of these factors which have been considered during development as follows:							
	 <u>5</u> = The project considers five or more of the factors when selecting the site. <u>4.5</u> = The project considers four of the factors when selecting the site. <u>4.25</u> = The project considers three of the factors when selecting the site. <u>4</u> = The project considers two of the factors when selecting the site. <u>3.5</u> = The project considers one of the factors when selecting the site. <u>3</u> = The project does not consider any of the factors when selecting the site. 							





3.2.1.3 Salt Tolerance

Salt Tolerance refers to whether the project is planting or protecting salt-tolerant species to reduce the risk of soil salinity and sea level rise to the project.

Rationale	If salt-tolerant species are selected or maintained in the project area, they will like less impacted and have lower risk of mortality due to sea level rise or soil salinity This is particularly relevant for ARR mangrove projects where salt-tolerant specie- help to support longer term permanence.					will likely be salinity risks. t species may
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
	\checkmark			\checkmark		
Scoring Definition	Each project is have low salt to tolerance to sal	Each project is scored on a scale of 1 to 5, where 1 indicates that all species plante have low salt tolerance, while 5 indicates that all species planted have high levels or tolerance to salt.				
Scoring Approach	MSCI ESG Research uses academic literature to research the mangrove species planted or protected for each project to determine the level of salt tolerance.					
	Each project is then scored based on the percentage of species in the project area which have high levels of salt tolerance.					

3.2.1.4 Alternative Livelihoods

Alternative Livelihoods relates to whether the project creates sustainable and attractive alternative livelihoods for communities that incentivize the continuation of the project's activity and forest maintenance.

Rationale	Projects that create sustainable and attractive economic opportunities for local communities increase the likelihood that those communities will be incentivized to continue with the project's activities beyond the project lifetime.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is support an attr baseline scena supported.	Each project is scored on a scale of 1 to 5, where 1 indicates that the project does not support an attractive alternative livelihood for local communities compared to the baseline scenario, and 5 indicates that very attractive alternative livelihoods are supported.					
Scoring Approach	The score for this sub-criterion is based on the score for 4.1.2.1 Alternative Livelihoods, which includes a detailed review of the net impact of the project on the social and economic wellbeing of local communities.						



3.2.1.5 Ownership and Management

Ownership and Management refers to whether the project's owners and managers have a track record of successfully running similar projects.

Rationale	Project developers with significant experience in successfully running similar projects may have both lower execution risk and lower risk of abandonment.						
Key Sources	Project Documentation	Pro Geospatial Metho Docum	oject Acac odology Liter nentation	lemic Third-pa ature Data	arty MSCI Carbon Markets		
	\checkmark				\checkmark		
Scoring Definition	Each project is sco does not have or d indicates that the project design and	Each project is scored on a scale of 1 to 5, where 1 indicates that the project developer does not have or does not appear to have any experience in running similar projects, and 5 indicates that the project developer appears to have significant experience in mangrove project design and implementation.					
	Through an analys MSCI Carbon Marl developer is asses for project manage	sis of both project do ket's database of car ssed. Where a non-pe ement is also incorpo	cumentation, pro bon projects, the rmanence report prated.	ject developer w experience of th t has been provid	ebsites and the e project's led, the risk score		
	Each project is the	en scored on a scale	of 1 to 5 as desc	ribed below:			
Scoring			Prio	r project managen	nent		
		Not available	1	1	3		
	Project	0	1	1	3		
	management risk score	-2	3	3	4.5		
		-4	4	3	5		

3.2.1.6 Long-Term Commitment

Long Term Commitment refers to whether the project has a long-term commitment in place to prevent the risk of short crediting periods.

Rationale	Projects providing details of a long-term commitment through contracts or longer crediting periods ensure the carbon is sequestered for a longer period of time and is therefore of greater permanence.							
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 the project does not appear to have a long-term commitment, and 5 indicates that the project has described a long-term commitment outside of the crediting period.							
Scoring Approach	MSCI ESG Reso committed to r	MSCI ESG Research assesses project documentation to determine if the project has committed to maintaining the project activities beyond the crediting period through a						



legal commitment. Each project is then scored based on the presence or absence of this legal commitment, with a score of 5 achieved for projects that have a legal commitment beyond the crediting period and a score of 1 indicates that no legal commitment has been identified.

3.2.1.7 Legal Considerations

Legal Considerations refers to whether the country has legislation in place to prevent the risk of mangrove deforestation.

Rationale	Projects located in countries with higher levels of supportive legislation regarding mangrove projects may mitigate some human risks of deforestation during the project's crediting period.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
				\checkmark	\checkmark	\checkmark		
Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that the project is in a country which lacks supportive legislation protecting or planting mangroves and has low levels of enforcement and 5 indicates that the project is located in a country which has strong legislation protecting or planting mangroves and high levels of enforcement.							
Scoring Approach	The score for this sub-criterion is based on the score for 1.3 Legal Considerations, which includes a detailed review of legislation supporting the protection and planting of mangroves combined with the use of policy data to determine the level of enforcement the country is likely to apply. This score is reversed compared to that of the Additionality criterion to take into account the extent to which this legislation will enforce project activity.							



Criterion 4 – Co-benefits

Co-benefits reflect the sustainable development benefits (and safeguards) of a project beyond the CO₂e it saves, in other words, 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.

Mangrove projects have the potential to deliver significant social and environmental outcomes in addition to their emissions impact. Through planting or protecting trees, mangrove projects can create and protect forested areas that support and enrich wildlife habitats and soil health, though for ARR projects this impact is highly dependent on the suitability and diversity of tree species planted. Mangrove projects can also support social development goals through community development initiatives that promote economic, health or diversity outcomes within the community that lives around the project area.

MSCI ESG Research's approach to co-benefit assessment builds on the UN's Sustainable Development Goals (SDG) framework. The focus is 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 12 illustrates the sub-criteria through which MSCI ESG Research assesses the co-benefits of mangrove projects, and the Integrity Assessment framework sub-criteria that they refer to. The detailed sub-criteria are described in Figure 13.



Figure12: Co-benefits integrity assessment approach





Figure 13: MSCI ESG Research Co-benefits integrity assessment framework

Sub	Sub-criteria Metrics Ratio		Rationale	REDD+	Renewables	ARR	Cookstoves	Biochar	Landfill Gas	Safe Water	IFM	Waste Mgmt.	Mangroves
4.1.1 4.1.1 4.1.1 4.1.1 Relevance to Project Type Project Type Relevance 4.1.1.2 Contribution to Net Zero		4.1.1.1 Relevance to Project Type	Different project types have an inherently different impact on each sustainable development impact.	✓ Standardized approach									
		4.1.1.2 Contribution to Net Zero	Some project types create "carbon lock-ins" tof technologies or practices that are not compatible with a net zero economy.	✓ Standardized approach									
4.1.2.1 Project 4.1.2 4.1.2 4.1.2 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		4.1.2.2 Biodiversity Value	Nature-based projects that enhance or protect areas of rich biodiversity have greater environmental value.	~		~					~		~
4.2.1 Co-benefits Evidence 4.2.2 Quantifi Outcom		4.2.1 Certification	Achieving certification involves more stringent project verification. This improves the likelihood that a project's co-benefits have been realized.			~	Stan	dardiz	ed ap	proa	ch		
		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 Safequards		4.3.1 Registry Safeguards	More effective environmental and social safeguards required by registries reduce the likelihood of projects causing harm.			~	Stan	dardiz	ed ap	proa	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.			~	Stan	dardiz	ed ap	proa	ch		

4.1.2.1 Project Intentions to Activities

While mangrove 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 detailed understanding of a project's activities and design is hence required in order to fully assess its co-benefit impact.



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

- **4.1.2.1 Alternative Livelihoods:** Whether the project provides a superior alternative livelihood to stakeholders beyond that which would have been achieved with the previous land use.
- **4.1.2.2 Diversity and Inclusion**: Whether the project promotes and drives increased diversity and inclusion within the project area, supporting the needs of any disadvantaged groups.
- **4.1.2.3 Education and Infrastructure:** Whether the project supports and invests in local education, health and infrastructure.
- **4.1.2.4 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. These are weighted differently for REDD+ and ARR mangrove projects. For ARR the first three are each weighted 20%, and Biodiversity is weighted as 40%. Biodiversity is weighted slightly higher given its direct relevance to all mangrove projects, and the fact that the other three criteria are less relevant to ARR projects based in remote regions. Whereas for REDD+ projects, Alternative Livelihoods is weighted at 35%, Diversity and inclusion weighted at 20%, Education and infrastructure weighted at 20% and Biodiversity weighted at 25%.

4.1.2.1 Alternative Livelihoods

When mangrove projects are implemented, whether they are ARR or REDD+ based, they will impact the economic opportunities that are available to local communities through land usage. For example, for ARR projects, local communities may have relied on the land for agricultural purposes, and therefore must ensure that they are promoting alternative livelihoods that still provide equal or greater benefits to any impacted local communities. For REDD+ projects, local communities may have financially relied on deforestation-linked activities and therefore projects must substitute them with alternative activities providing equal or greater benefits to 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 (and may then disrupt the project activities, by, for example, deforesting the replanted land).

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

- **4.1.2.1.1 Alternative Livelihoods Risk:** The extent to which the baseline scenario would have created financial opportunities for local communities.
- **4.1.2.1.2 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 reached by weighting these two factors 35% and 65% respectively.



4.1.2.1.1 Alternative Livelihoods Risk

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

- **4.1.2.1.1.1 Opportunity Cost:** Whether an alternative land use represents a financially very attractive scenario for project participants.
- **4.1.2.1.1.2 Previous Land Use Risk:** Whether the prior land use and baseline land type supported local community livelihoods through economic activities.

These criteria are assessed on a scale of 1 to 5, where 1 represents high risk and 5 represents low risk. The overall score for 4.1.2.1.1 Alternative Livelihoods Risk is then reached by weighting these two factors 60% and 40%, respectively.

4.1.2.1.1.1 Opportunity Cost

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

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 there is a very high opportunity cost and 5 indicates that the opportunity cost risk is very low	Rationale				
Scoring Definition 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.	Key Sources				
Scoring Definition Each project is scored on a scale of 1 to 5, where 1 indicates that there is a very high					
opportanity cost and o malcates that the opportanity cost lisk is very low.	Scoring Definition				
MSCI ESG Research assesses the financial attractiveness of alternative land uses for the project area.	Scoring Approach				
Scoring Approach 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. For example, if the most profitable land use would have been 100% or more financially attractive compared to the project scenario, then the project receives a score of 1.					



4.1.2.1.1.2 Previous Land Use Risk

Previous Land Use Risk relates to whether the previous or baseline land use supported local community livelihoods through agricultural or harvesting activities.

Rationale	If the previous or baseline land use of the project area would have provided financial opportunities and support to local communities, then the financial opportunity cost o removing this activity is higher.							
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 high alternative livelihood risk and 5 indicates very low alternative livelihood risk.							
	MSCI ESG Research conducts a review of the previous and baseline land use for the project and assessed the relevance of these to alternative livelihood risk.							
Scoring Approach	Each land use type is scored based on the risk to local communities' alternative livelihoods. For example, if the baseline land use is agriculture, then this represents a very high risk for alternative livelihoods. If the prior land use was barren land without any commercial activities, then the alternative livelihoods risk is lower.							
	The baseline and previous land use types for each project is then combined with their relevance to alternative livelihoods risk to reach an overall score.							

4.1.2.1.2 Alternative Livelihoods Support

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

- **4.1.2.1.2.1 Target SDGs:** Whether a project targets specific sustainable development goals related to the employment and financial opportunities for local communities.
- 4.1.2.1.2.2 Livelihood Improvements: The extent to which a project's activities involve support initiatives directly aimed at improving local livelihoods.
- **4.1.2.1.2.3 Benefit Sharing:** The extent to which a project shares the proceeds of its revenue from carbon credits directly with local communities.
- 4.1.2.1.2.4 Job Creation: Whether a project creates quantified employment outcomes.

These criteria are assessed on a scale of 1 to 5. The overall score is based on a weighting of these factors, with 5% weighting to 4.1.2.1.2.1 Target SDGs, 15% to 4.1.2.1.2.2 Livelihood Improvements, 50% to 4.1.2.1.2.3 Benefit Sharing and 30% to 4.1.2.1.2.4 Job Creation.



4.1.2.1.2.1 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 MSCI C Data Mark			
	\checkmark							
Scoring Definition	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 three sustainable development goals relevant to alternative livelihoods have been targeted.							
	MSCI ESG Rese indirectly sustai Work and Econo development im opportunities) a	arch assess inable develo omic Growth ipacts menti ire identified	es whether the p opment goal 1 (N). For projects th oned by the proje	roject has targ lo Poverty), 2 (at do not use s ect (such as el	jeted either dire Zero Hunger) o SDGs, all the su mployment and	ectly or or 8 (Decent ustainable d job		
Scoring Approach	Projects are the SDGs either exp	n scored on licitly or imp	a 4-point scale b licitly mentioned	based on the n	umber of releva	ant targeted		
	- $\underline{1}$ = No relevant SDGs either implicitly or explicitly mentioned - $\underline{3.5}$ = 1 relevant SDGs either implicitly or explicitly mentioned - $\underline{4.5}$ = 2 relevant SDGs either implicitly or explicitly mentioned - 5 = 3 relevant SDGs either implicitly or explicitly mentioned							

4.1.2.1.2.2 Livelihood Improvement

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 not only supporting but improving 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 3 to 5, where 3 indicates insufficient data on improved livelihoods, while 5 indicates that a significant proportion of locals have improved livelihoods due to the project activity.							
Scoring Approach	MSCI ESG Research conducts a detailed review of key project documents to determine whether the extent of improved livelihoods, measured by the number of people that benefit from improved livelihoods, are quantified.							



This value is then compared to the annual estimated emission reductions/removals, to then determine the extent of livelihood improvement on a per-credit basis.

4.1.2.1.2.3 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		
	\checkmark							
Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that no benefit sharing appears to be in place and 5 indicates that transparent benefit sharing agreements, within which a significant proportion of proceeds are delivered to local communities rather than to larger institutions (e.g., private companies or international charities) or governments.							
	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.							
	Projects receive up to 3 points based on the presence and transparency of any benefit sharing agreements, and up to 2 points based on the presence of cash payments and governance of these payments. Therefore, in total, projects that have transparent benefit sharing agreements including direct cash payments and a reliable governance structure to manage these receive the maximum 5 points.							

4.1.2.1.2.4 Job Creation

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

Rationale	Project activitie and therefore c	Project activities can directly provide employment opportunities to local communities, and therefore 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 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).							

MSCI ESG Research reviews each project's documents to identify the types, permanence and number of employment opportunities created by a project. Projects are scored on a 1 to 5 scale separately on both the number of employment opportunities created and the type and permanence of those opportunities. The number of employment opportunities is weighted 60% and type and permanence of employment opportunities 40% to reach the overall score.

Number of Employment Opportunities

For job creation, the total number of jobs is divided by the project's estimated annual emission reductions to assess the job creation on a relative basis.

This ratio of job creation per credit is categorized into a 3 to 5 score, where 5 indicates that over 5 jobs were created per $1,000 \text{ t } \text{CO}_2$ credits. This same scoring system for jobs created per kiloton (kt) CO₂e is used across all project types to ensure consistency.

Scoring Annroact						-
	bbroach	ADD	מו	rın	CO	S

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Points awarded	No. jobs per kt CO ₂ e
3	0
3.5	0-1
4	1-2.5
4.5	2.5-5
5	5+

Type and Permanence of Job Opportunities

The types and permanence of the jobs created by the project are analyzed. The types of jobs evaluated included planting, monitoring, harvesting, management, ecotourism, site preparation and maintenance jobs. The score for Type and Permanence of Job Opportunities was then based on both of these inputs:

			Number o	f different ty	pes of jobs	
		1	2	3	4	5
Permanence	All Temporary	1.0	1.375	1.75	2.125	2.5
of jobs	All Permanent	3.0	3.5	4.0	4.5	5.0

4.1.2.2 Diversity and Inclusion

Mangrove 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. Mangrove projects can help improve diversity and inclusion in the surrounding area by directly including and promoting the outcomes of disadvantaged groups.

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

- 4.1.2.2.1 Target SDGs: Whether a project targets specific sustainable development goals related to diversity and inclusion.
- **4.1.2.2.2 Zero Employment Discrimination:** Whether a project explicitly practices zero employment discrimination within their operations.



- **4.1.2.2.3 Female Empowerment:** Whether a project supports more equal gender outcomes through active and representative inclusion of women in project activities.
- **4.1.2.2.4 Land Rights:** Whether a project strengthens local land tenure rights and prevents the expulsion of communities from the project area.

Each of these sub-criteria is assessed on a scale of 1 to 5, with the overall score based on a weighting of each. 4.1.2.2.1 Target SDGs is weighted 5%, 4.1.2.2.2 Zero Employment Discrimination is weighted 10%, 4.1.2.2.3 Female Empowerment is weighted 50% and 4.1.2.2.4 Land Rights is weighted 35%.

4.1.2.2.1 Target SDGs

Target SDGs refers to whether the project explicitly targets sustainable development goals (SDGs) 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	
	\checkmark						
Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that no relevant sustainable development goals appear to have been targeted and 5 indicates that both the most relevant sustainable development goals have been targeted.						
	MSCI ESG Research conducts a review of project documentation to identify whether the project has targeted either sustainable development goal 5 (Gender Equality) or 10 (Reduced Inequalities).						
Scoring Approach	Each project is then scored on a 3-point scale from 1 to 5 based on the number of relevant targeted SDGs: - <u>3 =</u> No relevant SDGs - <u>4 =</u> 1 relevant SDGs - <u>5 =</u> 2 relevant SDGs						

4.1.2.2.2 Zero Employment Discrimination

Zero Employment Discrimination relates to whether the project actively and explicitly practices zero employment discrimination as part of its project activities.





Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that activities do not appear to do anything proactive to ensure zero discrimination and 5 indicates that projects explicitly support zero employment discrimination practices.
	MSCI ESG Research reviews both registry safeguard policies and project documentation to assess the extent to which projects have complied with zero employment discrimination practices.
Scoring Approach	Projects that explicitly practice zero employment discrimination achieve a score of 5. Projects that do not explicitly reference their practice of zero employment discrimination, but this is required through the associated registry standards receive a 3. If a project makes no explicit reference to it, and its registry does not require it, then the project receives a 1.

4.1.2.2.3 Female Empowerment

Female Empowerment relates to whether a project supports more equal gender outcomes through active and representative inclusion of women in 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		
Scoring Definition	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	MSCI ESG Research conducts a review of key project documents 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 assessed through an analysis of project monitoring and verification reports.							
	Projects are then scored based on both whether the project's activities explicitly target improved gender outcomes and the proportion of the project's beneficiaries that are women in the following way:							
	 <u>1</u> = Project provides no additional benefits to women and employs under 35% women in project activity. <u>3</u> = Project provides some additional benefits to women and employs between 35% and 45% women in project activity. <u>5</u> = Project provides several additional benefits to women's wellbeing and employs over 50% women in project activity. 							



4.1.2.2.4 Land Rights

Land rights relate to whether a project supports local land rights and prevents the expulsion of local communities from the project area.

Rationale	Projects can support land tenure rights by ensuring communities are not removed from the area and avoiding land tenure disputes.								
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 activities do not appear to support land tenure rights and remove communities from the project area and 5 indicates that project activities seem to support land tenure rights in addition to avoiding land tenure disputes or removal of communities.								
	MSCI ESG Research conducts a review of key project documents to assess the mention of land tenure and communities in the project area.								
Scoring Approach	Projects are then scored based on both whether the project's activities explicitly target land tenure rights and if local communities remain in the project area in the following way:								
	 <u>1</u> = Project appears to displace or remove local communities from the project area during the project's implementation, and/or appears to cause land tenure disputes. 								
	- <u>3</u> = Pro local c tenure	 <u>3</u> = Project does not appear to cause land tenure disputes or any expulsion of local communities, however it does not appear to directly strengthen land tenure rights. 							
	- <u>5</u> = Pro area, v	oject directly s vithout creatir	supports and stre ng and land tenur	engthens land e disputes and	tenure rights ir d/or displacem	n the project lent.			

4.1.2.3 Education and Infrastructure

As well as supporting direct, near-term social impacts, mangrove 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, three sub-criteria are considered:

- **4.1.2.3.1 Target SDGs:** Whether a project targets specific sustainable development goals related to education and infrastructure.
- **4.1.2.3.2 Education and Training Outcomes:** Whether a project explicitly supports and monitors improved education and training through its activities.
- 4.1.2.3.3 Other Infrastructure Impacts: Whether a project provides additional health or infrastructure projects 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. 4.1.2.3.2 Education and Training Outcomes is weighted 70% and 4.1.2.3.3 Other Infrastructure Impacts is weighted 25% while 4.1.2.3.1 Target SDGs is weighted 5%.



4.1.2.3.1 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 dev sustainable dev 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 Research conducts a review of key project documents to identify whether a project has targeted either SDG 3 (Good Health & Wellbeing), 4 (Quality Education), 6 (Clean Water & Sanitation), 7 (Affordable & Clean Energy), 9 (Industry, Innovation & Infrastructure), 11 (Sustainable Cities & Communities), 12 (Responsible Consumption And Production), 16 (Peace, Justice & Strong Institutions) or 17 (SDG Partnerships). Projects are then scored based on the number of relevant targeted SDGs: - 1 = no relevant SDGs - 4 = three relevant SDGs - 3 5 = two relevant SDGs - 5 = five or more relevant SDGs						

4.1.2.3.2 Education and Training Outcomes

Education and Training Outcomes related to whether a project explicitly supports and quantifies improved education and training through its activities.

Rationale	Projects can directly contribute to and quantify improved education and training outcomes in their local community.					
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 a project does not appear to positively impact local education and training, and 5 indicates that a projects' activities seem to positively impact the education and training of a significant proportion of local households.					
Scoring Approach	MSCI ESG Research reviews key project documents to assess both the relevance of activities to education and training, and the quantified number of people that benefit from these activities. Projects with activities that are highly relevant to improving					



education outcomes and can demonstrate that they impact the local population achieve a score of 5. Remaining projects are scored 1-5 based on the following parameters:

- <u>3 = No education or training initiatives.</u>
- <u>4</u> = Education and training opportunities are quantified and project activities contribute to education opportunities such as subsidized school fees or education provisions.
- <u>5 =</u> Education and training are provided to at least 5% of the population and the project contributes towards subsidizing education.

4.1.2.3.3 Other Infrastructure Impacts

Other Infrastructure Impacts relates to whether a project supports health or infrastructure improvements.

Rationale	Projects can directly contribute to improving health and infrastructure in their local communities.						
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 a project does not appear to positively impact local health or infrastructure, and 5 indicates that a projects' activities seem to positively impact the local health and infrastructure.						
Scoring Approach	MSCI ESG Research reviews key project documents to assess the relevance of activitie to healthcare and infrastructure improvements. Projects with activities that are highl relevant to improving infrastructure and healthcare achieve a score of 5. Remainin projects are scored 1-5 based on the following parameters: - <u>3 = No healthcare and infrastructure initiatives.</u>						
	 <u>4 =</u> Project activities contribute to healthcare or infrastructure opportunities such as transport, renewable energy or healthcare investments. <u>5 =</u> Several healthcare and infrastructure benefits provided by project activities and is a key component of community benefits. 						

4.1.2.4 Biodiversity and Nature Impact

Mangrove projects not only provide carbon benefits, but also can enrich and support diverse habitats and ecosystems within them. In this way, mangrove projects have environmental benefits beyond their emissions impact.

The significance of this impact depends on the type and range of trees planted or protected, 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 and nature, four sub-criteria are considered:

- **4.1.2.4.1 Habitat:** Whether a project enhances and protects habitats within the project area.
- **4.1.2.4.2 Water Quality:** The extent to which the project improves and monitors the water quality within its area.



- **4.1.2.4.3 Soil Health:** The extent to which the project improves and monitors soil health within its area.
- **4.1.2.4.4 Species Impact**: Whether a project considers the impact on species and their relevance to the project area.

Each of these sub-criteria is scored on a 1 to 5 scale and weighted to reach an overall score as follows: 4.1.2.4.1 Habitat is weighted 30%, 4.1.2.4.2 Water Quality is weighted 20%, 4.1.2.4.3 Soil Health is weighted 25% and 4.1.2.4.4 Species Impact is weighted 25%.

The project area's geospatial biodiversity value is also assessed for each mangrove project to determine whether the project is located within an area of high biodiversity value. The approach for this follows the same approach for all nature-based projects, and is outlined in sub-criteria 4.1.2.2 and described in the overall MSCI Carbon Project Ratings methodology document, "MSCI Carbon Project Ratings and Assessments Methodology."

Further, the individual project analysis above is also combined with a project type assessment outlined in sub-criteria 4.1.1.1, which is conducted separately for habitat, pollution, water quality and soil health for mangrove projects.

4.1.2.4.1 Habitat

To assess the projects impacts on habitats, five factors are considered:

- **4.1.2.4.1.1 Target SDGs:** Whether the project targets specific sustainable development goals that benefit the habitat.
- **4.1.2.4.1.2 Habitat Protection:** Whether the project considers habitat protection and land management within project activities.
- **4.1.2.4.1.3 Ecoregions:** Whether the project is located in an area of high biodiversity value.
- **4.1.2.4.1.4 Environmental Monitoring:** Whether the impacts of project activities on the local habitat are monitored and assessed.
- **4.1.2.4.1.5 Timber Harvesting:** Whether project puts the habitat at risk through continued harvesting.

These criteria are assessed on a scale of 1 to 5, where 1 represents high risk and 5 represents low risk. The overall score for 4.1.2.4.1 Habitat is then reached by weighting these factors as follows: 4.1.2.4.1.1 Target SDGs weighted 5%, 4.1.2.4.1.2 Habitat Protection weighted 20%, 4.1.2.4.1.3 Ecoregions is weighted 30%, 4.1.2.4.1.4 Environmental Monitoring is weighted 30% and 4.1.2.4.1.5 Timber Harvesting is weighted 15%.

4.1.2.4.1.1 Target SDGs

Target SDGs refers to whether the project explicitly targets sustainable development goals (SDGs) related to habitat protection.



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 relevant sustainable development goals have been targeted and 5 indicates that five or more sustainable development goals relevant to habitat protection have been targeted.							
	MSCI ESG Research conducts a review of key project documents to identify whether a project has targeted either SDG 14 (Life Below Water) or 15 (Life On Land).							
Scoring Approach	 ch Projects are then scored based on the number of relevant targeted SDGs: <u>3</u> = No relevant SDGs <u>4</u> = 1 relevant SDG <u>5</u> = 2 relevant SDGs 							

4.1.2.4.1.2 Habitat Protection

Habitat Protection refers to whether the project considers habitat protection and land management as a core component of the project's activities.

Rationale	Projects implementing activities which will lead to habitat protection and land management have a lower risk to the habitat than those which focus on carbon benefits.							
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 3 to 5, where 3 indicates no mention of habitat protection and 5 indicates project activity will lead to habitat protection and improved land management.							
	MSCI ESG Research conducts a review of key project documents to identify whether each project focuses on habitat protection in addition to carbon benefits or considers improved land management in project activities.							
	Project types are then scored on a scale of 3 to 5 as follows							
Scoring Approach	 <u>3</u> = Project does not mention habitat protection or land management. <u>4</u> = Project activity directly involves habitat protection or improved land management <u>5</u> = Project activity directly involves both habitat protection and improved land management. 							


4.1.2.4.1.3 Ecoregions

Ecoregions refers to whether the project is located in an area of high biodiversity value.

Rationale	Projects impler surrounding ha	Projects implemented in areas of high biodiversity value suggest greater benefits to the surrounding habitat.							
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets			
		\checkmark							
Scoring Definition	Each project is an area which i project area is l	Each project is scored on a scale of 3 to 5, where 3 indicates the project is located in an area which is not part of the top 200 ecoregions and 5 indicates that the whole project area is located in a top-200 ecoregion.							
	MSCI ESG Research conducts detailed geospatial analysis on the project area to compare to the World Wildlife Fund's Global 200, which represent the world's most distinctive biodiversity regions, to determine what percentage of the project area is located within the global 200. ¹⁷								
	Projects are then scored on a scale of 3 to 5 as follows								
Scoring Approach	 <u>3</u> = Less than 20% of the project area is within an ecosystem of high biodiversity value. 								
	 <u>3.5</u> = 20-40% of the project area is within an ecosystem of high biodiversity value. <u>4</u> = 40-60% of the project area is within an ecosystem of high biodiversity value. <u>4.5</u> = 60-80% of the project area is within an ecosystem of high biodiversity value. <u>5</u> = 0ver 80% of the project area is within an ecosystem of high biodiversity value. 								

4.1.2.4.1.4 Environmental Monitoring

Environmental Monitoring refers to whether the impacts of project activities on the local habitat are monitored and assessed.

Rationale	Projects using habitat will incl monitored. This assessments t	Projects using multiple measures to determine the project's impact on the surrounding habitat will increase the likelihood that the protection of the habitat is accurately monitored. This may also be applied for projects implementing environmental impact assessments to ensure the projects will not negatively affect the surrounding habitat.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							

¹⁷ Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., et al. 2001. "Terrestrial ecoregions of the world: a new map of life on Earth." *Bioscience* 51(11): 933-938.



Scoring Definition	Each project is scored on a scale of 3 to 5, where 3 indicates a lack of monitoring and environmental impact assessment and 5 indicates that the project applies multiple methods of environmental monitoring and has assessed the environmental impacts.						
	MSCI ESG Research conducts a review of key project documents to identify the type of monitoring used, such as GIS, field surveys or conducting local interviews, and to determine if an environmental impact assessment has been performed.						
	Projects are then scored on a scale of 3 to 5 as follows						
Scoring Approach	 <u>3</u> = Project has implemented no environmental monitoring and lacks an environmental impact assessment <u>4</u> = Project has used either field or GIS monitoring and may have performed an environmental impact assessment. <u>5</u> = Project applies multiple methods of environmental monitoring and has assessed the environmental impacts. 						

4.1.2.4.1.5 Timber Harvesting

Timber Harvesting refers to whether project puts the habitat at risk through continued harvesting.

Rationale	A project imple compared to a	A project implemented while continuing to harvest the area could put the habitat at risk compared to a project focused on conservation.						
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets		
	\checkmark							
Scoring Definition	Each project is place in the pro harvesting will t	Each project is scored on a scale of 1 to 5, where 1 indicates that harvesting will take place in the project area and 5 indicates that the project is conservation-led and no harvesting will take place during the crediting period.						
	MSCI ESG Research conducts a review of key project documents to identify whether harvesting is part of the project activity or is a risk to the project area.							
	Projects are then scored on a scale of 1 to 5 as follows							
Scoring Approach	 <u>1</u> = Pro the hab <u>5</u> = Pro the hab 	ject activity i vitat. ject activity o vitat.	nvolves harvestir does not involve	ng and potenti harvesting an	ially will reduce d has a focus	e the quality of on conserving		

4.1.2.4.2 Water Quality

To assess the project's impact on water quality, two factors are considered:

- **4.1.2.4.2.1 Water Quality**: Whether the project describes the impact of the project activity on water quality.
- **4.1.2.4.2.2 Water Monitoring:** Whether water quality is monitored to ensure there are no negative impacts.

These criteria are assessed on a scale of 1 to 5, where 1 represents high risk and 5 represents low risk. The overall score for 4.1.2.4.2 Water Quality is then reached by weighting these factors as follows: 4.1.2.4.2.1 Water Quality weighted 60% and 4.1.2.4.2.2 Water Monitoring weighted 40%.

4.1.2.4.2.1 Water Quality

MSCI

Water Quality refers to the extent to which the project describes the positive impact of project activity on water quality.

Rationale	Projects detailin more likely to b may involve des benefits such a	ng additional enefit the loca scribing the b s clean drinki	measures to app al community an enefits of the pro ing water, pot dis	bly to benefit t d species with bject on water stribution and t	he local water on hin the project a quality, providi trapping excess	quality are area. This ng additional s nutrients.
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
	\checkmark					
Scoring Definition	Each project is water quality ar quality.	scored on a s nd 5 indicates	scale of 3 to 5, wl that the project	here 3 in does activity will gr	not describe b eatly benefit lo	enefits to cal water
	MSCI ESG Rese project has des benefits are des trapping excess	earch conduc scribed its im scribed: impro s nutrients.	ts a review of ke npact on water c oved water qualit	ey project doc quality. In part y, clean drinki	uments to iden icular whether ng water, pot di	tify whether a the following istribution and
Scoring Approach	Projects are the - <u>3</u> = No - <u>3.5</u> = Ro - <u>4</u> = Refo - <u>4.5</u> = Refo - <u>5</u> = Refo	en scored bas description o eferences to o erences to tw eferences to t erences to all	ed on the number f impact on water one of the listed to of the listed ber three of the listed of the listed ber	er of benefits a er quality benefits enefits d benefits nefits	are met:	

4.1.2.4.2.2 Water Monitoring

Water Monitoring refers to whether water quality is monitored to ensure there are no negative impacts from the project.

Rationale	A project that r that the projec and that positiv	ronmental impac ve any adverse in e maintained.	Ital impacts such as water quality will help to ensure adverse impacts on the health and supply of water, tained.				
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is of monitoring v during the crea	scored on a s water quality a liting period.	scale of 3 to 5, w and 5 indicates tł	here 3 indicate nat the project	es that there is will monitor w	no mention ater quality	



MSCI ESG Research conducts a review of key project documents to identify whether a project has described a monitoring plan for the project's impact on water quality.

Scoring Approach

- Projects are then scored on a scale of 3 to 5 as follows:
 - $\underline{3}$ = There is no mention of monitoring water quality impacts.
 - <u>5</u> = Project describes monitoring plan for water quality impacts.

4.1.2.3.4 Soil Health

To assess the Soil Health impacts, three factors are considered:

- **4.1.2.4.3.1 Soil Health Activities:** Whether the project includes activities directly designed to benefit soil health.
- **4.1.2.4.3.2 Soil Monitoring:** Whether soil health is monitored to ensure there are no negative impacts.
- **4.1.2.4.3.3 Soil Disturbance:** Whether the project activity risks soil disturbance in the project area.

These criteria are assessed on a scale of 1 to 5, where 1 represents high risk and 5 represents low risk. The overall score for 4.1.2.4.3 Soil Health is reached slightly differently depending on project sub-type. For REDD+ projects these factors are weighted as follows: 4.1.2.4.3.1 Soil Health Activities weighted 65% and 4.1.2.4.3.2 Soil Monitoring weighted 35%. For ARR projects these factors are weighted as follows: 4.1.2.4.3.2 Soil Monitoring weighted 45% and 4.1.2.4.3.2 Soil Monitoring weighted 20% and 4.1.2.4.3.3 Soil Disturbance is weighted 35%.

4.1.2.4.3.1 Soil Health Activities

Soil Health Activities refer to the extent to which the project activities will directly benefit soil health through its activities.

Rationale	Projects that ex benefit the loca These measure stabilize produc	plicitly detail I soil health a s may involve ctivity and se	l additional meas are more likely to e activities to red diment accretion	sures that are l benefit specie luce soil erosi n.	being impleme es within the pr on, increase nu	nted to roject area. itrients or	
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is describe any ex greatly benefit l	scored on a s plicit benefit ocal soil qua	scale of 3 to 5, w s to soil quality a lity.	here 3 indicate and 5 indicates	es the project o that the project	loes not ct activity will	
Scoring Approach	MSCI ESG Research conducts a review of key project documents to identify whether project has described its impact on soil quality. In particular whether the followin benefits are targeted by explicit activities: improved soil quality, reducing soil erosic increasing nutrients, stabilizing productivity and sediment accretion.						
Projects are then scored based on the number of these soil health benefits the through explicit activities: 3 = No description of impact on soil guality						ts that are met	



- <u>3.5</u> = References to one of the listed benefits
- $\overline{4}$ = References to two of the listed benefits
- <u>4.5</u> = References to three of the listed benefits
 - 5 = References to four or more of the listed benefits

4.1.2.4.3.2 Soil Monitoring

-

Soil Monitoring refers to whether soil quality is regularly monitored to ensure there are no negative impacts.

Rationale	Through regular negative impac	r monitoring a ts are minimi	activities, project zed, and the ben	s can help to efits are main	ensure that the tained.	risk of any
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets
	\checkmark					
Scoring Definition	Each project is of monitoring so the crediting pe	scored on a s oil quality and riod.	scale of 3 to 5, wl d 5 indicates that	here 3 indicate t the project w	es that there is vill monitor soil	no mention quality during
	MSCI ESG Rese project has des	arch conduct cribed a mon	ts a review of key itoring plan relat	/ project docu ed to the proje	ments to identi ect's impact on	ify whether a soil quality.
Scoring Approach Projects are then scored on a scale of 3 to 5 as follows:						
	 <u>3</u> = There is no mention of monitoring soil quality impacts. <u>5</u> = Project describes monitoring plan for soil quality impacts. 					

4.1.2.4.3.4 Soil Disturbance (ARR only)

Soil Disturbance is only relevant to ARR projects and refers to whether the project activity risks soil disturbance in the project area.

Rationale	There is a risk of planting project negatively impa mitigate any ris	ere is a risk of project activities leading to soil disturbance, particularly regarding inting projects. Disturbance to soil in the project area may reduce the soil quality ar gatively impact organisms reliant on the soil. Projects avoiding disturbance of soil tigate any risks caused by project activity will reduce the risk to local biodiversity.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is risks soil distur to no soil distur	scored on a s bance in the bance or mit	scale of 1 to 5, w project area and igates any soil di	here 1 indicate 5 indicates th sturbance risl	es that the proj at the project a <s.< th=""><th>ect activity activity leads</th></s.<>	ect activity activity leads	
Scoring Approach	The score for the Emissions , which activity.	nis sub-criteri ch includes a	ion is based on th detailed review o	ne score for 2 . of the risk of s	2.3 Site Prepa oil disturbance	ration Project e from project	



4.1.2.4.4 Species Impact

To assess the species impacts, three factors are considered:

- **4.1.2.4.4.1 Specific Taxa**: Whether the project type (e.g., mangrove ARR or mangrove REDD+) has a positive or negative impact on specific taxa.
- 4.1.2.4.4.2 Species Planted: Whether the project plants a suitable number and type of species to benefits biodiversity.
- **4.1.2.4.4.3 Endangered Species:** The extent to which the project activity benefits the most vulnerable species.

These criteria are assessed on a scale of 1 to 5, where 1 represents high risk and 5 represents low risk. The overall score for 4.1.2.4.4 Species Impact is reached slightly differently depending on project sub-type. For REDD+ projects these factors are weighted as follows: 4.1.2.4.4.1 Specific Taxa weighted 15% and 4.1.2.4.4.3 Endangered Species is weighted 85%. For ARR projects these factors are weighted as follows: 4.1.2.4.4.1 Specific Taxa weighted as follows: 4.1.2.4.4.3 Endangered Species is weighted 15%, 4.1.2.4.4.2 Species Planted weighted 50% and 4.1.2.4.4.3 Endangered Species is weighted 35%.

4.1.2.4.4.1 Specific Taxa

Specific Taxa refers to the extent to which the project type is expected to impact the specific taxa in the project area.

Rationale	Project types may have inherent positive or negative impacts on specific taxa depending on the project activity. Nature-based projects, in particular, mangrove projects, tend to have a net positive impact on local taxa such as marine life.
Key Sources	Project Project Academic Third-party MSCI Carbon Documentation Geospatial Methodology Literature Data Markets
Scoring Definition	Each project is scored on a scale of 1 to 5, where 1 indicates that the project type puts specific taxa at high risk and 5 indicates that the project type will greatly benefit multiple specific taxa.
	MSCI ESG Research assesses the project level taxa impact using academic literature to determine the extent to which mangrove projects may benefit or put the local taxa at risk.
Scoring Approach	 Project types are then scored on a scale of 1 to 5 as follows: <u>1</u> = Project type may put specific taxa at high levels of risk. <u>2</u> = Project type may put specific taxa at risk. <u>3</u> = Project type is likely to have no impact on specific taxa. <u>4</u> = Project type may benefit specific taxa. <u>5</u> = Project type may greatly benefit specific taxa.



4.1.2.4.4.2 Species Planted (ARR only)

Species Planted assesses the suitability and impact of the additional new species planted to determine whether the project plants a suitable number and type of species to benefit biodiversity.

Rationale	The suitabilit the biodivers planting mul more suited	y and variety ity impacts o tiple native sp to the habitat	of specie f the proj becies wi	es plante ect, inclu Il most lil	d in the p Iding imp kely bene	project ar pacts on l efit local s	ea will he ocal wild species a	eavily infl life. Projo is they wi	uence ects ill be
Key Sources	Project Documentation	Geospatial	P Meth Docur	roject nodology mentation	Acade Literat	mic ture	Third-part Data	y MS	CI Carbon Markets
	\checkmark						\checkmark		
Scoring Definition	Each project monoculture native specie	Each project is scored on a scale of 1 to 5, where 1 indicates the project is planting monoculture non-native species and 5 indicates that the project is planting multiple native species.							
	MSCI ESG Research assesses the number and type of species planted through review of project documentation compared to third party sources.								
	Project types	s are then sco	red on a	scale of	T to 5 as	Tollows:			
			1	2	Num	ber of Sp	ecies	6	7+
Scoring Approach		Not found	1.0	1.5	1.5	2.0	2.0	2.5	2.5
	Type of Species	Non- native	1.0	1.5	1.5	2.0	2.0	2.5	2.5
		Partial	2.5	2.5	2.5	3.0	3.0	3.0	3.5
		Native	30	40	40	4.5	45	45	5.0

4.1.2.4.4.3 Endangered Species

Endangered Species refers to the extent to which the project activity benefits the most vulnerable species.

Rationale	Projects that pl important role i	Projects that plant or protect endangered or at-risk species in the area may play an important role in sustaining and supporting these vulnerable species.					
Key Sources	Project Documentation	Geospatial	Project Methodology Documentation	Academic Literature	Third-party Data	MSCI Carbon Markets	
	\checkmark						
Scoring Definition	Each project is provide informa quantified a hig project activity.	scored on a s ation on enda h number of	scale of 3 to 5, w ngered species a endangered spec	here 3 indicate and 5 indicate cies in the are	es that the proj s that the proje a which will be	ect does not oct has nefit from	
Scoring Approach	MSCI ESG Research assesses the impact on endangered species through review of ke documentation to determine the number of endangered species benefitting from project activity.					n review of key ng from	



Project types are then scored on a scale of 3 to 5 as follows:

- 3 = Project provides no data for endangered species in the project area.
- 3.5 = Project documentation defines one endangered species in the area or suggests there are endangered species in the project area.
- 4 = Project documentation defines project area as home to one to three endangered species.
- 4.5 = Project documentation defines project area as home to three to five endangered species.
- 5 = Project documentation defines project area as home to more than five endangered 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 Methodolog Documentat	Acader y Literati	mic ure	Third-party Data	MSCI Carbon Markets
	\checkmark						
Scoring Definition	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.						uantification onitored.
	MSCI ESG Research assesses the level to which co-benefits have been quantified and/or monitored.						lantified
Scoring Approach			Quan	tified			
3 11			Yes	No			
	Monitored	Yes	5	1			
		No	3	1			

4.3.2 Local Stakeholder Engagement

It is clear from literature that the quality of engagement by mangrove projects with local stakeholders plays a key role in ensuring communities benefit from their activities, as well as also helping to mitigate human-based permanence risk. Projects that put additional resources and time into consulting with their local communities, and modifying their 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 consultation conducted?
- **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?



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 35%, representation and inclusivity 30% access to information 15% and feedback and grievance 20%. Projects scoring a 5 will represent projects that undertake detailed stakeholder consultations that are representative of the target users.

4.3.2.1 Effective Consultation

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

Rationale	Projects that engage with stakeholders towards 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	
	\checkmark						
Scoring Definition	Each project is scored on a scale of 1 to 5 scale, where 5 indicates that the project appeared to conduct effective in-person engagements, and 1 indicates that very limited in-person stakeholder consultation seemed to have been performed.				e project at very limited		
	Through a review of project documents consultation effectiveness was determined based on the number of consultations and if this occurred in person.						
Scoring Approach	This was then scored as follows						
	 3 = if there has been only one consultation with limited details of location. 4 = if there has only been one consultation occurring in person. 5 = if multiple consultations have been performed in person. 						

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
Scoring Definition	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.

MSCI ESG Research assesses if the number of stakeholders in attendance has been provided. In particular, if the total number of stakeholders and the number of female attendees is disclosed. This is then scored as shown in the table below.

	No. Stakeholders Consulted				
Scoring Approach			Unknown	<50	50+
	Transportanov	Total, including women	3	4	5
	of Disclosures	Total	2	3	4
		None	1	n/a	n/a

4.3.2.3 Access to Information

Access to Information refers to whether the project provides transparent and detailed 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		
	\checkmark							
Scoring Definition	Each project is scored on a scale of 1 to 5 scale, where 5 indicates that a project provides very transparent access to information through both documentation and in- person meetings and the consultation took place before the project start date, and 1 indicates that limited access to information is provided to stakeholders and did not occur until after the project began.							
MSCI ESG Research conducts a detailed review of relevant project docum understand whether in-person meetings were conducted to present project or whether clear documentation was/is provided.				nentation to ct information				
Scoring Approach Scoring Content and the present info documentation project document		or in-person meetings, projects receive a score of 2 if they have conducted meetings o present information on the projects, and 0 otherwise. For documentation, if any locumentation has been provided to local communities, projects receive a score of 3 if project documentation and/or pamphlets are provided, and 1 otherwise.						
	This score is then combined with a score of when stakeholders were consulted where if the consultation occurred prior to the project start date it receives a score of 5 and if this occurs after the start date or it is uncertain it scores a 1.							



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
	\checkmark					
Scoring Definition	Each project is scored on a scale of 1 to 5 scale, where 5 indicates that a project provides very transparent access to information through both its documentation and the holding of in-person meetings, and 1 indicates that stakeholders appear to have only limited access to information.					
Scoring Approach	 Three aspects of a project's feedback procedure are assessed: 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. Projects receive a score of 3 if they have a feedback mechanism in place, and 1 otherwise. For the other 2 factors, projects receive a score of 1 if they satisfy this factor. The overall scores are then based on adding each of these components to reach a score from 1 to 5. 					



Appendix A: Permanence risk vs mitigation map

			Natu	Iral Risks		Human Risks		
		Drought	Landslide	Sea level rise	Soil Salinity	Land Tenure	Crediting Period Impact	Opportunity Cost
Highest	t Risk Assumed	10%	10%	10%	10%	30%	30%	40%
l te d)	Ecosystem Diversity	45%	45%	25%	25%	0%	0%	0%
litiga	Site Selection	15%	15%	10%	10%	0%	0%	0%
sk M	Salt Tolerance	0%	0%	15%	15%	0%	0%	0%
% of Ri	Ownership and Management	0%	0%	0%	0%	10%	0%	10%
cimum,	Community Engagement	0%	0%	0%	0%	50%	0%	30%
n (Max	Long Term Commitment	0%	0%	0%	0%	0%	100%	0%
gatic	Legislation	0%	0%	0%	0%	0%	0%	5%
Miti	Alternative Livelihoods	0%	0%	0%	0%	0%	0%	10%
Total M (% of Ri	itigation Potential sk)	60%	60%	50%	50%	60%	100%	65%



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Change log

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