

# THE FUTURE OF REFORESTATION CARBON CREDITS

Prioritizing biodiversity and socioeconomic benefits for effective carbon sequestration



BY MORFO  
FEATURING 15 ORGANIZATIONS

# INTRODUCTION

Since MORFO's establishment, our goal has been to create the scientific, technical, technological, and social conditions required for the development of native and resilient forest projects. These projects need funding.

In early 2023, The Guardian and Die Zeit articles on the carbon credit systems were published. These articles primarily questioned the effectiveness of carbon offsets linked to forest preservation projects. While these concerns are distinct from the ecosystem restoration projects that are our specialty at MORFO, we felt it was our duty to conduct our research. **We reviewed more than 300 documents, including scientific studies, company reports, articles, and opinion pieces, and conducted over 20 interviews with experts.**

Our central inquiry was straightforward and focused: **How to help finance more reforestation projects?** Indeed, even though it is criticized, this system enables the preservation and restoration of millions of hectares worldwide. It also helps stock carbon from the atmosphere or prevent the release of carbon. For the first half of 2023, the issuance of carbon credits from Nature-Based Solutions (NBS) activities was estimated to have reached 58 million MtCO<sub>2</sub>e, which is a 10% decrease compared to H1 2022<sup>1</sup>.

It quickly became apparent that **the results of our research needed to be shared**. For three main reasons:

1. The consensus among diverse stakeholders, even those with contrasting viewpoints, is that solutions already exist and simply need to be communicated as clearly as possible.
2. Our conviction that biodiversity and economic benefits are key pillars of reforestation projects.
3. The desire of local actors to make their financing needs heard.

Preserving and restoring our forests should be a central focus of global investments. At MORFO, we work diligently every day to ensure that these investments result in impactful and resilient projects. We hope that this document will contribute to the development of numerous new nature-positive restoration projects.

Adrien Pages, Pascal Asselin & Hugo Asselin  
MORFO's Co-Founders

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### **Disclaimer:**

The individuals interviewed for this white paper do not necessarily endorse its analysis, conclusions, or proposals. Their contributions are aimed at shedding light on specific aspects of the analysis, but they may not fully align with all the opinions expressed in this document. Furthermore, the information presented here is primarily sourced from websites and existing reviews related to the respective activities.

The data included in this publication is derived from carefully selected public sources that we believe are reliable. However, we do not guarantee its accuracy or completeness, and nothing in this document should be interpreted as a representation of such a guarantee. Lastly, this white paper presents diverse opinions, some of which may be contradictory. We believe it is important to acknowledge these differing viewpoints without necessarily endorsing all of them. When MORFO's perspective aligns with others, it is explicitly indicated.

# THE FOUNDATIONS OF AN INTELLIGENT SYSTEM FOR NATURE-POSITIVE PROJECTS ARE IN PLACE, WITH IT FLAWS

# 1

## UNDERSTANDING THE CRITICISM ABOUT CARBON CREDITS

### Credits related to preservation are under scrutiny

According to McKinsey, **global demand for carbon credits in the Voluntary Carbon Market (VCM) could increase by a factor of 25 by 2030 and 100 by 2050<sup>2</sup>**. However, over the last decades, the carbon credit system has been challenged several times. In early 2023, The Guardian, the German weekly Die Zeit and SourceMaterial, a non-profit investigative journalism organization, came out with **a startling allegation: according to the publication, over 90% of rainforest preservation carbon offsets were "worthless<sup>3</sup>"**. Initially, their claims relied on a study that was publicly shared before being peer-reviewed, i.e., a so-called "preprint." After undergoing a vetting process, the research<sup>4</sup> has now been officially published in Science. Its final verdict being that some projects selling Reducing Emissions from Deforestation and Degradation (REDD+) credits have failed to deliver a real impact. On the other hand, Verra has strongly disputed<sup>5</sup> The Guardian's / Die Zeit analysis, arguing it wasn't detailed enough.

Since the first article published by The Guardian in January 2023, other studies have been released. On September 15th, another study<sup>6</sup>, published by the UC Berkeley Carbon Trading Project and supported by Carbon Market Watch, also concluded that current REDD+ methodologies are likely to generate credits that represent only a small fraction of their claimed climate benefit. According to the authors, **estimates of emission reductions were found to be overstated across all quantification factors reviewed when compared to the published literature and independent quantitative assessment.**



The Guardian's article at the beginning of the year has clearly slowed things down, but probably for the better. Carbon credits buyers have become more cautious, and are now more aware of the differences between avoidance and removal for instance.

**PIERRE-  
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A few weeks before, the online intelligence platform Trove Research conducted another analysis<sup>7</sup> using an AI deforestation model, which indicated that 30-40% of REDD+ projects (42 unplanned deforestation projects) in South America have overestimated deforestation baselines, with a deviation of over 60%. **According to them, the figure presented in the study published by The Guardian is exaggerated, but they still call for greater integrity in such assessments.**

## Primary criticisms aimed at the carbon credit system

The Guardian's accusations only targeted a few projects belonging to a single credits category, i.e., REDD+. When looking at the whole picture, we see that **there are 170 other types of carbon credits available on the market**<sup>8</sup> (See Fig. 1). At MORFO, we believe that **even though these allegations specifically pertain to preservation credits, all organizations financing or potentially being funded by carbon credits should step back and comprehend the system as a whole**, in order to contribute to its improvement.

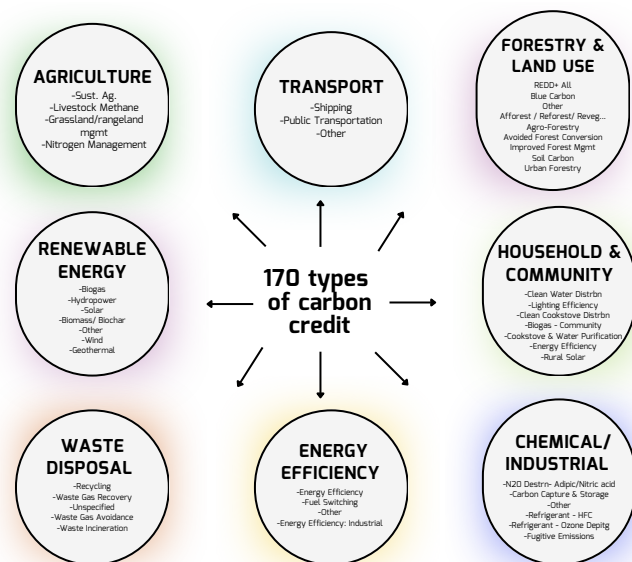


Figure 1: What's in a Category? Ecosystem Marketplace's Carbon Offset Project Typology, 2021<sup>9</sup>

How can we explain the criticisms, and **what areas need improvement?** Here is a non-exhaustive list based on the interviews we conducted for this white paper:

- **Over-crediting and independence issues:** As explained above, some credits probably should not have been issued. One of the problems arises from the financing method of the standard-setting body, which can benefit from compensation when a credit is issued.

There is a potential conflict of interest, as the organization responsible for setting the standards may have a financial incentive to approve more projects and issue more credits, even when they may not meet the required criteria.

- **Lack of Common Calculation:** Carbon credit systems are virtual and rely on a reference that combines calculation methods and projected outcomes. This explains the variations in calculation approaches between standard setters and more critical studies. This also explains why determining the number of hectares restored or preserved by the carbon credit system is impossible, although it could be a valuable communication tool to help people understand the system's scale.
- **Biodiversity loss:** Some critics emphasize the bias introduced by solely focusing on carbon. This has been theorized under the concept of "Carbon tunnel vision<sup>10</sup>" by the sustainability expert Jan Konietzko. In a recent article published in the journal "Trends in Ecology & Evolution," this issue was emphasized<sup>11</sup>. Three ecologists point out that "Despite the broad range of ecosystem functions and services provided by tropical ecosystems, society has reduced the value of these ecosystems to just one metric – carbon." According to them, the increasing popularity of commercial pine, eucalyptus, and teak plantations in the tropics for carbon offsetting is having unintended consequences, such as drying out native ecosystems, acidifying soils, crowding out native plants, and turbocharging wildfires. "These schemes are a win for the company planting these trees but not for biodiversity. This marks the beginning of this phenomenon, hence the seriousness of the situation."
- **Opacity:** Besides being incomplete, the system is often seen as unclear. People may not fully understand the criteria for evaluating and verifying carbon credits, which can vary widely between different projects and standards. This lack of clarity can result in misunderstandings and potentially misleading claims of carbon neutrality.

- **Greenwashing:** French economist Alain Karsenty<sup>12</sup> is notably skeptical of the existing model: "The interests of both parties are understandable: they aim to sell or acquire as many credits as possible while minimizing their efforts. For credit sellers, this is easy to understand. As for buyers, their primary goal is to present a green image to their customers and/or shareholders, often without scrutinizing the ecological value of the carbon credits purchased, which allow companies to avoid the costlier emissions reductions or defer them." These stakeholders are calling for the valuation of high-quality credits and consideration of the role of credits in a company's overall emissions.

The foundations of an intelligent system for nature-positive projects are in place, albeit with its flaws. In the following pages, we will provide an overview of how stakeholders are responding to these issues, whether by attempting to improve the existing system or by developing new ones.



The question is not whether carbon credits are good or bad, carbon credits are a tool. It's like saying blockchain is good or bad, insurance good or bad, internet good or bad. There are good and bad uses for each of these tools. Carbon credit is a way for decarbonation projects to find the financing they need, provided VOLUNTARILY by companies that have already started their own reduction trajectory, as French law now implies.

**GREGOIRE  
GUIRAUDEN**

RIVERSE<sup>13</sup>



## Cheat sheet: potential & challenges by carbon project type

VCM market in 2021: 0.3 GtCO2	Afforestation/ reforestation	Agricultura soil mgt.	Peatland rewetting	Wood construction	BECCS - Bioenergy CO2 capture and storage	Direct air capture	Mineralization
Carbon removal potential	HIGH	LOW	LOW	LOW	MEDIUM	HIGH	HIGH
Potential in GtCO2 / year	6 - 11	0.7 - 1.8	0.8	0.5 - 1 (plus huge avoidance potential)	1 - 2.1	Limited by access to low carbon energy	2 - 4
Time to full potential	10 - 30 years	10 - 30 years	10 years	10 - 30 years	10 - 30 years	30 + years	30 + years
Permanence	C. 50 years, with some risks	Practices must be maintained	Maintenance and protection needed	Lifespan >50 years, with reuse potential	High for geologic storage, low for fuels	High for geologic storage, low for fuels	Permanent storage
Commercial potential	HIGH	HIGH	MEDIUM	HIGH	MEDIUM	HIGH	MEDIUM
Current cost (\$/tCO2)	Tropical: 5 - 50 Current cost (\$/tCO2) Global: 2 - 150	Traditional: 0, 10 Biochar: >>100	Half of potential: <100	Negligible additional costs	30 - 400	100 - 600	10 - 600
Potential to decrease costs	LIMITED	LIMITED	LIMITED	Moderate, some R&D to amortize	Uncertain due to rising procurement costs	SIGNIFICANT	Moderate if mineral mining is required
Readiness to scale	HIGH	Moderate, esp. biochar	Limited experience in restoration	High in Europe moderate elsewhere	Moderate (handful of pilots)	Few companies operating pilot plants	Niche technology with on-going R&D
Need for large infra.	Moderate (for large scale Need for large infra. planting)	LOW	LOW	Moderate (timber manufacturing)	High (processing plants & supply chain)	High (plants, energy supply...)	Mining and transportation infra required at scale
Project value w/o VCCs	Moderate and linked to managed forests	High, increased productivity & resilience	LIMITED	High (usual construction business)	High (produces energy)	High (fuels, food, chemicals, polymer)	Some variation can produce building materials
Impacts beyond CO2	MEDIUM	HIGH	HIGH	MEDIUM	LOW	MEDIUM	MEDIUM
Competition for resources	High (agricultural lands)	LIMITED	Moderate (palm oil, pulp wood)	Moderate (land uses)	High (biomass, land, water and sometimes fertilizers)	Moderate (low carbon energy)	Moderate (low carbon energy & mining ops)
Risks	Local food security concerns afforestation)	Some risks from practices requiring N2O inputs	Small opportunity cost for local pop.	Unsustainable wood mgt. biodiversity	High, due to resources used	No known social effects	Social & health risks linked to mining activities
Cobenefits	High (water, air, soil, fertility...)	High, increased productivity & resilience	High (biodiversity, flood, water...)	Moderate if thin wood is used	LIMITED	No cobenefit	LIMITED

Figure 2 - Source : Compilation of scientific literature realized by The Economist, Daphni "Voluntary carbon offsets: long-term potential and short-term troubles", January 2023

## RECOGNIZING THE IMPORTANCE OF AN INCREASINGLY ETHICAL FUNDING SYSTEM

### The forest needs funding for its preservation and restoration

According to the UN, **1 billion hectares must be reforested by 2030**<sup>14</sup>. At the current rate, only 5% of this target will be achieved. **Urgent action is required to secure substantial funding and establish robust financial mechanisms for the preservation and restoration of our forests.** In fact, every year the planet loses 5 million hectares of forest<sup>15</sup>.

Natural forests serve as the habitats for countless species of plants, animals, and microorganisms. **The Amazon rainforest is estimated to host approximately 10% of the world's known species,** according to scientific research conducted by organizations such as the World Wildlife Fund (WWF)<sup>16</sup> and the United Nations Educational, Scientific and Cultural Organization (UNESCO). Furthermore, forests play a pivotal role in mitigating climate change by absorbing carbon dioxide (CO<sub>2</sub>) from the atmosphere via photosynthesis. The global forests are estimated to absorb about 29% of annual anthropogenic emissions of CO<sub>2</sub><sup>17</sup>.

Aside from countering the greenhouse gas (GHG) effect, **forests provide a myriad of essential ecosystem services that are vital for human survival.** By regulating water cycles, they avert floods and ensure a steady supply of clean water. Forests also purify the air we breathe and the water we consume. Furthermore, without veering into a 'tree hugger' stereotype, it's important to highlight that several studies have demonstrated the positive impact of forests and natural environments on human well-being and happiness<sup>18</sup>.

Moreover, forests act as natural buffers against calamities such as storm surges and tsunamis. The mangrove forests in the Sundarbans, Bangladesh, serve as a prime example by protecting coastal communities from natural disasters. In 2007, mangroves played a pivotal role in reducing the impact of Cyclone Sidr, thereby saving countless lives<sup>19</sup>.



Carbon markets are first and foremost a way to finance impactful projects based on their impact. If there was some bad usage in the past, we need to insist on all the great projects which get financed thanks to this mechanism.

**GREGOIRE  
GUIRAUDEN**

RIVERSE<sup>22</sup>



**Forests also present economic opportunities for local communities.** Sustainable timber harvesting and the collection of non-timber forest products, including nuts, fruits, and medicinal plants, can generate income and create jobs. In Nepal, community-managed forests contribute significantly to the livelihoods of over two million households<sup>20</sup>. 1.6 BILLION of people - including around 70 million indigenous - depend on forests for their livelihoods. <sup>21</sup> Farmers, seed collectors, traders, producers, you name it.



## Struggling local actors are in immediate need of sustainable financing

To preserve or restore forests, local actors inevitably need financing. On the ground, the carbon credit system provides tangible means of financing to stakeholders. As José Júnior, founder of the Brazilian forest restoration organization Natureza Bela, explains “restoration costs are too high for rural landowners to bear. In this context, the carbon market allows others to finance this restoration, benefiting all parties involved (landowners, financiers and executors).”<sup>23</sup>

In Brazil as you can read in the interviews appended to this document, **on-the-ground actors like restoration NGOs closely monitor the changes in carbon credit prices.** This robust financial mechanism not only incentivizes reforestation efforts but also facilitates the mobilization of resources needed to execute these initiatives effectively. **It creates a dynamic ecosystem where businesses, governments, and organizations can collaborate to address pressing environmental challenges and contribute to the preservation and restoration of our forests.** Higher prices can also enable local organizations to diversify their business models by incorporating a new and sustainable revenue stream alongside their existing activities.

Unfortunately for these actors, the carbon credit market remains uncertain and subject to significant fluctuations. The international climate consultancy and project developer **EcoAct<sup>24</sup> has explored this issue of price variation.** How can we explain this fluctuation, which, as we've understood, doesn't favor local actors and often doesn't allow them to plan for the long term?

The price of a carbon credit is influenced by several factors, including operational costs, project location, delivery time, project type, and the following key considerations:

- **Volume of Credits Purchased:** Similar to other markets, the price of carbon credits decreases with higher purchase volumes.
- **Credit Vintage:** The vintage of a carbon offset refers to the year when its associated credits were issued or when greenhouse gas emission reductions occurred. For example, if my forest sequestered 1 ton of carbon in 2021, the vintage of my credits will be 2021, even if the forest was planted 5 years before. Older vintages are typically cheaper, and organizations often seek offsets with vintages matching the timeframe of the emissions they aim to offset (usually 1-3 years).



A higher valuation of reforested lands in Brazil has a positive impact on forest restoration, as it facilitates the process of convincing rural landowners. On the other hand, if the price of carbon credits decreases, there will be more resistance to providing land, as landowners may consider investing in more profitable activities. It is essential to note that currently, forested lands have a reduced value in the market, as they are considered unfit for production. The Mata Atlântica is protected by legislation such as the Forest Code, which designates areas for permanent protection. Consequently, there is a perception that these areas have low economic value. Paying for environmental services is not yet a reality in our region.

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TATIANA HORTA**

ASA



**A clear distinction arises here between the local and global perspectives.** On the ground, where funding needs are critical, the sale of carbon credits is a highly favored solution, especially when they fetch a high price. Local stakeholders often lack the time or inclination to delve into the criticisms surrounding carbon credits. To them, these critiques primarily signify a reduction in funding, which, in turn, leads to an inability to carry out conservation or restoration projects. Even when funding remains stable, price volatility introduces uncertainties in the medium term, making it challenging to structure effective conservation or restoration activities.



There have been some negative publications about the carbon markets, and as a result, buyers and investors are now overly cautious. An example is a potential transaction that I facilitated, where there had been negative publicity over a land conflict in the past. In the end, that publicity caused the transaction to be canceled.

**CASPER VAN DER TAK**

NUTAWA

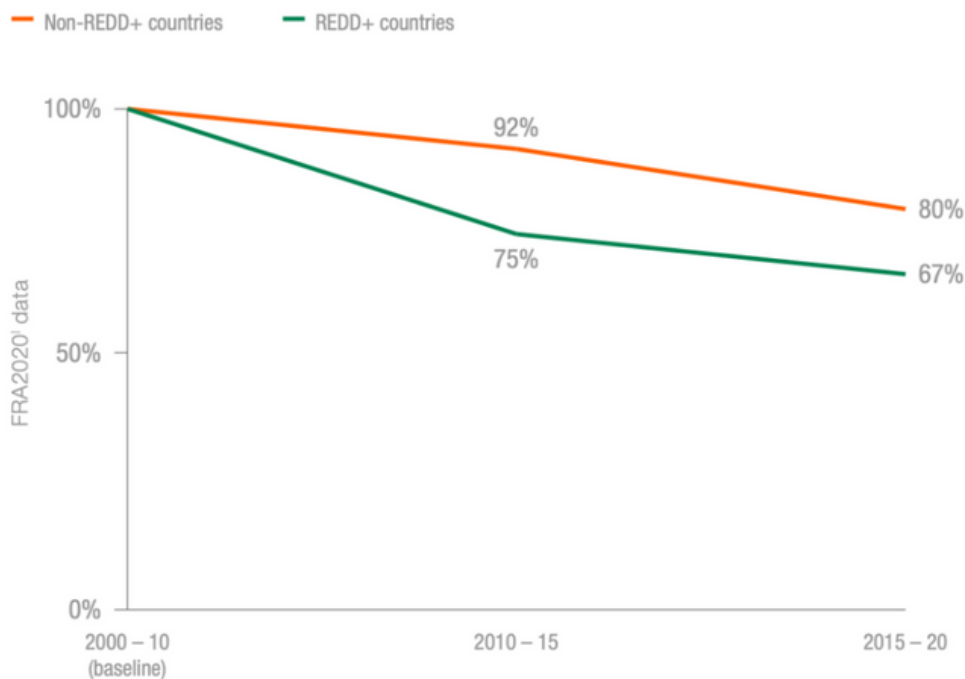


Figure 3: REDD+ countries saw lower deforestation rates compared to non-REDD+ countries<sup>25</sup>

## Companies urgently need reassurance to invest in credits

As we have observed, recent criticisms of the carbon credit system have had a profound impact on those directly involved in its implementation. However, what about the perspective within corporations? Under the veil of anonymity, one of the ESG directors at an international company raised a thought-provoking question: **"Is it justifiable to condemn any company utilizing carbon credits as a form of greenwashing?"** This question warrants serious consideration because it is highly probable that businesses will disengage from the voluntary carbon market if their credibility is called into question.

That's why **some organizations are trying to prove that there is a link between credit purchases and emissions reduction on a global scale.**

Sylvera, the carbon intelligence company, gathered 9 years' worth of data from 102 of the largest businesses across different sectors<sup>26</sup>. Their analysis showed that, **on average, offset buyers cut their scope 1 & 2 carbon emissions nearly twice as fast as firms who didn't purchase any credits.** The relationship between emission reductions and credit purchases varies depending on the industry. Oil corporations achieved higher decarbonisation rates than technology firms likely because they're bigger emitters.

However, it is worth mentioning that Sylvera's calculations did not factor in scope 3 emissions, which hold the lion's share of a company's carbon footprint<sup>27</sup>. Sylvera's findings are in line with those reported by the non-profit organization Forest Trend (see Fig. 4).<sup>28</sup>



The market for reforestation carbon credits is incredibly promising and complex. We see more and more companies understanding that simply buying credits to offset their emissions is not enough, and realizing that we have to rebuild the carbon sequestration areas we have destroyed while creating jobs and income for people around those areas if we are serious about our environmental awareness and global goals. This trend has significantly driven demand and increased the price of reforestation credits. But there is still a lot of room for improvement!

**DANILO ZELINSKI**  
KPTL

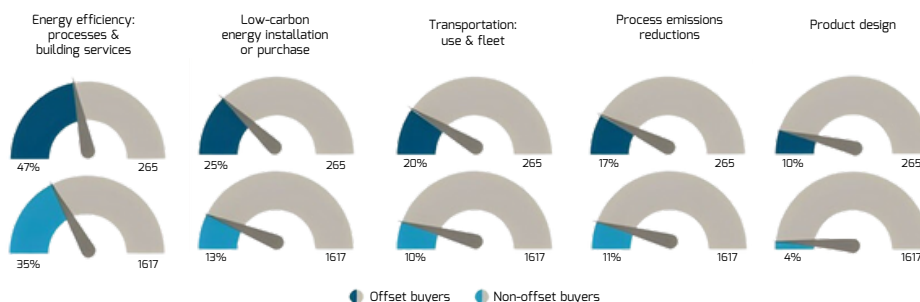


Figure 4: Emissions Reductions Activities, Offset Buyers versus Non-Offset Buyers<sup>29</sup>

In another study<sup>30</sup>, the business intelligence platform Trove Research reached a similar conclusion. **They also found that companies that are significant users of carbon credits decarbonize twice as fast, on average, compared to those that do not use carbon credits.** This study, based on a sample of 4,156 companies, was also conducted only on Scope 1 and 2 emissions. On a smaller sample of 164 companies, including Scope 3 emissions, the results show a 4.1% reduction in emissions for companies using the credit mechanism, compared to 1.6% for companies not using this mechanism. However, even though these results are very encouraging, they are based on a sample that is too small and too incomplete to draw a definitive conclusion.

**While embracing carbon offsets seems to accelerate companies' climate action, investors are demanding for more credibility<sup>31</sup>.** If not satisfied, a firm risks falling into the greenwashing trap and losing revenue. Luckily, new standards and technologies are enhancing the transparency of carbon credits. That's what you'll discover in the upcoming pages.

At MORFO, our stance is that **all participants in the carbon market system need to address criticisms (and our interviews show that many individuals are making efforts to do so), even if it may result in short-term financial difficulties for local actors or questioning for some sellers.** By addressing these critiques and delivering high-quality projects., we believe that the criticisms will diminish, and funding will subsequently increase. In the following sections of this document, we will delve into the solutions proposed by the stakeholders we have interviewed. The second part of this document will, therefore, focus on determining how to ensure the implementation of resilient reforestation projects, a common theme in all the interviews conducted. We will explore how, before discussing carbon, it is essential to consider the benefits offered by biodiversity and the integration of economic and social factors.

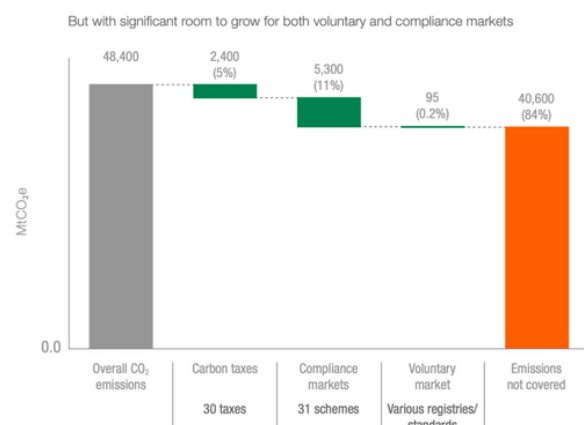


Figure 5: The majority of emissions generated are not covered by either a voluntary or regulated emissions market or regime (Based on retirement volume in 2020 across Verra VCS, Gold Standard, ACR and CAR)<sup>32</sup>



## KEY TAKEAWAYS

- Following The Guardian and Die Zeit articles in January, trust in carbon credits has diminished. While the investigation discredited REDD+ credits, it has prompted a healthy debate about the effectiveness of carbon credits for reforestation projects.
- For stakeholders on the ground and businesses alike, these criticisms have tangible short-term impacts.
- However, in the long term, there is a pressing need to improve the carbon credit model, explore alternative approaches, and, most importantly, prioritize the quality of projects within these credits.

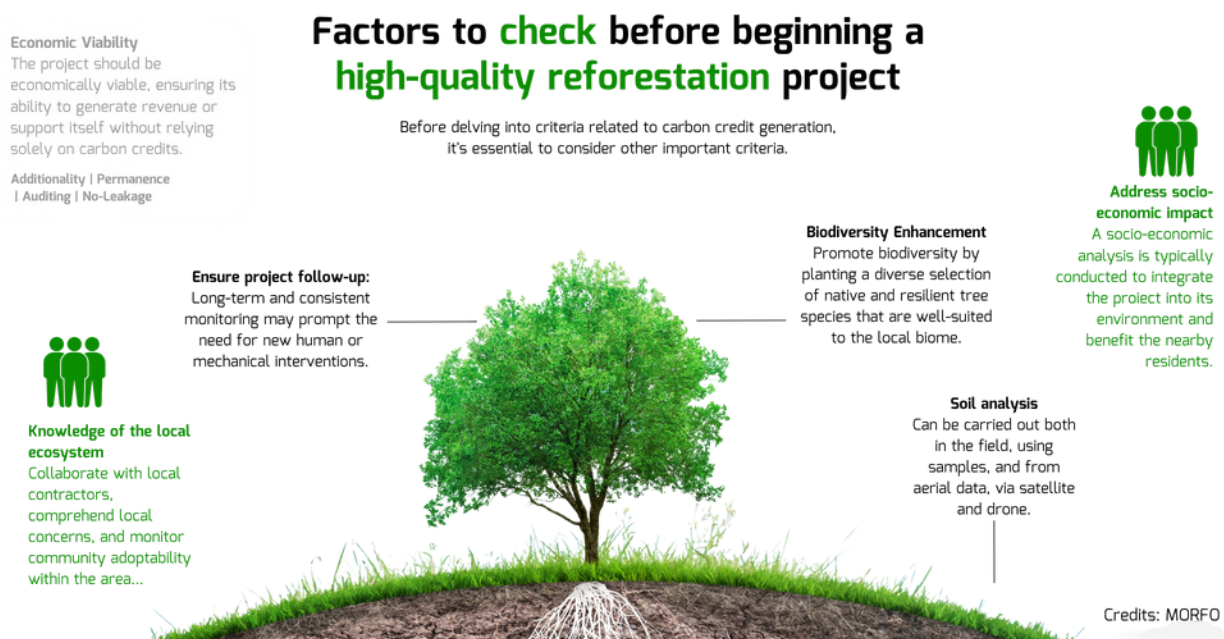
## THE SYSTEM NEEDS TO BE REVISED TO ENSURE THAT BIODIVERSITY AND SOCIOECONOMIC BENEFITS ARE KEY PILLARS OF ALL PROJECTS DEPLOYED

When it comes to reforestation, our numerous interviews have shown that one of the challenges with the carbon system is that it prioritizes carbon as the starting point, rather than the quality of the project itself. Beyond the financing model, it is essential to consider the projects being funded for restoration. The financial model should be revised to prioritize biodiversity and socioeconomic benefits in all deployed projects, go beyond carbon and delve deep into the projects that are being funded. Quality restoration projects go far beyond just planting trees; they involve a holistic approach that considers various factors to guarantee their success.

All reforestation projects should be built on a foundation of two plus one pillars, where **Biodiversity and Social Impact (2)** take the lead, ultimately resulting in **carbon capture with integrity (+1)**. The current problem with the system is its excessive focus on carbon as the sole metric, overshadowing other vital aspects. While this approach may have appeared financially viable, reality has proven it to be somewhat illusory. We should prioritize the forest itself, emphasizing its resilience through biodiversity and social benefits. By doing so, we can achieve high-quality and long-term carbon capture in larger quantities.

Taking this concept a step further, it becomes evident that we need a framework and metrics to quantify both biodiversity and social integration levels – a direction that an increasing number of companies are now pursuing.

Figure 6:



## BIODIVERSITY: RESTORING RESILIENT ECOSYSTEMS USING WITH MULTIPLE NATIVE SPECIES

As of 2019, 45% of reforestation practices implied the plantation of a single non-native tree species (e.g., acacia or eucalyptus)<sup>33</sup>. This approach undermines the ecosystem's biodiversity and resilience. Instead, choosing a variety of native species is a more advantageous practice.



Even if it is still quite rare, there is an increasing number of buyers that have understood that preventing biodiversity loss is at least as important as fighting climate change, so they now have a more holistic view on reforestation projects, favoring other co-benefits rather than only carbon capture.

**PIERRE-  
ALEXANDRE  
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ECOTREE



### Why multi-species native projects are essential

When considering a certain land to be reforested, some tree species will grow better than others, which is why it is fundamental to handpick the most suitable seeds and species for a specific region. This implies performing field surveys, testing soil samples in the lab, acquiring drone or satellite-based images of the area, and referring to a series of selection criteria<sup>34</sup>. **Replanting a mix of local species increases the resilience of the forest** against pests, wildfires, water stress, and other climate-driven changes. In addition, according to a case study conducted on Hainan Island<sup>35</sup>, biodiverse forests have superior erosion control capabilities as well as helping to limit the spread of disease. Another case study in Honduras demonstrates how the preservation and restoration of forests help alleviate water shortages in its capital, Tegucigalpa<sup>36</sup>.

**As a result, carbon sequestration can occur.** A recent study<sup>37</sup> demonstrates for the first time that **tree diversity can significantly improve carbon sequestration in natural forests**. According to the research, increasing species variability raises soil carbon and nitrogen levels by 30% and 42% respectively. In addition, improving functional diversity, which encompasses a range of physical characteristics within the forest, leads to a 32% and 50% increase in soil carbon and nitrogen levels respectively.



### SINGLE-SPECIES REFORESTATION VS. BIODIVERSITY RESTORATION: WHAT STRATEGY FOR MORFO?

[Read on our website](#)

## However, 90% of reforestation projects are still based on low biodiversity seedlings

According to the World Resources Institute, in 2022, 90% of reforestation projects worldwide were based on low biodiversity seedlings. This figure is reflected in the quality of ARR carbon projects. As explained by Sylvera in its latest report<sup>38</sup>, "many of the ARR projects on the market take the form of plantations, often commercial monocultures of non-native species, rather than reforestation with native species and assisted natural generation. The result: **no ARR project rated by Sylvera achieves one of the top two levels, AA or AAA.**"

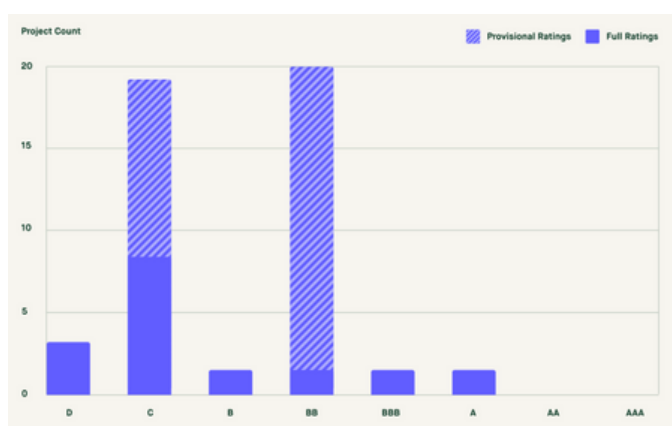


Figure 7: Sylvera's ARR ratings

One might think that the actors in charge of this reforestation (governments, NGOs, companies...) are the only ones responsible for this situation. But the problem is deeper. **There are several reasons why companies and governments may prefer to plant in monoculture.**

- **Costs:** Monoculture may seem less expensive than multi-species planting because there is no need to plant and cultivate different species. But this vision is always short term and the poor quality of these reforestations makes, over the years, the total amount of the projects increase.
- **Simplicity:** With a limited level of knowledge and in the short term, it is easier to manage a monoculture because it requires less care and monitoring. But simplicity in the short term does not take into account the symbiosis between species and can create great complexity in the long term.

- **Profitability:** Monocultures may be more profitable for the forest industry because they produce higher and more consistent yields than mixed crops. However, this approach only considers the income of the forest industry and overlooks potential additional income that can be generated from a diverse reforested area. It also fails to address risks such as vulnerability to diseases and pests.
- **Industrial needs:** Some companies, such as paper mills or biofuel producers, need large quantities of a single type of feedstock, which is easier to obtain with monocultures.

These reasons are often misguided, and **every day we encounter numerous scientists, governments, NGOs, and companies eager to undertake high-quality reforestation projects but struggle to do so.** Genuine reforestation initiatives aimed solely at restoring primary forests without cutting them down are exceptionally rare. Consequently, there has been limited investment in such projects. The primary cause is the insufficient allocation of resources to research and development, as well as the lack of coordination among various stakeholders in the reforestation process.



Of the 334 ARR projects actively delivering credits on the top 5 registries, many rely on the intensive cultivation of non-native species, often planted as monocultures. These forests sequester carbon, but little else.

**THIBAUT  
SORRET**

ECOSYSTEM  
RESTORATION STANDARD



## How to design effective biodiversity-based reforestation projects

As we have seen, even if they have the will to do so, **carrying out complete reforestation projects of diversified ecosystems with complementary species is not an easy job for plantation actors. But solutions do exist.** And they are diverse.

The first challenge lies in **investment in R&D and collaboration among different stakeholders.** Numerous tests must be conducted to ensure positive interactions between plants and to determine relevant planting patterns. At MORFO, for example, we have entered into research partnerships with several laboratories in France and Brazil with this goal in mind<sup>39</sup>.

The second challenge lies in the **seed supply system.** Let's take the example of Brazil. The Brazilian government has ambitious plans to restore 12 million hectares of degraded forest land by 2030. However, the current situation presents a significant obstacle, albeit not an insurmountable one. The issue at hand revolves around the scarcity of seedlings and seeds, limiting the potential for restoration to about 100,000 hectares per year. This critical concern has been highlighted in an article published by Valor Economico, shedding light on the core of the issue. Garo Batmanian, the current Director-General of the Brazilian Forest Service, emphasized, "We do not have enough seedlings today. The production chain that leads to reforestation, which is crucial for achieving environmental recovery at the necessary scale, is not currently functioning."<sup>40</sup>

However, this ambitious goal is **possible to meet if we take several steps:**

- Establish government and corporate incentives for forest restoration to create a viable and sustainable market, thus structuring a seed production market capable of meeting state-set goals.
- Integrate local/indigenous knowledge with technical/technological innovations to enhance seed production and align with national objectives.
- Provide long-term visibility to seed collectors to attract investments and facilitate sector development.
- Advance scientific research in microbiology, ecology, botany, and forestry to improve seed selection and planting techniques through extensive R&D.
- Combine traditional and modern planting methods to benefit both projects and local stakeholders and communities.



**FOCUS: 4 STUDIES SHOW THAT WE NEED TO REFOREST WITH BIODIVERSITY**

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## Innovative plantation methods to restore with biodiversity

Just spreading bio-diverse and resilient seeds on suitable soil might not always suffice. Even the best seeds can struggle to grow into trees under challenging conditions. In recent years, significant progress has been made in planting techniques, offering promising ways to reduce planting costs.



For example, instead of being directly introduced into the soil, the chosen seeds can be placed within a pod containing all the necessary ingredients to boost growth. This alternative seeding method could result in a laboratory survival rate that is 80% higher, mainly due to the dormancy breaking process<sup>41</sup>.



**FOCUS: COMPARING 4 REFORESTATION METHODS: NATURAL, MANUAL, DRONE AND HYDROSEEDING**

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**FOCUS: SEEDPODS: ENSURING HIGH SURVIVAL RATES IN A DRONE REFORESTATION PROJECT**

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**SOCIAL AND ECONOMIC BENEFITS: COLLABORATING CLOSELY WITH LOCAL COMMUNITIES TO CREATE SUSTAINABLE PROJECTS**

Indigenous Peoples (IPs) and Local Communities (LCs) are crucial custodians of around 32% of global land and waters<sup>42</sup>. As Jessica Smith, leader of the UNEP Finance Initiative’s Nature program, points out : “IPs & LCs play a key role as environmental defenders, protecting human rights related to the environment. Respecting their roles ensures that biodiversity credits align with their needs and rights.”<sup>43</sup> Let’s explore this further.

**When biodiversity aligns with socio-economic benefits**

Although being detrimental for biodiversity, planting only one fast-growing tree species is a profitable way to produce wood, fibers, etc. In theory, this has the potential to bolster the local economy. However, in practice, there have been instances where companies from developed countries purchase land owned by indigenous communities with the intent to transform it into private plantations. **This unfair practice has been dubbed as land grabbing** or climate colonialism. <sup>44 45</sup> In the Democratic Republic of Congo (DRC), which is by far the most affected country by land grabbing (see Fig. 8), the national government behaves the same as foreign businesses. <sup>46</sup> Regardless of the country, the Rights and Resources Initiative revealed that the risk of investing in forest carbon offsets projects that don’t acknowledge indigenous rights is very high.<sup>47</sup>

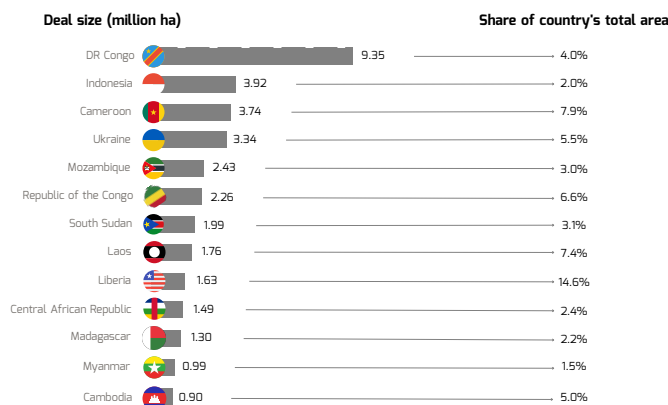


Figure 8: Land grabbing by country<sup>48</sup>

Concluded deals of 200+ ha (purchase, lease, concession) for a range of uses that imply the potential conversion from smallholder to commercial use.

## Including local communities in the project from Day 1

Sustainability is not just about the environment. **A high-quality reforestation project should have a positive social impact too. To achieve this, the local stakeholders should be included from the very beginning, through...**

- **Public Consultation:** This allows community members to voice their concerns, provide insights, and express their needs and expectations regarding the reforestation project.
- **Co-construction of the Project:** Local knowledge, traditions, and context should be considered to tailor the project's objectives and strategies to the specific needs and aspirations of the community. Taking into account feedback from the communities, developers can make adjustments to various parameters, including the types of seedlings planted, planting areas and methods, monitoring periods for the forest, and more.
- **Co-development of the Project:** Local stakeholders, including community members, should be involved in the decision-making processes related to the project's development. This includes selecting tree species, planning planting locations, and establishing management practices that align with both ecological goals and local interests. After these preliminary actions, some of the actors could also help with practical activities (e.g., seed collection, land preparation, etc.).
- **Involvement in Follow-up and Maintenance:** The local community should be engaged in the ongoing monitoring, maintenance, and management of the reforested areas. This can create employment opportunities, empower local residents, and ensure that the project remains aligned with community priorities over time.



To prevent resistance from local populations against a reforestation project, fostering ongoing dialogue and providing environmental education are key.

**JOSE JUNIOR**  
NATUREZA BELA



As we will see later in this paper, **the integration of landowners and, more broadly, all local stakeholders in reforestation projects also offers numerous advantages in terms of permanence**, increasing the likelihood that projects will endure over time. In a recent study<sup>49</sup> published in *BioScience*, the results of research carried out by Sara Löfqvist and her team at ETH Zurich highlight the crucial importance of integrating social considerations into initiatives aimed at restoring forest ecosystems. The study shows that **integrating local populations can contribute to more sustainable management, preserving biodiversity, increasing resilience to disturbance, conserving carbon and reducing conflict, with long-term benefits for forests and the environment in general.**



Involving landowners in the choice of areas and species fosters greater engagement. Additionally, we emphasize the ecosystem services that will be restored through ecological restoration.

**GABRIELA VIANA & TATIANA HORTA**  
ASA



## Bringing local economic opportunities

Apart from protecting indigenous rights and increasing the project success rate, **a more inclusive forest restoration also makes economic sense**. In fact, involving native people in the development and decision-making processes improves the effectiveness of ecosystem restoration initiatives. <sup>50</sup> Other than improving the quality of the reforestation offsets, this strategy has the co-benefit of providing the native population with economic resources.

In a reforestation project, **partnerships with local players play a pivotal role in promoting the engagement of the local workforce**, which is essential for several key aspects of successful forest restoration. These partnerships facilitate crucial activities, including soil analysis for diagnostic purposes both before and after planting, ensuring the effectiveness and long-term monitoring of restoration projects. Additionally, local collaborations support soil preparation, the collection of native seeds, and the efficient management of nurseries for traditional hand planting. Manual planting, another significant aspect facilitated by local partnerships, allows for the introduction of specific tree species that may not be conducive to capsule technology due to factors like size, low water stress resistance, limited seed availability, or inadequate preservation methods. Such collaborations empower the involvement of local communities and stakeholders, ultimately enhancing the sustainability and impact of reforestation efforts.



We work directly with local communities, not only through environmental education activities carried out in all schools of the municipality through the Integrated Education Program, but also through research and social mobilization events under the Biodiversity Monitoring Program. In this context, we explore the possibilities and benefits of fauna restoration with the community and during the mobilization events we provide feedback on biodiversity. Furthermore, the projects we undertake contribute to job creation and income generation within local communities.

**GABRIELA VIANA &  
TATIANA HORTA**

ASA



### KEY TAKEAWAYS

- Before thinking about carbon sequestration, market actors must focus on the sustainability and resilience of each project.
- We now know that this resilience depends in particular on the biodiversity of each restoration project and the socio-economic benefits it generates.
- However, adhering to these criteria requires accelerating financing as well as collaboration among both international and local stakeholders.

# 3

## COMPANIES NOW HAVE THE OPTION TO INVEST IN REFORESTATION WITH INTEGRITY

In the second section of this document, we have stressed the importance of evaluating a project's quality, especially by examining its impact on induced biodiversity and socio-economic benefits, before delving into carbon credits. Along with the aspect of integrity, the issue of quality is indeed at the center of all discussions. In fact, a recent study by the Boston Consulting Group<sup>51</sup> has confirmed what everyone has been noticing: carbon credit investors are willing to pay a premium for credits that can be clearly demonstrated to be of high quality.

Now, **let's explore how high-quality projects could be financed in the future.** To fund these projects, some advocate for an improvement of the current carbon credit system, arguing that no complex global system was built overnight. Others wish to abolish the current system or provide alternatives. In any case, no serious actor today would argue against the need for changes. The evolution of awareness, the development of new tools, and unfortunately, the realization of the impacts and disasters associated with climate change are accelerating these transformations.



It's good to live in a world that has grown accustomed to the notion of ecosystem outcomes as a value worth paying for. The VCM was established at a time when we didn't have the opportunity to employ technology as we do now. And it's time to revisit.

**DR. SONJA STUCHTEY**

THE LANDBANKING GROUP



### LEARNING FROM PAST MISTAKES TO FILL GAPS IN AN INITIALLY SMART SYSTEM

#### Transitioning from a compensation to a reduction and contribution approach

As Alex Navarro, Senior Manager of Nature at the events and media company GreenBiz Group, puts it: "When I hear that a company donated millions towards a conservation project, I don't automatically celebrate. Instead, I ask what that company is doing to directly reduce the impacts of its operations and products on people, biodiversity and climate."

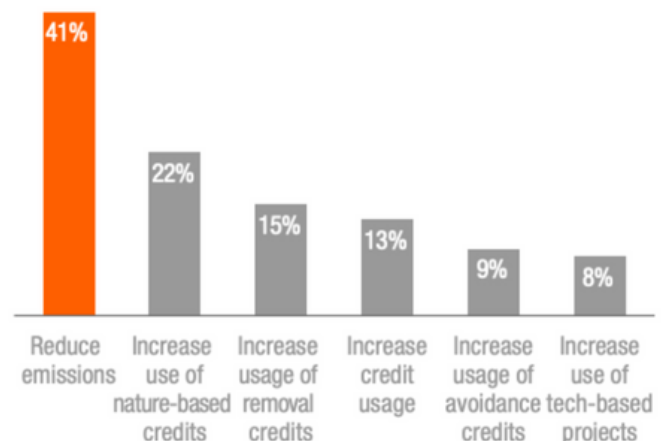


Figure 9: When you are in contact with groups such as the Science Based Targets initiative (SBTi) or the Voluntary Carbon Market Integrity Initiative (VCMi), what are you being influenced to do?<sup>52</sup>

In reality, all the actors interviewed call for **a shift from the sole compensation model to one of reduction and contribution**. As economist Alain Karsenty explains, “we must convince stakeholders and consumers that compensation alone cannot solve the problem. As compensation loses credibility, alternative solutions may emerge.”<sup>53</sup> This shift is imperative for companies looking to make a real and lasting impact on the environment and society. **While the offsetting mechanism tends to extend the business-as-usual lifespan, a contribution logic encourages true sustainability.** This new concept should go beyond carbon capture by enhancing ecosystems biodiversity and enriching the population living in them.

The contributive approach can also significantly boost a company's reputation, thus attracting more customers, investors, and partners. On top of that, firms embracing the contribution mechanism will increase their climate resilience and therefore competitiveness.



A compensation logic will not get us there. If we compensate, we only restore - in the best and most honest case - what we have destroyed before. That doesn't add up to the necessary dimension and is massively unattractive. Who likes punishment?

**DR. SONJA  
STUCHTEY**

THE LANDBANKING GROUP



Greenwashing poses a significant threat, with some companies struggling due to inadequate project due diligence, prioritization, and monitoring. The lack of proper communication often stems from insufficient data on projects and a broader lack of education on the subject.

**GUILLAUME LETI**

CARBONABLE

# ENSURING ADDITIONALITY, PERMANENCE, AND NO-LEAKAGE THROUGH NEW TECHNOLOGIES

## Additionality: How to ensure it in a reforestation project

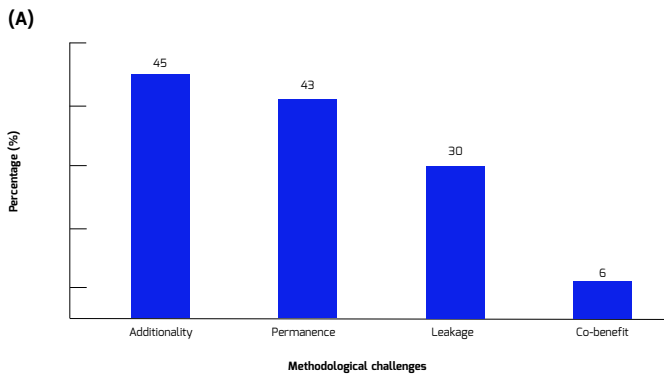


Figure 5: Major challenges for Forest Carbon Offset projects<sup>54</sup>

Additionality is the top criterion to have in mind when vetting reforestation projects. But what does it mean? A carbon offset project is additional when it adds a positive climate impact (i.e., emissions removal or reduction) to a business-as-usual scenario (i.e., no project development). Also, the carbon credits bought should be the key incentive for the project's approval. So, for instance, a reforestation project that is subsidized by a local government might happen regardless of a purchase, therefore it's not additional.

Being dependent on what will happen in the future, additionality is difficult to estimate beforehand. Given this intrinsic uncertainty, one should refer to an additionality likelihood or profile. <sup>55</sup> <sup>56</sup>When looking at the past, things don't seem encouraging. Researchers found that 85% of the carbon offset projects developed as part of the EU Clean Development Mechanism (CDM)

had a low likelihood of being additional. Also, when assessing 12 REDD+ projects in the Brazilian Amazon, scientists found that most of their additionality's claims were overstated.<sup>57</sup>



Speaking to carbon brokers in the market there is a clear preference for reforestation projects that restore degraded farmland. Our understanding is that these projects are valued because of the clear and measurable net impact on the local environment, converting unproductive land into carbon removing assets.

**MATHIAS LESSMANN**

YMBU AGROFLORESTAL



If there's no information available on the additionality likelihood of an offset project, you can watch out for some red flags. For example, revenue-generating monoculture plantations are unlikely to be additional reforestation projects. <sup>58</sup>However, according to some experts, riparian reforestation offsets are among the most likely projects to be additional (see Fig. 10).

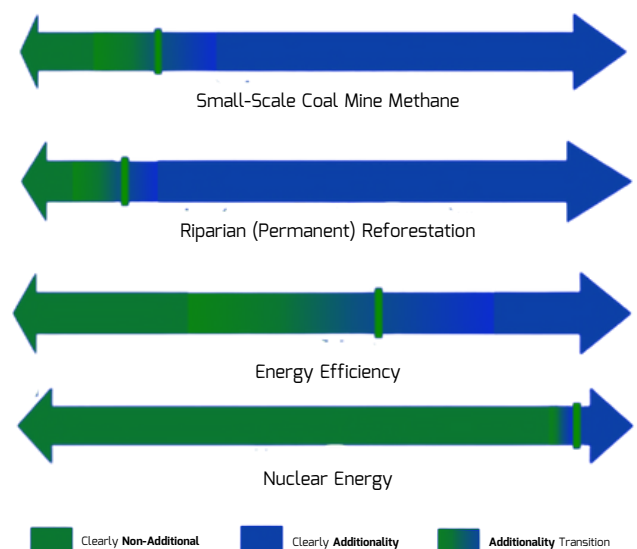


Figure 10: Additivity profile for different carbon offset projects<sup>59</sup>

Assuming that the plantation company possesses the necessary research capabilities and/or collaborates with certified labs, several actions are now known to enhance the likelihood of achieving additionality in a reforestation project. Here they are:

- **Baseline Assessment:** Conduct a comprehensive baseline assessment to determine the current state of the land and forest cover. This evaluation should encompass historical land use and any prior reforestation efforts. Researching the land helps ascertain whether natural restoration is progressing too slowly or not at all. Based on this analysis, a counterfactual scenario can be defined.
- **Specify Clear Conditions:** Clearly define conditions under which a project can be considered additional. These criteria should encompass factors such as the rate of natural forest regeneration, legal requirements, and the local context.
- **Implement Robust Verification:** Establish a rigorous verification process that includes periodic assessments and continuous monitoring of the project's progress. This approach allows for a comparison of the actual project outcomes against the counterfactual scenario.
- **Engage Local Communities:** Involve local communities from the outset of the project, considering their input, needs, and context. Public consultation, co-construction, and co-development of the project can lead to better alignment with local conditions and improve additionality.
- **Adaptation and Adjustments:** Based on communities' feedback and monitoring data, be prepared to adapt and adjust project parameters, such as the types of seedlings planted, planting methods, and the area covered. This flexibility enhances the project's ability to achieve additionality.

## Permanence: why we need to track impact throughout their lifetime

Along with additionality and carbon leakage, permanence is a major challenge for forest carbon offset (FCO) projects.

**A high-quality offset project should permanently lock carbon away from the atmosphere.** However, a number of factors could shorten the lifespan of a forest. Pests, diseases, and mismanagement<sup>60</sup> prevents the healthy growth of plants. On top of that, mature trees could be cut down by agricultural expansion and logging activities or burnt in a wildfire. Also, non-native trees tend to decompose faster, thus releasing carbon earlier compared to local species<sup>61</sup>. This is commonly known as carbon reversal<sup>62</sup> and compromises the climate benefits of the reforestation project. That being said, tactics (e.g., long-term monitoring, multi-species replanting, optimized seeding, etc.) exist to maximize the permanence of forests' carbon stock.

As elaborated in the second section of this document titled "Social and Economic Benefits" and supported by research conducted by ETH Zurich<sup>63</sup>, involving local stakeholders from day one in the long-term development of these projects increases the likelihood of sustainability.

When it comes to permanence, the long-term management of the forest following planting is a crucial subject, and is essential in determining the signs of success or failure of the project. Regular monitoring by the contractor after planting is essential to assess the success of the project and detect any potential problems. Corrective action can be taken by the reforestation contractor in the event of signs of unproductivity, such as a second or third planting.



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WHY REFORESTATION AND NATURAL  
REGENERATION ARE COMPLEMENTARY**

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Figure 4

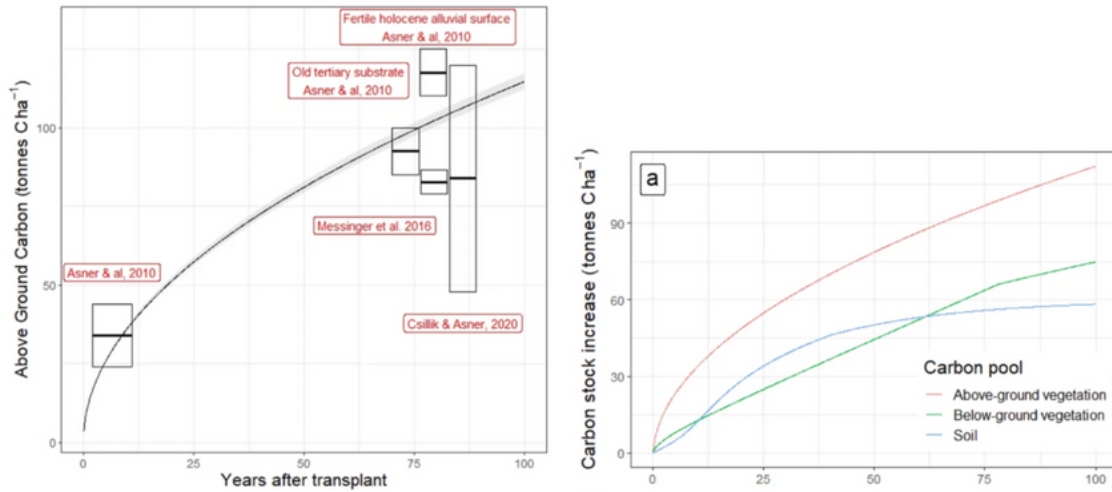


Figure 11:

In 2021, a study highlighted the challenge of measuring carbon capture, as results varied from one study to another (Figure 11), and it emphasized the need to consider three levels: above-ground, below-ground, and soil (Figure 12)<sup>64</sup>.



I advise to let buyers, investors and stakeholders in at an early stage. Identify the partners you want to work with, and give full access to all relevant information related to a project.

**CASPER VAN DER TAK**

NUTAWA



- For 30/40 years. However, it would be ideal to follow up for as long as needed as timelines are still under debate. Based on a recent study, it takes about 40 years to reach the typical reforestation carbon capture target. On the other hand, some experts argue that permanent offset projects should guarantee the sequestration of carbon for at least 100 years.<sup>65</sup>
- On a recurring basis. This may be weekly or monthly at first, then biannual or annual after a few years of growth.
- By leveraging both technology and human power! Field monitoring is ideally carried out by a network of people in charge of sampling in the region and/or people trained on your site by your service provider. Thanks to their on-the-ground skilled supervision, locals will help project developers look over the permanence of a forest over the years. Combining human forest wardens with best-in-class technologies such as drones and satellites supercharge the efficiency of the monitoring process.

Despite ongoing debates surrounding the tracking of carbon capture and sequestration, it appears that **some consensus is beginning to emerge**. Ideally, it is recommended by many that monitoring activities should be conducted:



On the technological front, **numerous innovations are now accessible to ensure not only the long-term monitoring of a credit but also its validity.** While primarily linked to cryptocurrencies, blockchain technology can also enhance the transparency of the carbon market. <sup>66</sup>As Open Forest Protocol proves it, blockchain enhances the carbon market by ensuring credit legitimacy and preventing double-counting through an immutable ledger. Real-time monitoring via smart contracts guarantees accurate credit retirement, reducing intermediaries for efficiency and security. Decentralization and transparency promote trust among users. Automated verification and IoT integration further streamline processes, instilling confidence in credit integrity. Leveraging this technology, offset providers can enable companies to trace the impact of each credit throughout its entire lifecycle, from acquisition to retirement.



Blockchains are already revolutionizing the supply chain industry because of these capabilities, and they will continue to bring more trust and transparency to the various carbon markets.

**FRED FOURNIER**  
OPEN FOREST PROTOCOL



Aside from blockchain-enabled credits tokenisation, **buyers can access customized dashboards to gain full visibility on their projects over their lifetime.** Accessing real-time data on forest growth, biodiversity, carbon storage, etc., these platforms allow a reliable follow up of reforestation investments<sup>67</sup>, plus the ability to share all this information with stakeholders. In other words, it's a way to mitigate the risk of greenwashing.



Choose projects that implement a robust monitoring and reporting system to verify and validate their environmental contributions. Share your approach with all stakeholders.

**GUILLAUME LETI**  
CARBONABLE



## Leakage: strategies to avoid it

Ironically, it's true that the implementation of an offset project in a certain area could indirectly cause the emission of carbon somewhere else. This spillover effect is defined as carbon leakage.

However, **there are a series of strategies that can minimize the carbon leakage risk of a reforestation project.** <sup>68</sup>A smart site selection is the first place to start. Forest restorers should identify non-productive, degraded, and/or non-arable land to avoid competition with timber production, farming, and other activities. <sup>69</sup>In particular, the tropical and subtropical regions of the world host most of the land that needs reforestation while not competing with agriculture or urbanization. In addition to that, leveraging drones enable access to remote areas that are at low risk of reforestation-induced carbon leakage.<sup>70</sup>

Aside from choosing a strategic location, **developers should engage local workers** in project-related tasks and combine reforestation with agroforestry to reduce the need for new land to deforest.

Without delving into too much detail, let's consider that our three carbon pillars (additionality, permanence, and no-leakage) must be complemented by other criteria, including:

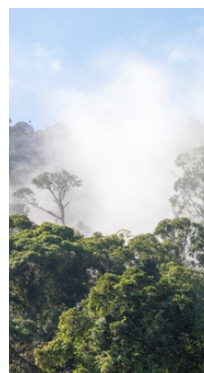
- **Independent Auditing:** Verification of emissions reduced, avoided, or sequestered by each project through a recognized methodology developed by experts and verified by an independent body is a prerequisite. Projects cannot issue carbon credits without a certified and verified methodology.

- **Avoidance of Double Counting:** To preserve the environmental integrity of mitigation activities, emission reductions or units must not be claimed or accounted for more than once. The new accounting framework outlined in Article 6.2 of the Paris Climate Agreement addresses the critical issue of accounting for internationally transferred mitigation outcomes (ITMOs) to prevent double-counting by both the country obtaining them and the country supplying them.



It seems that more and more buyers and investors want to become engaged early on in the project development, to ensure that the projects they are associated with are completely sound. There is a premium for co-developed projects.

**CASPER VAN DER TAK**  
NUTAWA



**FOCUS: CARBON-EMITTING FORESTS: SORTING THE TRUTH FROM THE LIES**

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## DRAWING INSPIRATION FROM NEW INITIATIVES TO RESHAPE THE SYSTEM

The majority of the people we interviewed for this paper believe that **the carbon credit process requires improvement**. Multiple initiatives aimed at improvement are currently underway, with a focus on preservation projects, which have faced accusations of overcrediting. However, these improvements could also benefit other types of carbon credits, including reforestation. In 2022, the BCG<sup>71</sup> outlined three scenarios for the voluntary carbon market's development by 2030.

1. **Global Market Scenario:** This scenario envisions significant progress through international climate agreements, leading to a strong, coordinated global carbon market. Demand for carbon credits could reach 2 GtCO<sub>2</sub>e annually by 2030. It would feature enhanced public trust, transparency, comparability, and standardization in market infrastructure. Carbon credits would also count toward countries' climate pledges under the Paris Agreement.
2. **Diverged Market Scenario:** In this scenario, there's less global coordination and more fragmentation, making it challenging to establish common rules and regulations. Trust issues could persist, and some projects might face credibility concerns. Companies would favor high-quality credits, leading to potential supply constraints, but the market would still grow, with an estimated annual demand of 0.7 GtCO<sub>2</sub>e by 2030.

**3. Linked Market Scenario:** Here, policymakers promote convergence between compliance and voluntary markets, though not a single global market. A "linked" market would emerge, with annual carbon credit demand expected to reach around 1.1 GtCO<sub>2</sub>e by 2030. This scenario could drive a rapid increase in demand but might also face supply challenges due to project lead times, potentially tightening the market by 2024 on an annual basis and by 2028 cumulatively.

The difference between these scenarios could notably **depend on the market's ability to prove its credibility and regulate excesses**. The level of investments will hinge on this. To achieve this, various actions are possible, and we will explore them in the upcoming pages.

## Reviewing the validation and monitoring of projects

As we've seen, carbon credit validation and monitoring organizations are subject to criticism. According to the BCG and Shell, in 2022, 91% of buyers rank MRV as one of their top criteria in credit purchase decisions.<sup>72</sup>As a consequence, one of the first criticisms raised concerns the quality of certified projects. Today, all stakeholders have clearly understood this and are seeking to improve their methods to address these criticisms.

On a global scale, last March, **the Integrity Council for the Voluntary Carbon Market ICVCM launched a global quality standard for carbon offsets**<sup>73</sup>. Carbon credits certifiers like Gold Standard or Verra will have to meet its 10 core carbon principles. ICVCM requirements include having an effective tracking system in place as well as sharing information on additionality, permanence, human rights & biodiversity protection, etc. Thanks to this guideline, companies will be able to identify high-quality projects more easily.

More recently, on October 3rd, various standard setters and rating systems made announcements or spoke up to reaffirm their commitments. Things are indeed changing. For instance, Verra has announced a new ARR methodology<sup>74</sup> in the Verified Carbon Standard VCS Program,

the world's leading carbon crediting program. The VM0047 Afforestation, Reforestation, and Revegetation methodology is expected to be the first in the voluntary carbon market to incorporate dynamic performance benchmarks. It relies on remote sensing data to establish a project's baselines test its additionality. In an article titled **"Taking down the carbon markets won't stop climate change: responding to the latest market criticism,"** Allister Furey, the CEO and co-founder of Silvera, emphasized that "although it is true..." that without the ability to assess quality a market for "lemons"<sup>75</sup> emerges, the tools and technology to assess and improve the carbon markets already exist and are in deployment. We have already seen buyers prioritizing quality today with the tools at their disposal, such as our ratings and data about the projects".

Others go even further and are seeking to improve the financing methods and, consequently, the integrity of carbon credits. On October 3rd (once again!), **BeZero Carbon launched the world's first rating system for ex-ante carbon credits**<sup>76</sup>. Tommy Rickes, CEO and co-founder of BeZero Carbon, explained, "BeZero's ex-ante rating provides buyers with robust assessments of projects before any credits are issued, so they can direct capital with confidence into the projects that can have the most impact."



Carbon credits are not greenwashing proof. It depends on how buyers use them as part of their net-zero implementation agenda and how they source them. It's all about whether buyers do their homework before spending vast amounts of money on unknown credits from unknown projects.

**DANILO ZELINSKI**  
KPTL



The French organization ERS (Ecosystem Restoration Standard) aims to change the way standards settlers are compensated. As their CEO Thibault Sorret explained in our interview<sup>77</sup>, "Carbon standards' involvement in MRV is hindered because they have a vested interest in the issuance of credits." In contrast, **ERS intends to implement an annual per-hectare fee rather than charging per issuance** (i.e., per ton). With the same goal of preventing conflicts of interest, **The Landbanking Group, another relatively recent organization, has opted to decline data provided by beneficiaries of ecosystem payments. Instead, they exclusively rely on data from independent sources.** Dr. Sonja Stuchtey, co-founder, explains<sup>78</sup>, "While this may reduce the range of parameters we can currently provide, it enhances transparency and minimizes bias. As technology continues to advance, we anticipate a significant surge in the availability of independent data."

## Placing co-benefits or biodiversity at the heart of financing?

Other individuals interviewed in the context of this white paper are advocating for the development of biodiversity credits that could complement or replace carbon credits. **Their objective is to shift the system's focus away from relying solely on a carbon measurement unit and instead incorporate a more comprehensive measurement unit.** This is the case, for example, with economist Alain Karsenty, who states, "It doesn't make sense to think solely in terms of carbon without considering biodiversity, water quality, waste, benefit-sharing, and sustainable development alternatives built with local populations."<sup>79</sup>



Biodiversity credits are certificates representing measured biodiversity gains obtained through restoration, conservation, or threat reduction. They are quantified and tradable units of biodiversity gain. Biodiversity offsets are typically used by economic entities to obtain permits for land development with residual adverse impacts, involving ecological equivalence checks and compliance with conservation mitigation hierarchy. They are generally traded within the home country. In contrast, non-offset biodiversity credits are expected to be traded internationally, involving domestic laws and international integrity principles.

**JESSICA SMITH**

UNEP FI



This perspective is shared by Inigo Wyburd, Policy Expert at Carbon Market Watch<sup>80</sup>. After emphasizing that the Verified Carbon Market (VCM) already distinguishes between projects with co-benefits by offering price premiums for such initiatives (e.g., the Climate, Community, and Biodiversity (CCB) standard), he calls for consideration of a system "whereby credits are separated for different types of environmental and social-economic benefits, aside from carbon."



Companies should focus on co-benefits, and avoid fixating solely on carbon offsets and offsetting because this doesn't work from an accounting point of view, and could drive companies towards the purchase of the cheapest tonnes from low quality projects.

**INIGO WYBURG**  
CARBON MARKET WATCH



### What system should be put in place then?

**This is where the greatest differences among the interviewed stakeholders lie.** For some, as we've seen, the current credit system should be amended and improved, but it already provides a good foundation. For others, there is very little chance that the existing system is a solution. "Credits are unlikely to be the best way for channeling finance towards real climate action. Projects that have biodiversity and social benefits we are in favor of, and believe are in need of financing, but this financing needs to come from alternative financing sources. If this were to be through credits, then they should certainly not be for offsetting and ton for ton accounting," explains Inigo Wyburd<sup>81</sup>.

This is why **some organizations are working on alternative measurement methods.** The names given to these new biodiversity measurement units and their adoption by businesses may vary among the interviewed stakeholders. Arthur Pivin of Carbone 4, for instance, refers to them as "biodiversity certificates," emphasizing that this new financial asset should not be used for offsetting purposes: "Reporting for biodiversity impacts should be separate from reporting for negative impacts on biodiversity."

This system is part of a broader approach, notably based on The Kunming-Montreal Global Biodiversity Framework adopted at CBD COP15 in December 2022, which established a goal and targets to address the significant global biodiversity finance gap. The concept behind these certificates is to **enable the funding of on-ground activities that are supported by quantified and certified biodiversity gains.**

According to Carbone 4 and NatureFinance<sup>82</sup>, this entails:

- Developing a methodology for evaluating biodiversity gains.
- Establishing a certification process for generating certificates.
- Crafting a market framework for trading and utilizing these certificates.

Biodiversity credits are gaining momentum right now, as evidenced by the revelation made by Carbon Pulse of the World Economic Forum (WEF) creating a buyers' club for biodiversity credits.<sup>83</sup>

### How to measure co-benefits and biodiversity?

The question that has consistently arisen is the **ability to measure these new biodiversity measurement units.** As Adrian Dellecker wittily writes, "How many koalas should equal a hectare of the Amazon rainforest?"<sup>84</sup>. This challenge is currently being addressed by the Carbone 4 team, in collaboration with the Muséum national d'Histoire naturelle. In December 2022, they published a first methodological framework, which includes a proposal for an assessment method for biodiversity.

Their starting point is that **biodiversity is inherently a localized issue.** Their approach involves gathering field experts for a specific category of ecosystems to define a taxonomy of biodiversity practices. Subsequently, they engage scientific experts to establish a consensus on the value of biodiversity associated with a particular change in practices. The outcome is an evaluation framework that enables the assessment of biodiversity gains linked to a specific transition.

- 1 Providing credible, timely, and affordable measurement and monitoring of the state, improvement and/or maintenance of biodiversity.
- 2 Scaling sustained and high-integrity demand for credits and associated financing.
- 3 Ensuring sufficient high-integrity supply of credits that offer nature positive outcomes.
- 4 Securing adequate price and equitable distribution of rewards to project developers, sovereigns, and Indigenous Peoples and local communities.
- 5 Establishing robust governance and broader, transparent institutional arrangements.

Figure 12: The five core design challenges for enabling high-integrity biodiversity credit markets according to Carbone4 and NatureFinance<sup>85</sup>

It's also important to mention that Carbone 4's approach differs from that of another interviewee. In creating their standard, the ERS team engaged in a public consultation, which led to a surprising revelation: "We expected the market to embrace efforts to directly monitor biodiversity, even if such measurements were imperfect. To our surprise, many market participants preferred the use of proxies, such as habitat capacity, over imperfect direct measurements." (Thibault Sorret, co-founder and CEO at ERS).

Ultimately, these two examples unmistakably demonstrate that **the issue of data is pivotal, but there may not be a one-size-fits-all solution**. The most efficient data depends on the level of relevance, the specific inquiry, and how practically it can be utilized by the ultimate end-user.

The final word of this book should indeed probably **address the inherent uncertainty of nature**, a topic on which more and more viewpoints are emerging. This is emphasized by Gregoire Guirauden<sup>86</sup>, Co-founder of Riverse, a carbon credits issuance protocol: "I know it can be weird, but we need to oversimplify the mechanism, and accept that there is always a part of uncertainty and some ways to interpret information. Like in every measurement, verification, or accounting process, there are biases, but the priority now is to finance the transition massively." His words are supported by a recent study. By stepping back and examining the carbon monitoring results (considered a simpler indicator to measure than biodiversity), **researchers have demonstrated that making exact predictions about the amount of carbon that can be sequestered in offset projects is scientifically impossible**. Their conclusion is that this is precisely why the carbon offset market should prioritize building resilience and draw lessons from other sectors. "In the absence of absolute certainties, a service-focused model could be a game-changer... It allows us to shift the narrative from buying specific, contestable amounts of carbon offsets to making conditional investments in sustainable and just future landscapes."<sup>87</sup> And to attract more investments, without further delay.



## KEY TAKEAWAYS

- Whether it's carbon credits or biodiversity certificates, companies now have the necessary tools to finance reforestation projects with meaning and a positive impact. The choices are theirs to make, with full awareness of the consequences.
- An increasing number of stakeholders are advocating for the integration of project financing or valuation models into a company's broader reduction strategy. Consequently, solutions are emerging to address this demand.
- Project monitoring is evolving rapidly. However, it's essential to keep in mind that: 1 - when it comes to nature, not all data will ever be available, and 2 - on the other hand, creating resilient projects that yield satisfactory results is indeed achievable.

# CONCLUSION & EXTRAS

# 4

At the end of this six-month journey, we are filled with enthusiasm and energy. Today, many stakeholders are coming together to tackle the challenges of sustainable, long-lasting, and resilient reforestation. Critiques of the carbon credit system have existed for a long time, with some advocating for its improvement for nearly two decades. However, until recently, several key factors were missing: critical elements were absent: widespread awareness, a collective dedication to change among the majority, and viable, practical technical solutions.

Now, we stand at a pivotal moment. Our accumulated experience enables us to discern what works and what needs reevaluation, all while recognizing that solutions are available.

On a global level, there is now an opportunity to redesign the system to ensure that the vast majority, if not all, of the reforestation credits generated and sold have a positive impact on combating climate change. Recent advancements in the Voluntary Carbon Market (VCM) indicate that progress is being made. However, the question remains: will the VCM be the answer, or will alternative models emerge? The future will determine whether the intentions of market participants alone can truly meet the expectations. If not, individuals, committed businesses, and regulatory bodies may need to intervene.

On a corporate level, all the necessary tools are at our disposal to fund projects that have a positive impact on our planet, as long as we adhere to certain principles:

- Start by reducing emissions and contributing to solutions, rather than relying solely on compensation mechanisms
- Prioritize projects that demonstrate resilience and emphasize biodiversity and social impact as foundational elements of carbon sequestration
- Go beyond the label 'high-quality' and gain a profound understanding of what it truly represents
- Evaluate whether a credit-based financing approach is the best fit for the company, or if other financing or valuation methods would be more suitable

We extend our gratitude to all the individuals who participated in our interviews and to the communication teams that permitted the publication of our discussions. Today, transparency and collaboration are more crucial than ever.

**Let's grow.**

# INTERVIEWS

Click on the names down bellow to be redirected to the interview



[Fred Fournier - Open Forest Protocol](#)



[Danilo Zelinski - KPTL](#)



[José Júnior - Natureza Bela](#)



[Matthias Lessmann - YMBU](#)





**Alain Karsenty - Cirad**



**Arthur Pivin - Carbone 4**



**Jessica Smith - UNEP FI**



**Dr. Sonja Stuchtey - The Landbanking Group**



**Inigo Wyburd - Carbon Market Watch**



**Gregoire Guirauden - Reverse**



Casper van der Tak - Nutawa



Gabriela Viana & Tatiana Horta - ASA



Guillaume Leti - Carbonable

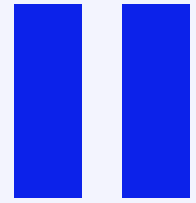


Pierre-Alexandre Jivoult -  
Ecotree



Thibault Sorret - Ecosystem Restoration Standard

# SURVEY

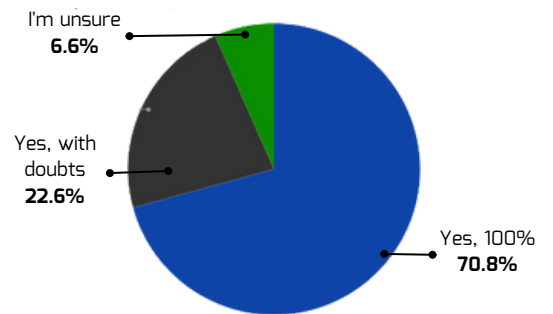


While working on this white paper, we asked 212 professionals from around the world to answer questions about their perception of reforestation carbon credits. Here are the results.

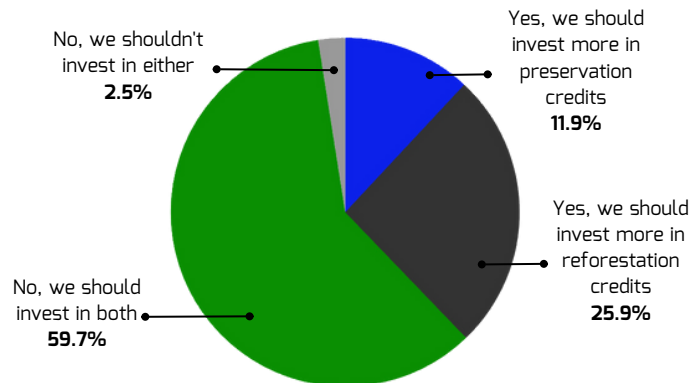
**What are your thoughts on the concept of generating carbon credits to support reforestation efforts?**



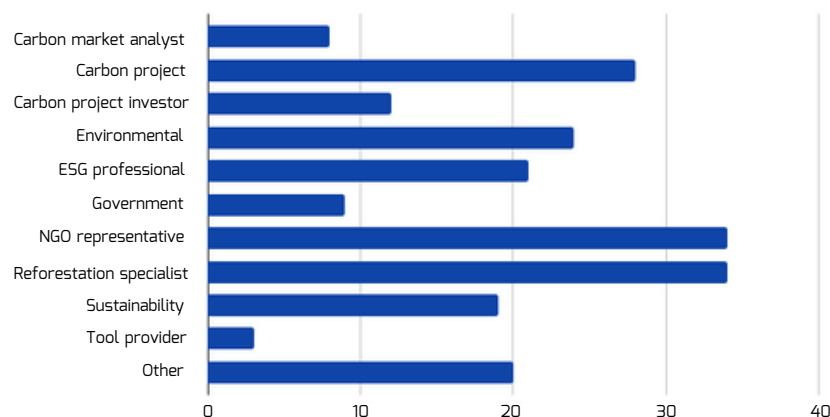
**Do you support the idea of creating certificates that promote carbon sequestration, as well as benefits for biodiversity and local communities, for example?**



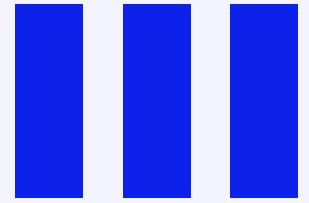
**Do you differentiate between credits for preservation and reforestation?**



**Which of the following categories do you believe you belong to?**



# LEARN MORE ABOUT MORFO



MORFO restores deforested areas in tropical regions like the Atlantic and Equatorial African forests by integrating all forest layers, ensuring ecosystemic resilience. Our efficient approach prioritizes long-term sustainability and comprehensive monitoring of biodiversity, biomass, and carbon levels.

MORFO is a Franco-Brazilian company. We currently have 3 offices in Rio de Janeiro, Paris and Libreville. Our solution is a multi-stage reforestation process:

## 1. Area analysis

Using drones, satellite images, and field studies.



Unique expertise in Seeds and Soils.



## 2. Species selection and encapsulation

+200 species studied in our laboratories. 20 species planted on average per projet. Holder of our seed collectors' library.

Extensive monitoring brought together on a single dashboard.



Unparalleled speed and efficiency.

## 3. Ecological monitoring

Full access to our monitoring platform.



## 4. Planting by drone

From 20 to 50 hectares/day & 180 seedpods/minute.

30

people

19

customers

600

hectares restored

\$5m

raised

8

nationalities

Website : [morfo.rest](http://morfo.rest)

Newsletter: [morfo.substack.com](http://morfo.substack.com)

LinkedIn: [Morfo Global](#) / [Morfo Brasil](#)

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# GLOSSARY

# IV

## VMC:

The voluntary carbon market (VCM) is a marketplace where individuals, organizations, and businesses can buy and sell carbon credits voluntarily to mitigate their carbon emissions and take action against climate change. Unlike the compliance carbon market, where carbon emissions reductions are mandated by government regulations and typically involve industries covered by emissions caps (such as the European Union Emissions Trading System), the voluntary carbon market is not driven by legal requirements. Instead, it is driven by voluntary actions and commitments to reduce greenhouse gas emissions.

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## MRV:

MRV stands for "Measurement, Reporting, and Verification." It is a framework and set of processes used to track and verify greenhouse gas emissions and emissions reductions, particularly in the context of climate change mitigation efforts, such as carbon reduction commitments and emissions trading programs. MRV is essential for monitoring progress toward emissions reduction targets and ensuring the transparency and accuracy of reported emissions data.

MRV processes and requirements may vary by country, region, or specific climate agreements and standards. International initiatives like the United Nations Framework Convention on Climate Change (UNFCCC) establish guidelines and protocols for MRV to ensure consistency and comparability of emissions data on a global scale. These guidelines are often updated and refined to reflect advances in measurement and verification methodologies.

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## Biome:

A biome is a large, distinct ecological region characterized by specific climate, vegetation, and wildlife. Biomes are defined by their unique combination of abiotic factors (such as temperature, precipitation, and soil type) and biotic factors (including plant and animal species) that interact within a particular geographic area. These factors collectively determine the biome's overall structure, function, and appearance. Each biome plays a crucial role in the global ecosystem, influencing climate patterns, water cycles, and biodiversity. Understanding and protecting these biomes are essential for the health of our planet and the various species that inhabit them.

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## Insetting vs offsetting:

"Insetting" and "offsetting" are two distinct approaches to addressing greenhouse gas (GHG) emissions in the context of environmental sustainability and climate action. Both strategies aim to mitigate carbon emissions, but they differ in their methods and objectives. While offsetting involves purchasing carbon credits from external projects to compensate for emissions, insetting involves implementing emissions reduction or removal projects within an organization's own operations or value chain. Insetting is considered a more proactive and sustainable approach to carbon management, as it focuses on reducing emissions at the source and aligning environmental goals with core business activities. However, offsetting can still play a role in achieving carbon neutrality, especially when it's challenging to eliminate all emissions directly within an organization's operations. The choice between insetting and offsetting depends on an entity's specific goals and circumstances.

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## Scope 3 emissions:

Scope 3 emissions, often referred to as "Scope 3 greenhouse gas emissions," are a category of greenhouse gas (GHG) emissions that are associated with an organization's activities but occur as a result of activities in its value chain, including both upstream and downstream sources. The Greenhouse Gas Protocol, a widely recognized standard for GHG accounting and reporting, defines three scopes of emissions, with Scope 3 being the most comprehensive and complex to account for. While Scope 1 and 2 emissions are direct emissions that occur from sources that are owned or controlled by an organization or indirect emissions associated with the generation of purchased electricity, heat, or steam consumed by the organization, Scope 3 emissions encompass all other indirect emissions that occur as a result of an organization's activities but are not within its direct control. These emissions are associated with the entire value chain, including suppliers, customers, and other stakeholders. Thus, Scope 3 emissions are often the most challenging to quantify and manage because they involve multiple stakeholders and can extend across complex global supply chains.

## Out-come based:

An "outcome-based" approach refers to an approach that emphasizes the actual and verified environmental outcomes or benefits achieved through a project, such as emissions reductions or removals, rather than just the implementation of project activities or processes. It places a strong emphasis on measuring, reporting, and verifying the quantifiable results of a project in terms of its impact on reducing or removing greenhouse gas (GHG) emissions. Outcome-based carbon projects are critical in the carbon market because they provide transparency and assurance that emission reduction claims are backed by real environmental benefits. By emphasizing outcomes, stakeholders can have confidence that their investments in carbon offsets are contributing to meaningful and measurable reductions in greenhouse gas emissions.

## Ex ante projects:

An ex ante rating, in the context of carbon credits and carbon offset projects, is an assessment conducted before the carbon credits are generated and sold on the market. It aims to evaluate the likelihood that a specific project will successfully remove or avoid a certain amount of greenhouse gas emissions, typically measured in terms of CO<sub>2</sub>e (carbon dioxide equivalent), before those credits are made available for trading. This assessment also involves an evaluation of the risks associated with executing the project. Ex ante ratings play a crucial role in ensuring the transparency and credibility of carbon offset projects. They help investors, buyers, and project developers make informed decisions about which projects to support and invest in, based on their potential for carbon reduction and associated risks.

## Indigenous Peoples (IPs) and Local Communities (LCs)

"IPs have unique cultural, economic, and environmental relationships, with specific rights recognized under international law, like the UN Declaration on the Rights of Indigenous Peoples. LCs also have distinct ties to their environments but may lack the same legal recognition. In the context of biodiversity credits, it's essential to understand these differences. IPs often hold specific legal rights over their territories, while LCs may not. Recognizing these distinctions is vital when involving IPs and LCs in biodiversity credit initiatives"

Read [Jessica Smith's interview](#) for more information:

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