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Inclusive and Nature-based Carbon Markets: A Path to Resilient Livelihoods in Sub-Saharan Africa

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Executive summary

In sub-Saharan Africa, people largely depend on nature for their livelihoods. According to the UNEP, more than 70 percent depend on forests and woodlands, and more than 50 million smallholder farmers grow most of the region's food. This heavy reliance on natural resources has made individuals and households particularly vulnerable to changes in climate, land cover, and land policy. In a region that is disproportionately feeling the impacts of rising temperatures, changing precipitation, and more extreme weather, a potential solution is emerging that may provide a path to resilience.

The **Voluntary Carbon Market (VCM)**, where individuals, institutions, and corporations buy and sell carbon credits to offset their carbon emissions, is a promising way for vulnerable communities to access critical resources. In sub-Saharan Africa, carbon credits from **nature-based solutions (NbS) may have the greatest impact and offer the broadest benefits**. NbS is a term coined by the International Union for Conservation of Nature (IUCN) to mean "leveraging nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future." From jobs to biodiversity and food security, NbS are an opportunity to improve livelihoods and leverage the region's

rich natural resources for climate mitigation and adaptation.

The VCM is growing rapidly and is estimated to be **worth US\$30–50 billion by 2030. Innovation in the VCM ecosystem is also at**

a turning point. With the market now worth more than US\$2 billion in value and initial regulatory hurdles (e.g., Article 6 of COP26) overcome, private and public actors need to focus on **catalytic actions and investments** that would establish VCM ecosystems in areas vulnerable to climate change that would benefit the most.

The potential for carbon sequestration and a young and growing workforce makes the nature-based **VCM a huge opportunity for sub-Saharan Africa**. At a voluntary carbon credit price of US\$10/tCO₂e, nearly **43 million jobs could be impacted**. However, **average voluntary carbon credit prices remain low** at US\$4/tCO₂e, largely due to high measurement, reporting and verification (MRV) costs, lack of transparent and direct marketplace solutions, low quality credits, and a lack of credibility.

Despite their potential, **nature-based ventures remain underfunded** in part because funders are unsure where to invest. NbS tend to be piecemeal, difficult to price, and small-scale, with little understanding among financiers of the economic returns and social impact. More venture capital investment in technology companies that make NbS work for small land stewards could help to unlock investment in the VCM.

This brief explores how the VCM could build climate-resilient livelihoods in sub-Saharan Africa and outlines key investment opportunities for donors, investors, and innovators, with a focus on nature-based, small-scale projects. To ensure access to the VCM is equitable and benefits are shared, **donors and investors should consider:**

- Reducing the costs of MRV.
- Enhancing the quality of carbon credits.
- Reducing market transaction costs and increasing marketplace access.
- Making markets more transparent.
- Improving risk mitigation mechanisms, such as carbon credit insurance.
- Building regional VCM innovation ecosystems.
- Diversifying financing strategies for small-scale projects in climate-vulnerable contexts.

43M
jobs could
be impacted

Background

This brief is designed to inform donors, investors, and innovators of key investment opportunities in the voluntary carbon market (VCM) in sub-Saharan Africa, with a focus on nature-based, small-scale projects. It also charts a path for the Climate Innovations for Adaptation and Resilience (CIFAR) Alliance, identifying strategic entry points for engagement in the VCM. In this brief, the Carbon Finance Working Group of the CIFAR Alliance explores the VCM as a way to provide economic incentives for climate mitigation and adaptation, and to direct a greater share of the benefits to small project developers and, ultimately, small land stewards who have been excluded from the VCM. This brief is the output of a literature review, expert interviews, roundtables and panel discussions held between March and July 2022.

Priorities of the CIFAR Alliance

The CIFAR Alliance aims to “determine the opportunity for the digital finance industry to enable access to climate resilience solutions, and to chart a path to scale up an innovation ecosystem for this emerging sector.” The mission of the Alliance is to accelerate responsible innovation in digital finance for climate adaptation and resilience.

During and after COP27, which will be hosted by Egypt in November 2022, the Carbon Finance Working Group of the CIFAR Alliance aims to:

01

Unite existing initiatives to avoid fragmentation and redundancy in the VCM, taking a whole market approach. The CIFAR Alliance strives to become more inclusive, incorporating actors from across the VCM value chain and encouraging the various task forces to share what they have learned, collaborate, and act in partnership.

02

Build locally led carbon finance innovation ecosystems in sub-Saharan Africa. While acting at a global level, CIFAR Alliance members will continue to nurture and connect innovators across the region and encourage access to the VCM for marginalized or under-resourced communities (e.g., youth, women, low-income populations, Indigenous peoples) and ecosystems (e.g., blue economy, fragile environments).

03

Increase venture and catalytic capital for innovation to unlock the business case for nature-based solutions in the VCM, especially those with sustainable co-benefits. Alliance members will aim to launch or cultivate companies that provide scalable solutions using innovative and inclusive technologies.



Alliance members

The CIFAR Alliance is coordinated by BFA Global and made possible by financial support from PayPal.



¹ Carbon offset projects are usually implemented by land stewards and land managers, which include smallholder farmers, communal/tribal lands, and government-owned lands. A smallholder farmer in Africa owns less than 1 hectare of land, whereas a large concession can measure 10,000 to 20,000 hectares. While the

definition of smallholder farmers varies by region, in sub-Saharan Africa it refers to those who own less than 2 hectares. The land may be contiguous (connected) or fragmented. Contiguity is critical for carbon project development and the ability to claim offsets based on geospatial boundaries. Source: Tim Rann, “Reforestation, Emerging

Markets, and The Voluntary Carbon Market”, Mercy Corps Ventures, August 24, 2022.

² See: <https://www.cifaralliance.org/>.

01

The voluntary carbon market opportunity

In Africa almost half a billion people, or 48 percent of the population, depend on nature for their livelihoods.³ This heavy reliance on natural resources makes individuals and households particularly vulnerable to changes in climate, land cover, and land policy. Current estimates indicate there are more than 50 million smallholder farmers in sub-Saharan Africa (SSA), most of whom are working and living in high-risk environments.⁴

Smallholder farmers play a vital role in the region's food security and ecosystem services, which are threatened by an ever-changing climate.⁵ In the worst-hit countries, climate change will make the hottest months 2.6°C hotter and rainfall will drop by more than 100 mm a year.⁶ In the coming decades, such changes threaten to reduce major staple crop yields by 10 percent while food demand will increase by 190 percent.⁷ Lack of adaptation by farmers and others who rely on nature for their livelihoods is expected to push an additional 40 million people into poverty, mainly in fragile rural contexts.⁸

As these communities bear the brunt of the intensifying impacts of climate change, the **Voluntary Carbon Market (VCM)** has emerged as a way to provide critical resources to the most vulnerable.⁹ The VCM is “where private individuals, corporations and other actors issue, buy and sell carbon credits outside of regulated or mandatory instruments (Box 1).”¹⁰ Carbon credits are measurable and verifiable emission reductions from certified climate action projects. These credits are traded in carbon markets where, typically, one carbon credit is issued for one metric ton, or tonne, of CO₂e (tCO₂e) that is reduced, avoided or removed. This is about the same amount of CO₂ that one tree will absorb over 40 years.¹¹

³ Giacomo Fedele et al., “Nature-dependent people: Mapping human direct use of nature for basic needs across the tropics”, ScienceDirect, 2020, <https://www.sciencedirect.com/science/article/pii/S0959378021001473#>.

⁴ Achim Steiner et al., “Actions to Transform Food Systems Under Climate Change”, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), 2020, <https://cgspace.cgiar.org/bitstream/handle/10568/108489/Actions%20to%20Transform%20Food%20Systems%20Under%20Climate%20Change.pdf>.

⁵ Samkelisiwe Nosipho Hlophe-Ginindza and N.S. Mpanzeli, “The Role of Small-Scale Farmers in Ensuring Food Security in Africa”, IntechOpen, 2020, <https://www.intechopen.com/chapters/72086>; Hannah Ritchie, “Smallholders produce one-third of the world’s food, less than half of what many headlines claim”, Our World In Data, August 6, 2021, <https://ourworldindata.org/smallholder-food-production#:~:text=It%20is%20often%20claimed%20that,for%20agricultural%20and%20development%20policies>.

⁶ International Fund for Agricultural Development (IFAD), “What can Smallholder Farmers Grow in a Warmer World? Climate Change and Future Crop Suitability in East and Southern Africa”, 2021, https://www.ifad.org/documents/38714170/42164624/utc_report.pdf/89c0228f-bef3-24f7-8d02-0289971d4607?t=1634830791584.

⁷ Elliot Carleton, “Climate change in Africa: What will it mean for agriculture and food security?”, ILRI, February 28, 2022; Caroline Plante, “Let’s not miss the chance to feed the 700 million plus people who will live in West Africa by 2050!”, World Bank Blogs, September 21, 2020.

⁸ Rodolfo Maino and Dilona Emrullahu, “Climate Change in Sub-Saharan Africa Fragile States: Evidence from Panel Estimations”, IMF Working Paper, 2022, <https://www.imf.org/en/Publications/WP/Issues/2022/03/18/Climate-Change-in-Sub-Saharan-Africa-Fragile-States-Evidence-from-Panel-Estimations-515159>.

⁹ Céline Yvon, “Making carbon markets work – for everyone”, Plan Vivo Foundation, May 4, 2022.

¹⁰ For information on carbon pricing instruments, see Climate Focus, “The Voluntary Carbon Market Explained”, 2022; R.C. Brears et al., Financing Nature-Based Solutions (London: Palgrave MacMillan, 2022), <https://link.springer.com/book/10.1007/978-3-030-93325-8>.

¹¹ S&P Global Commodity Insights, “Voluntary carbon markets: how they work, how they’re priced and who’s involved”, June 10, 2021; European Environment Agency, “Trees help tackle climate change”, January 6, 2012.

Box 1. Carbon markets: the VCM and the CCM

The VCM exists alongside the more widely known emissions cap-and-trade schemes of the **Compliance Carbon Market (CCM)**, where emissions permits are regulated for specific industries mandated by governments (US\$850 billion in size).¹² In the VCM, a verified tonne of CO₂e reduced or removed represents a credit that can be traded or retired. This allows corporations, universities, NGOs, or individuals to reduce their carbon footprint or reach climate neutrality.¹³ Industry players in the CCM cannot currently buy carbon credits in the VCM if they exceed their emissions cap. The VCM is currently worth US\$2 billion¹⁴ and is estimated to be worth US\$30–50 billion by 2030.¹⁵ The compliance carbon (CC) and voluntary carbon (VC) markets are slowly moving together and could merge in the future.

There are two main types of carbon credits:

01

Removal Credits (RCs)

These types of credits involve removing carbon from the atmosphere and storing it in either biomass or geological sinks. RCs are perceived as higher quality carbon credits since the amount of carbon is actually being reduced. Since there is a limited supply due to nascent technology and high upfront costs for implementation, RCs have commanded a two to three times higher price (e.g., S&P, Global Platts Index).

02

Avoidance Credits (ACs):

These credits are mostly renewable energy-related (i.e., cook stoves and conversion of coal/wood to natural gas), but also apply to the conservation of natural ecosystems. There is a larger supply of ACs than RCs.

¹² R.C. Brears et al., *Financing Nature-Based Solutions* (London: Palgrave MacMillan, 2022), <https://link.springer.com/book/10.1007/978-3-030-93325-8>.

¹³ David Burns et al., "Guidance on Voluntary Use of Nature-based Solution Carbon Credits Through 2040", World Resources Institute, June 2, 2022.

¹⁴ Ecosystem Marketplace, "VCM Reaches Towards \$2 Billion in 2021: New Market Analysis Published from Ecosystem Marketplace", August 3, 2022.

¹⁵ Christopher Blaufelder et al., "A blueprint for scaling voluntary carbon markets to meet the climate challenge", McKinsey Sustainability, January 29, 2021. The low-end estimate of \$5 billion to \$30 billion represents a scenario where buyers purchase the historical surplus of carbon credits and then acquire the lowest cost credits available; the high-end estimate of more than \$50 billion represents a scenario in which most buyers opt to purchase credits from local suppliers only, even at a premium.

The VCM is currently at a turning point based on the following milestones:

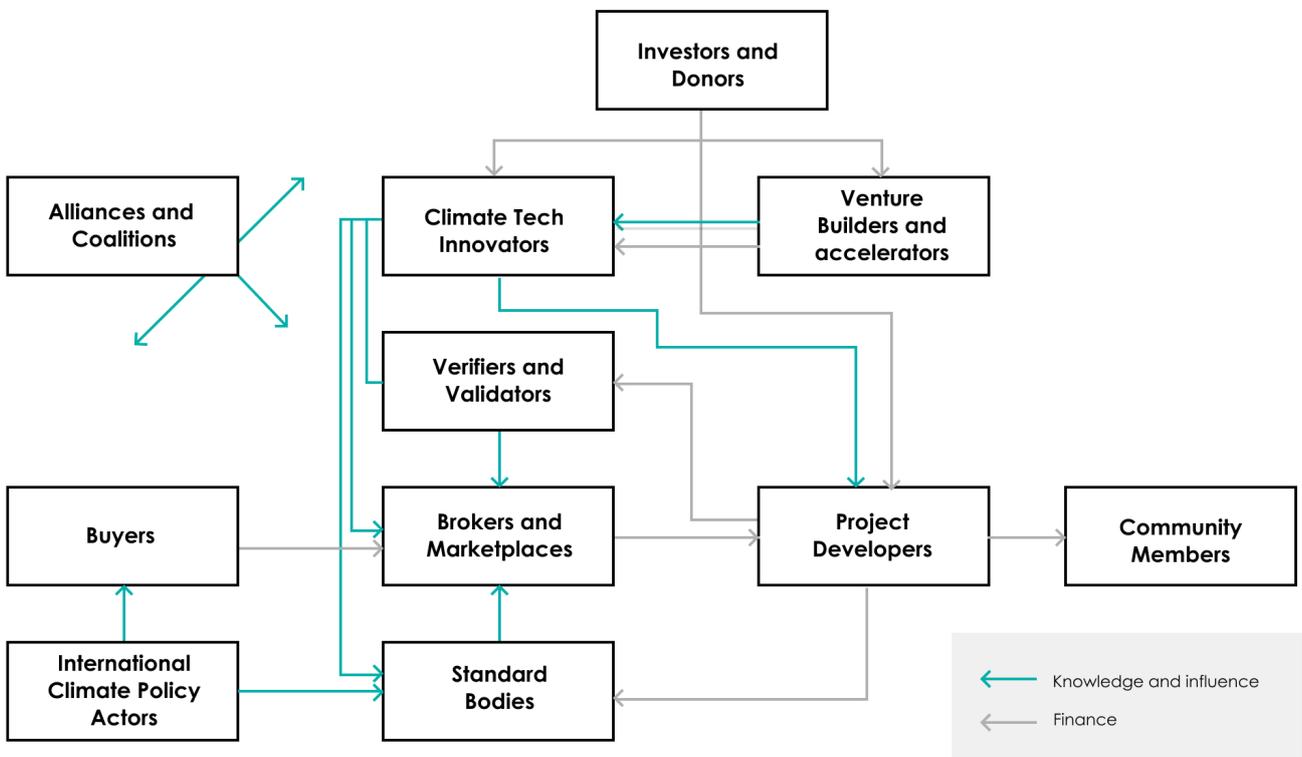
More than US\$2 billion in credits were traded in 2021 – a four-fold increase from 2020. Given past peaks and troughs in the market, this substantial volume increase and increasing emphasis on credit integrity has given the market more credibility.¹⁶

Approval of the Article 6 rulebook by governments at COP26 in 2021 has provided initial regulatory guidance for the development of carbon markets and avoidance of double counting, which are critical for market integrity.¹⁷

The Taskforce for Scaling Voluntary Carbon Markets (TSVCM) published key guidance in January 2021, defining pathways for governance of the VCM and the Core Carbon Principles (CCPs), consolidating industry-wide thresholds for carbon credit quality and creating transparency across various standards bodies.¹⁸ The principles create a framework for the VCM to scale.

This turning point could be an opportunity for VCM actors to harness the rich natural resources of sub-Saharan Africa for carbon mitigation and adaptation, to make the VCM more inclusive for small-scale projects that directly benefit individuals and communities, to protect natural ecosystems, and to generate lasting environmental and economic impacts. Figure 1 provides a high-level overview of the VCM ecosystem.

Figure 1. Overview of the VCM ecosystem



Source: BFA Global

¹⁶ Ecosystem Marketplace, "VCM Reaches Towards \$2 Billion in 2021: New Market Analysis Published from Ecosystem Marketplace", August 3, 2022.

¹⁷ IHS Markit, "Voluntary carbon markets poised for growth in 2022", January 4, 2022.

¹⁸ TSVCM, "The Core Carbon Principles", 2022, <https://icvcm.org/the-core-carbon-principles/>.

The sub-Saharan Africa advantage

Nature-based solutions (NbS) is a term coined by the International Union for Conservation of Nature (IUCN) to mean “leveraging nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future.”¹⁹ Carbon credits created from NbS have significant potential to reduce or prevent greenhouse gas (GHG) emissions while also building the resilience of communities.

In sub-Saharan Africa, NbS can provide traction in the VCM and strengthen the climate resilience of vulnerable communities and regional economies. Africa is home to 17 percent of the world’s forests and 31 percent of woodlands.²⁰ The Congo Basin stores about 1.2 billion tons of CO₂ each year and the continent’s highest mountain forests absorb more carbon per hectare than the Amazon.²¹ According to the

African Union, the blue economy²² and related activities in Africa generate almost 50 million jobs and US\$300 billion in value, and are projected to be worth US\$405 billion by 2030.²³ With a young and growing workforce and outstanding natural resources, Africa is poised to move the world towards a more secure, climate-resilient future,²⁴ despite the threats to these natural resources and the challenges of protecting them.

Another advantage is the type of carbon credits Africa can produce. Sub-Saharan countries have the potential to host a large portfolio of NbS and have

the natural resources to compete in other mitigation options.²⁵ Currently, NbS-based carbon sequestration, or removal, is more attractive because of marketing optics and potential for livelihood development²⁶ (see Box 2 in section 3). However, avoiding conversion of natural ecosystems (i.e., not cutting down forestlands or draining wetlands) is also vitally important for human rights (e.g., clean water) and biodiversity (e.g., pollinator species).

According to the Oxford Principles for Net Zero Aligned Offsetting, **avoidance and carbon removal with short-lived storage are needed in equal measure in the short term**, with investments in long-lived storage options increasing as we near 2050.²⁷ A mixed portfolio approach will be needed to meet both short-term and long-term climate goals while minimizing the overall risks of investments.

¹⁹ IUCN, “Nature-based Solutions”, 2022.

²⁰ Rebecca Wesloh, “Growing forests and communities”, African Wildlife Foundation, March 21, 2022. Forests have greater than 10 percent canopy cover while woodlands have 5 to 10 percent canopy cover. This implies a difference in carbon sequestration potential. See: Food and Agriculture Organization of the United Nations (FAO), “Terms and Definitions”, Global Forest Resources Assessment 2020, 2020, <https://www.fao.org/3/I8661EN/I8661en.pdf>.

²¹ Ahunna Eziakonwa and Maxwell Gomera, “Africa needs carbon markets”, UNDP Climate Promise, June 16, 2022.

²² The World Bank defines the blue economy as “sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean ecosystem.”

²³ African Union, “Africa Blue Economy Strategy”, 2019, https://www.au-ibar.org/sites/default/files/2020-10/sd_20200313_africa_blue_economy_strategy_en.pdf.

²⁴ Phemo Kgomo, “Africa’s role in saving the world’s damaged lands and ecosystems”, United Nations Africa Renewal, June 16, 2022.

²⁵ James Irungu Mwangi, “Africa’s great carbon valley -- and how to end energy poverty”, TED Countdown New York Session 2022, https://www.ted.com/talks/james_irungu_mwangi_africa_s_great_carbon_valley_and_how_to_end_energy_poverty.

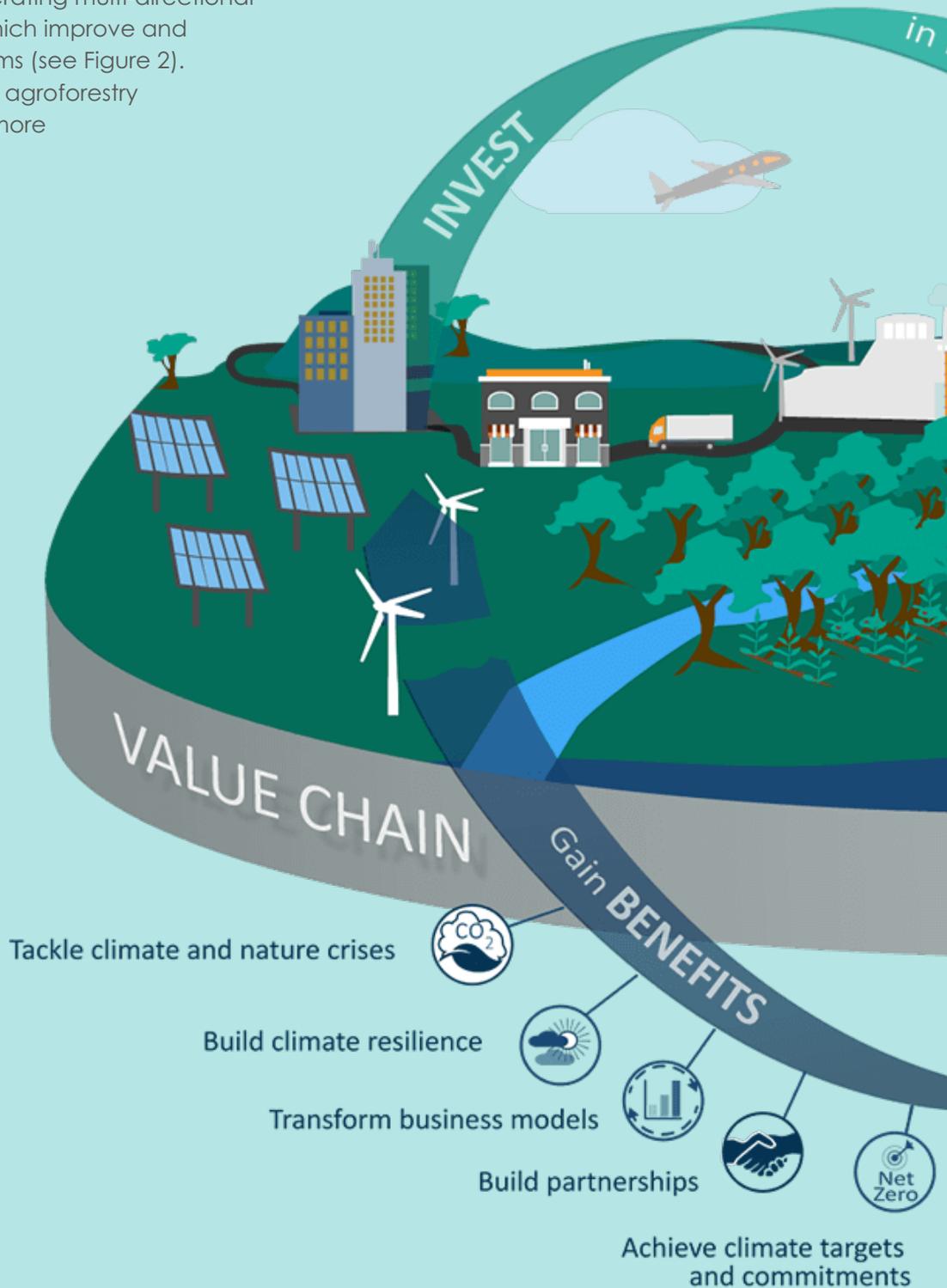
²⁶ Expert interview with Hugh Salway, Gold Standard, July 11, 2022.

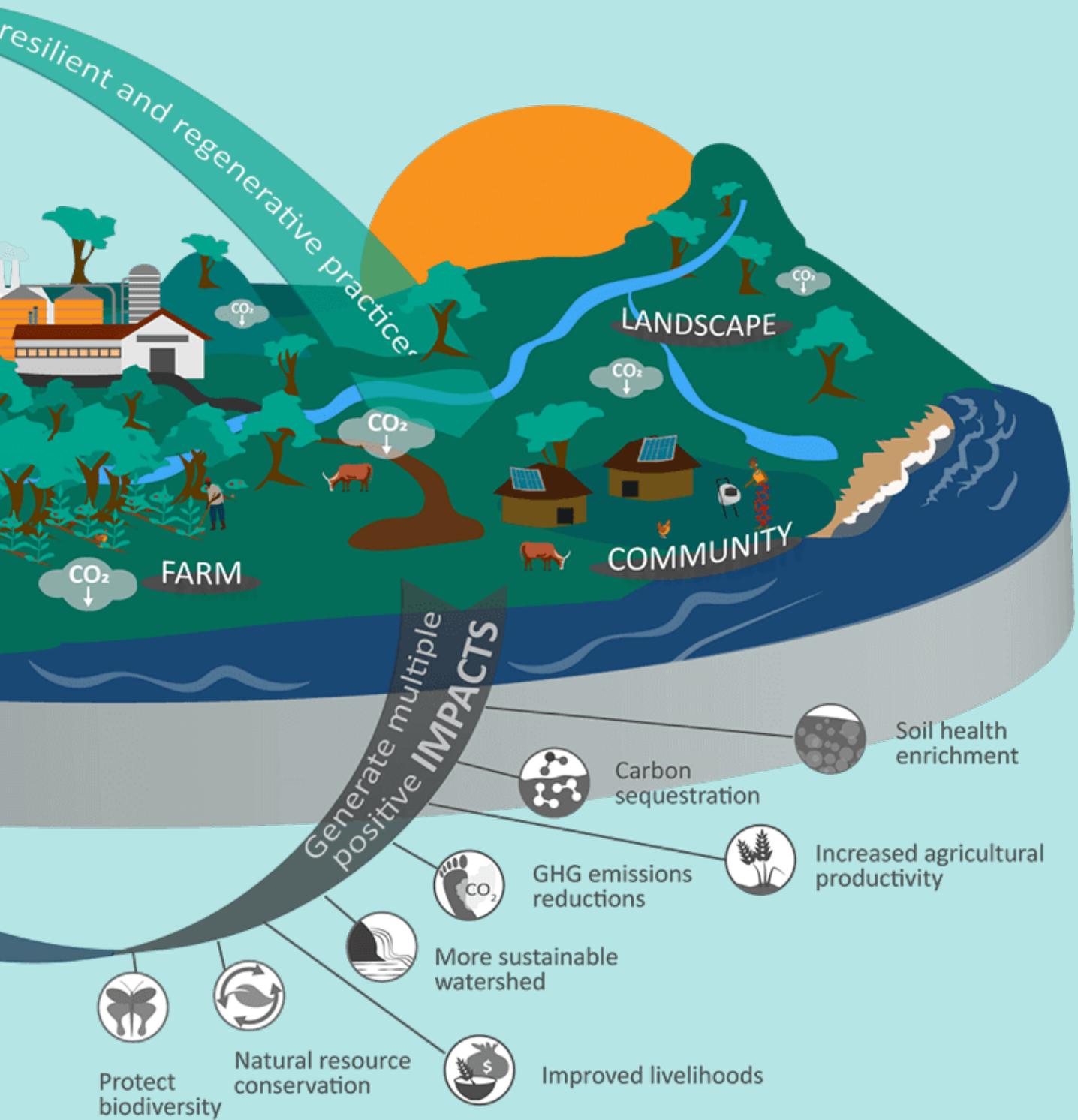
²⁷ Myles Allen et al., “The Oxford Principles for Net Zero Aligned Carbon Offsetting 2020”, 2020, <https://www.smithschool.ox.ac.uk/sites/default/files/2022-01/Oxford-Offsetting-Principles-2020.pdf>.

Nature-based solutions are rich in co-benefits

Compared to other mitigation approaches, NbS are especially good at generating multi-directional impacts or “**co-benefits**”, which improve and strengthen natural ecosystems (see Figure 2). For example, transitioning to agroforestry not only helps to sequester more carbon but also increases biodiversity and soil health, which in turn improves food and livelihood security.

Figure 2. Direct benefits and co-benefits of nature-based solutions





In addition to removing or reducing carbon, NbS can enhance the adaptive capacity and resilience of individuals and communities by contributing to livelihood generation, biodiversity conservation, and gender equity (Table 1). These co-benefits are meaningful for achieving the Sustainable Development Goals (SDGs) and lasting growth in sub-Saharan Africa. Those who depend on nature for their livelihood, such as smallholder farmers, also stand to benefit from the secondary impacts of the VCM, including higher incomes and the regenerative

practices associated with NbS. For example, regenerative landscape management has potential to strengthen the resilience of entire communities with improved soil health, greater biodiversity, better access to clean water, and the ability to absorb climate shocks, such as drought or floods.

Table 1. Examples of NbS in the VCM with proven co-benefits

Sub-sector	Forestry	Agricultural crops	Livestock	Coastal wetlands	Marine fisheries
Region	Zimbabwe	Zambia	Kenya	Madagascar	Kenya
Targeted marginalized groups	Women, especially widows	Women	<ul style="list-style-type: none"> Poorest 25% Women heads of households Young herders 	Women and youth	Indigenous coastal community
VCM use case	Community-based reduction of deforestation via introduction of alternative livelihoods, fuelwood plantations and fire management	Intercropping 1+ acre units with trees, contributing to soil health and providing additional fruit crops	Community-based implementation of sustainable grazing management for grassland recovery	Carbon credits are accrued through reforestation and conservation of mangroves; REDD+ activities promoters have legal right to carbon benefits, and partner villages receive annual payments	Carbon credits are awarded for offshore seaweed farming
Co-benefits	<ul style="list-style-type: none"> Food security Alternative sources of income Improved education Improved health Ecosystem services 	<ul style="list-style-type: none"> Food security Ecosystem services Increased income 	<ul style="list-style-type: none"> Ecosystem services Food security Reduced conflict Increased income Improved health Improved education Self-sufficiency 	<ul style="list-style-type: none"> Alternative sources of income Improved access to education Gender equality Clean water Ecosystem services 	<ul style="list-style-type: none"> Food security Alternative sources of income Ecosystem services Social equity
Project	Kariba REDD+ Project	Carbon Pilot Market: Intercropping Project	Northern Kenya Grassland Project	Tahiry Honko Community Mangrove Project	N.B. ²⁸
Lead organization	South Pole	One Acre Fund	Northern Rangelands Trust	Blue Ventures	n/a

²⁸ Proof of concept for marine fisheries carbon credits in Africa is currently limited, but may offer unique benefits related to biodiversity conservation and sustainable fisheries. See: Julien Claes et al., "Blue carbon: The potential of coastal

and oceanic climate action", May 13, 2022, <https://www.mckinsey.com/business-functions/sustainability/our-insights/blue-carbon-the-potential-of-coastal-and-oceanic-climate-action>.

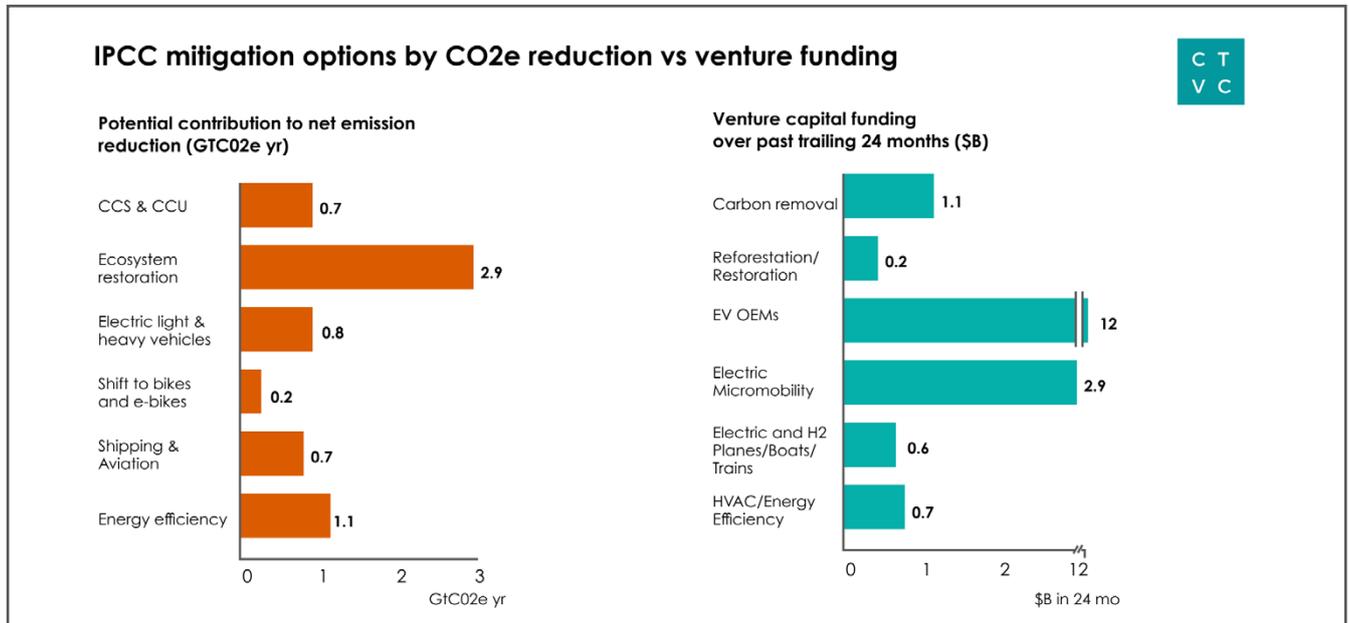
Despite their impact, nature-based solutions are still seen as risky investments

Around US\$130 billion flows to NbS each year, with just 14 percent from private finance.²⁹ The United Nations Environment Programme (UNEP) estimates that more than US\$536 billion in NbS finance, or four times current spending, will be needed every year until 2050 to reach SDG targets – an opportunity for the private sector to bridge the NbS finance gap.

NbS-based voluntary carbon markets will be critical to reaching climate mitigation goals such as Net Zero.³⁰ NbS, including outside the VCM, could help to offset 15 GtCO₂e, or about 30 percent of the global GHG mitigation required until 2050 to reach the 1.5°C target. According to McKinsey, the annual global demand for voluntary market carbon credit is projected to reach up to 7 to 13 GtCO₂e by 2050.³² This means that the VCM could contribute up to 87 percent of all NbS offsets.

Despite the outsized impact of NbS on climate change mitigation and adaptation, options such as reforestation and restoration receive **the least amount of venture capital funding – 60 times less than electric automotive components** (Figure 3).³³ Low levels of investment have been due in part to the difficulty of making the business case for such companies. NbS tend to be piecemeal, difficult to price, and small-scale,³⁴ with little understanding among financiers of the economic returns and social impact while the perceived risk remains high.³⁵ However, more venture capital investment in technology companies that make NbS work for small land stewards could help unlock investment in companies that serve the VCM.³⁶

Figure 3. Mitigation options



Source: Zou and Purdom, 2022.

²⁹ UNEP, "State of Finance for Nature", 2021, <https://www.unep.org/resources/state-finance-nature>.

³⁰ David Henry, "Can carbon markets supercharge nature-based solutions to climate change?", Landscape News, Global Landscapes Forum, April 1, 2022.

³¹ Judith Reise et al., "Nature-based solutions and global climate protection", Umwelt Bundesamt, 2022, https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-01-03_climate-change_01-2022_potential_nbs_policy_paper_final.pdf.

³² Christopher Blaufelder et al., "A blueprint for scaling voluntary carbon markets to meet the climate challenge", McKinsey Sustainability, January 29, 2021.

³³ Kim Zou and Sophie Purdom, "IPCC 6: Running out of time #9Z", April 11, 2022.

³⁴ United Nations Environment Programme, "State of Finance for Nature in the G20", 2022 <https://www.unep.org/resources/report/state-finance-nature-g20-report>

³⁵ ISFI, "The role of the financial sector in mainstreaming nature-based solutions", 2022, <https://www.wwf.org.uk/sites/default/files/2022-06/WWF-NBS-Public-Report-Final-270622.pdf>.

³⁶ Expert interview with Timothy Rann, Mercy Corps Ventures, August 22, 2022.

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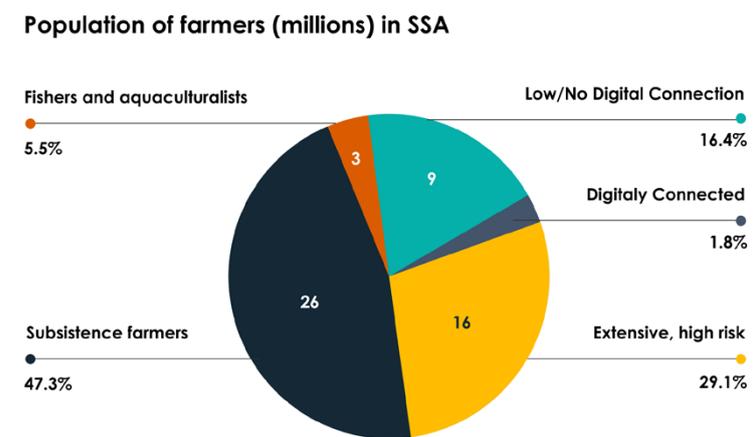
Fueling resilient livelihoods in the voluntary carbon market

While the main impetus for carbon markets has been GHG mitigation, **the most evident impact is on livelihoods**. In sub-Saharan Africa, a considerable proportion of the population earns their livelihood from informal work or self-employment from a variety of income sources.³⁷ The potential for livelihood development in Africa is clear, given that agriculture is the principal economic activity, provides employment for the majority of the population, and contributes 14 percent to the GDP of the continent.³⁸ More than 26 million farmers rely on subsistence agriculture and only a small fraction (1.8 percent) of farmers in sub-Saharan Africa are digitally connected (Figure 4).³⁹

lands and livelihoods.⁴² Certification requirements, such as Verra’s Climate, Community, and Biodiversity (CCB) program or PlanVivo’s validation criteria, have added conditions that help to avoid these unintended consequences and ensure the outcomes of VCM projects are equitable.⁴³ In general, more research is needed to understand incentive mechanisms for small land stewards and marginalized groups to enter the VCM via NbS. Given current VCM economics, carbon credits may need to be integrated into other interventions, such as insurance products or agricultural certifications.

Making the voluntary carbon market more inclusive by expanding marketplace access and lowering barriers to entry with better financing options would have both direct and indirect livelihood benefits for marginalized populations, such as Indigenous peoples, women, and youth.⁴⁰ Women’s empowerment has a place in the VCM – there is even a W+ Standard to support projects for gender equity. However, there are several documented cases of early VCM projects that had unintended consequences for stakeholder equity, in particular restricting access to traditional

Figure 4. Total addressable market of agriculture-based VCM using NbS in sub-Saharan Africa



³⁷ For BFA Global’s definition of livelihoods, see: <https://bfa-global.com/iworker/insights/digital-commerce-and-youth-employment-in-africa/>. The definition of reference for sustainable livelihoods is by Chambers and Conway, 1991 to mean “the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base”.

³⁸ Bernardo Bruzzone et al., “Agriculture in Africa 2021: Focus Report”, Oxford Business Group, 2021, <https://oxfordbusinessgroup.com/blog/bernardo-bruzzone-focus-reports/agriculture-africa-2021-focus-report>.

³⁹ Achim Steiner et al., “Actions to Transform Food Systems Under Climate Change”, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), 2020, <https://cgspace.cgiar.org/bitstream/handle/10568/108489/Actions%20to%20transform%20Food%20Systems%20Under%20Climate%20Change.pdf>.

⁴⁰ Céline Yvon, “Making carbon markets work – for everyone”, Plan Vivo Foundation, May 4, 2022.

⁴¹ WOCAN, “Survey of Women in the Environmental Markets Ecosystem”, 2021, https://www.wplus.org/wp-content/uploads/2021/08/REPORT_Survey_-

[Women-in-the-carbon-market-ecosystem_Final.pdf](#).

⁴² Betsy A. Beymer-Farris and Thomas J. Bassett, “The REDD menace: resurgent protectionism in Tanzania’s mangrove forests”, *Global Environmental Change*, 22(2), 332–341, May 2012, <https://www.sciencedirect.com/science/article/abs/pii/S0959378011001932>.

⁴³ Ecosystem Marketplace, “A Green Growth Spurt: State of Forest Carbon Finance 2021”, 2021, <https://www.ecosystemmarketplace.com/publications/state-of-forest-carbon-finance-2021/>.

Nature-based solutions offer a major opportunity for job creation and better livelihoods

The Climate Action Platform for Africa's open dashboard visualizes job opportunities for nature-based climate change mitigation and related revenue (Figure 5).⁴⁴ **At an average voluntary carbon price of US\$10/tCO₂e, there is potential to impact nearly 43 million jobs in Africa**, either through job creation or integration of the VCM into current roles. At the projected average price of \$30/tCO₂e – a conservative projection – NbS could affect 66 million jobs.

Nature-based livelihoods relevant to the VCM can take many forms depending on the local context and point in the value chain. **IUCN estimates that implementing crop-based agroforestry⁴⁵ will require the greatest labor force per hectare**, followed closely by silvopastoralism (the integration of forestry and pastoralism) and mangrove restoration (Table 2). During maintenance years, mangrove restoration and silvopastoralism will require the largest effort. These estimates include jobs that are created to implement and maintain the NbS solution, but do not account for additional jobs created as the result of co-benefits. For example, within forest landscape restoration, jobs are created along the value chain, including input supply, production, processing, transport, storage, retail, marketing, and research.

Figure 5. Job creation of NbS in African VCM, US\$10/tCO₂e

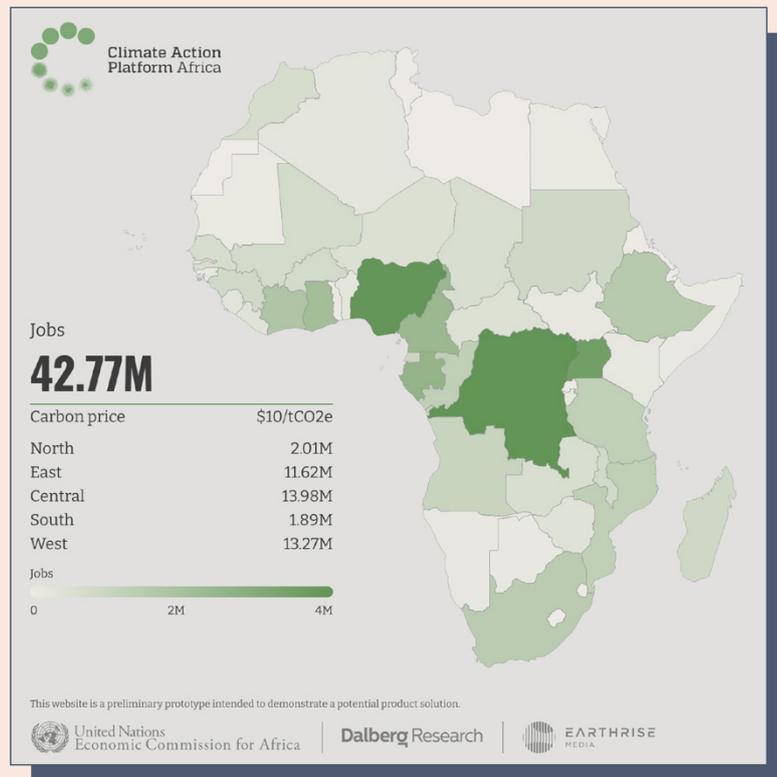


Table 2. Job creation indicators and carbon balance for restoration

Activity	Additional jobs for implementation (FTE*/ha/year)	Additional jobs for maintenance (FTE*/ha/year)	Total additional jobs (FTE*/ha/year)	Carbon balance (CO ₂ /ha/year)
Agriculture and agroforestry	1.01	0.48	1.49	148
Silvopastoralism and related activities	0.57	0.41	0.98	41
Mangrove restoration	0.42	0.34	0.76	83
Timber plantation and woodlots	0.07	0.04	0.11	30
Passive restoration riparian forest	-0.16	-0.2	-0.36	127

*FTE = full-time equivalent

Source: Adapted from Raes et al., 2017 and Nello et al., 2019.

⁴⁴ See: <https://capa.earthrise.media/>.

⁴⁵ Leander Raes, et al., "Nature-based Recovery can create jobs, deliver growth and provide value for nature", Technical Paper No. 3, IUCN, 2021, <https://www.iucn.org/sites/default/files/2022-06/iucn-nbr-tp-3-compressed.pdf>.

Co-benefits of VCM solutions can support resilient livelihoods

Based on the current average price per hectare and reported percentage of price that remains with smallholder suppliers, carbon credits would increase a smallholder farmer's annual income by two percent, based on an average price of US\$4/tonne CO₂e. This meager payout is not enough additional income for a farmer to break free from the cycle of poverty, much less a strong enough incentive to change practices. More research is needed to determine how best to scale up the impact of carbon credit finance, whether through direct payments to individuals or subsidizing community benefits (health, education, water management, etc.). However, it is clear that improvements related to soil health, diversified livelihoods (e.g., orchard fruit production), and ecosystem services (e.g. biodiversity), among other co-benefits, may multiply the net impact of carbon credits.

The VCM has the potential to make a significant contribution to livelihoods through interventions with co-benefits. An analysis of Gold Standard's portfolio determined that afforestation and reforestation could provide US\$150/tCO₂e in co-benefits related to biodiversity and US\$27/tCO₂e related to employment, and projects with co-benefits commanded a 35 percent premium compared to others.

A recent study showed that NbS in the sub-Saharan African VCM not only have strong co-benefits, but also above-average additionality

and permanence benefits (Figure 6). These are critical for improving the quality (see Box 2 on Credibility), and therefore the market price, of carbon credits in the VCM. With higher prices and more accessible and effective measurement, reporting and verification (MRV), there is potential for a larger share of income to reach small land stewards.

Based on today's prices, carbon credit payouts alone will not be enough to lift the most under-resourced and vulnerable out of poverty. However, co-benefits from NbS in the VCM may have the broadest impact in sub-Saharan Africa given the disproportionate vulnerability to climate impacts and abundance of natural resources. Transparent co-benefits and robust, equitable sharing mechanisms will be essential for projects to realize their potential. Evaluating the current and future commercial demand for carbon credits with co-benefits will be essential for making a case for their continued growth.

⁴⁶ Author's calculation based on average smallholder farmer land size (less than 2 hectares), average annual income per hectare in sub-Saharan Africa (USD\$535/hectare/year), average price of carbon per hectare (USD\$4 with potential sequestration of 3.6 tons/hectare), and average percentage of carbon credit purchase kept by the supplier (40 percent, based on expert consultations).

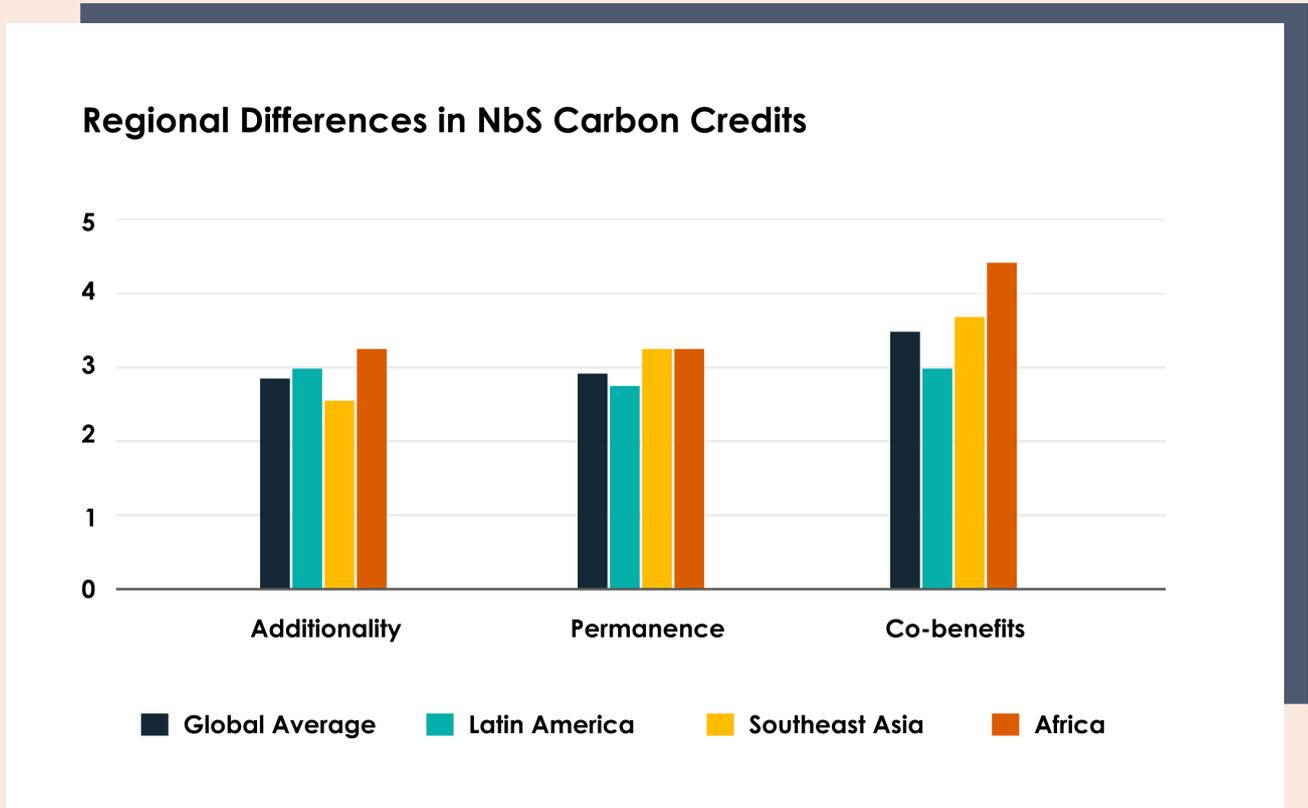
⁴⁷ The Gold Standard, "The Real Value of Robust Climate Action", 2014, https://www.goldstandard.org/sites/default/files/documents/goldstandard_impactinvestment.pdf.

⁴⁸ Climate Trade, "Voluntary carbon market value tops US\$2B", August 4, 2022.

⁴⁹ See Glossary for definitions of carbon quality characteristics.

⁵⁰ David McNeil et al., "Tightening Voluntary Carbon Markets to Drive Up Costs", Sustainable Fitch, 2021, <https://www.sustainablefitch.com/assets/special-reports/tightening-voluntary-carbon-markets-to-drive-up-costs.pdf>.

Figure 6. Regional differences in NbS carbon credit projects



Source: *Fitch Ratings and Sylvera study* uses a systematic scoring framework where 5 represents the highest-performing projects.⁵¹

There is growing recognition from corporate buyers that the co-benefits of VCM solutions may be more important than the additional income derived from carbon credits. However, it has been difficult to source credits with verified co-benefits. Standards bodies have incorporated co-benefits in various ways, with Gold Standard integrating co-benefits via SDG screening and Verra using CCB benefits.⁵²

However, some believe the best way to price co-benefits is not necessarily by tying them to the carbon price in the form of a premium, but treating them as separate credits, such as biodiversity credits.⁵³ More research is needed to understand market demand for premium credits with verified co-benefits, as well as separate co-benefit credits, and how to measure and evaluate them properly.

⁵¹ Ibid.

⁵² Gold Standard for the Global Goals, "SDG Impact Tool", 2021, <https://globalgoals.goldstandard.org/430-ig-sdg-impact-tool/>; Carina Bracer et al., "Feet on the Ground: Demonstrating co-benefits for carbon projects", Verra, March 31, 2021, <https://verra.org/wp-content/uploads/2021/03/SA-webinar-31-March-2021-Co-benefits-to-carbon-credits.pdf>.

⁵³ Expert interview with Philip Fogel, Flowcarbon, July 29, 2022.

03

Three ways for funders to create a more inclusive voluntary carbon market

In the legacy VCM ecosystem, which spans almost 30 years, carbon offset projects typically followed four stages of “waterfall” development, primarily with large project developers (Figure 7).⁵⁴

Figure 7. Traditional project development in the VCM



⁵⁴ Without subsidies, a project under 10,000 hectares would be considered too expensive and risky at today’s prices or in absence of a price guarantee, especially if there are other economically appealing alternatives for using the land.

Corporate buyers with net zero commitments worked with intermediaries of large-scale projects to locate carbon offsets at the cheapest price and continue operating “business as usual”. There are many drawbacks to the legacy VCM ecosystem: it is highly fragmented with more than 20 standards issuing carbon credits,⁵⁵ certification of carbon offsets takes two to five years, and the transparency of data at the project level is limited, leading to speculation about greenwashing and buyer risk. In the traditional model, small-scale projects are shut out as the cost

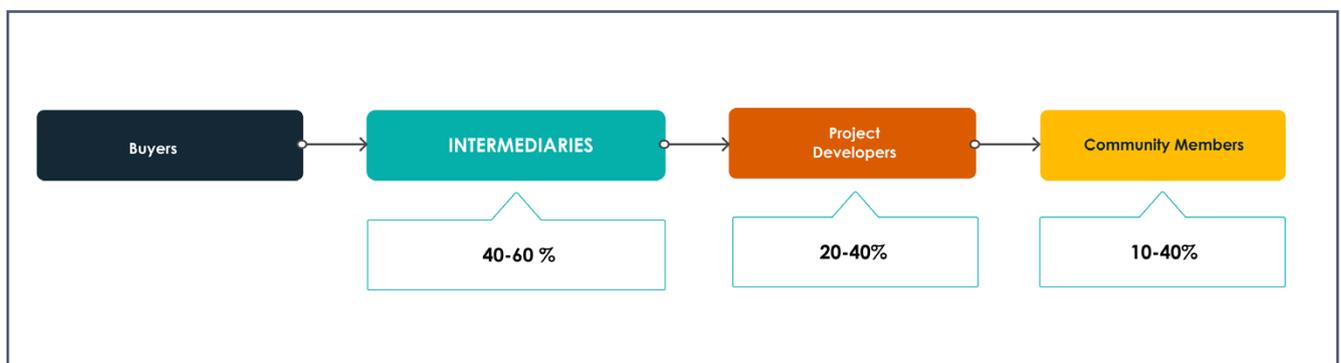
of certification is prohibitive and upfront project financing is limited for projects that do not scale. As new players have entered, the carbon market has evolved, **with more emphasis on tech-enabled credit quality, direct procurement by buyers from a wide range of projects using alternative approaches to quality, and offsets achieved through the permanent removal of carbon** (versus avoidance).⁵⁶

Low carbon credit prices are keeping the VCM from expanding

Despite significant advances in accessibility, technology, and transparency, and renewed net zero commitments following COP26, certain pain points are hampering rapid expansion of the VCM.⁵⁷ The successful use of carbon credits will require high standards of integrity and a robust, transparent, and liquid market. The VCM currently suffers from a mismatch between buyers and sellers as **it is unclear what the market price for carbon should be**. Although it is expected to rise, the price of voluntary carbon credits varies widely and is overall too low at **US\$1–\$9/tCO₂e** to achieve the unit economics needed to make small-scale projects feasible.

OECD projections indicate that the price must reach approximately **US\$50–\$150/tCO₂e** by 2030 to reach 2050 targets.⁵⁸ The current price is certainly not enough to mainstream the VCM, crowd in smaller project developers, or reach the goals of the Paris Agreement.⁵⁹ Higher prices are needed to cover the cost of developing and measuring quality credits. Often, 40 to 60 percent of the carbon credit price goes to intermediaries in the VCM, leaving only a small fraction for the small land stewards in vulnerable communities actually producing the carbon solution (Figure 8).⁶⁰

Figure 8. Estimated share of the carbon credit price in the VCM



Source: Expert consultations, 2022

⁵⁵ TSVC, “Taskforce on Scaling Voluntary Carbon Markets: Phase 2 Report”, 2021, https://icvcm.org/wp-content/uploads/2022/03/TSVC_Phase_2_Report.pdf.

⁵⁶ Sophie Purdom and Kim Zou, “Giving carbon credit where it’s due”, Climate Tech VC, February 4, 2022; Expert interview with Jaxon Love, PayPal, June 23, 2022.

⁵⁷ Helen Mountford et al., “COP26: Key Outcomes

From the UN Climate Talks in Glasgow”, World Resources Institute, November 17, 2021; Bernice Van Bronkhorst, “Global carbon pricing generating record revenues but much potential remains untapped”, World Bank Blogs, May 24, 2022.

⁵⁸ UNEP/PRI, “Discussion paper on governmental carbon pricing”, 2021, [https://www.unepfi.org/wordpress/wp-content/uploads/2021/07/FINAL-AOA-Discussion-paper-on-governmental-carbon-](https://www.unepfi.org/wordpress/wp-content/uploads/2021/07/FINAL-AOA-Discussion-paper-on-governmental-carbon-pricing.pdf)

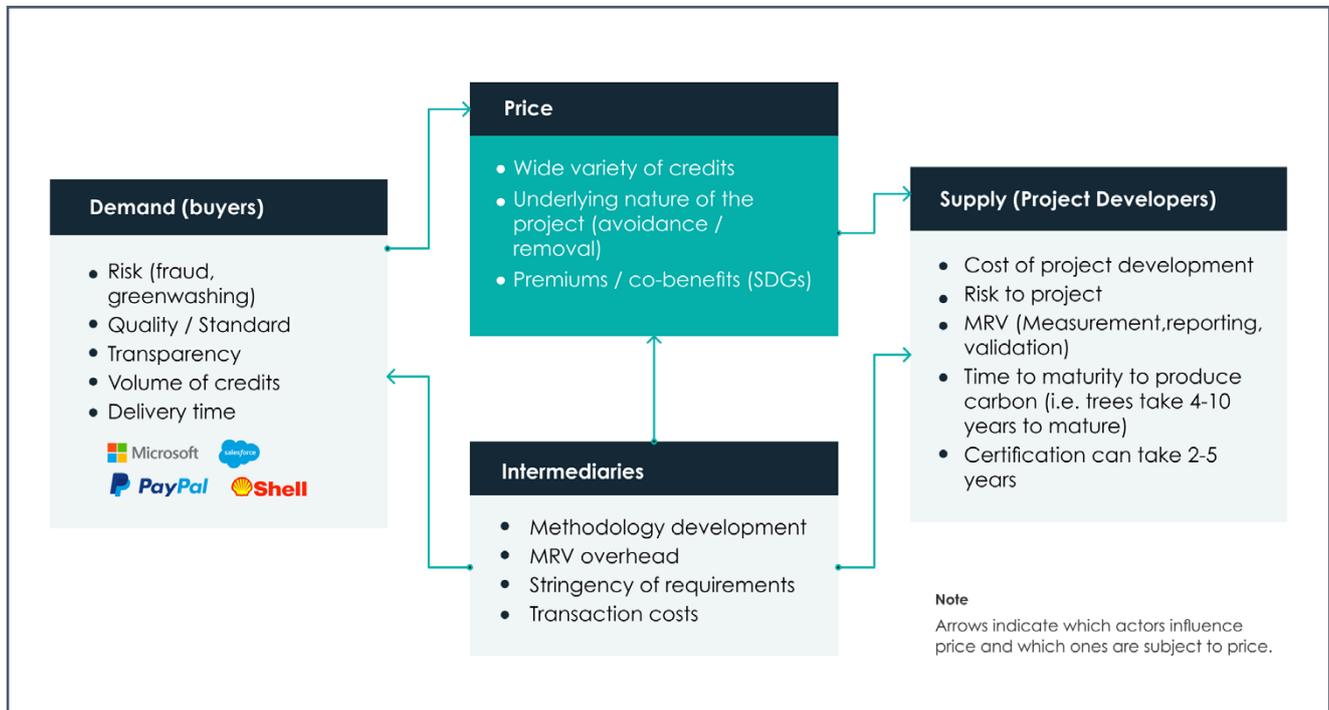
[pricing.pdf](https://www.unepfi.org/wordpress/wp-content/uploads/2021/07/FINAL-AOA-Discussion-paper-on-governmental-carbon-pricing.pdf).

⁵⁹ World Bank Group, “State and Trends of Carbon Pricing 2022”, 2022, <https://openknowledge.worldbank.org/handle/10986/37455>.

⁶⁰ Estimates based on interviews with CIFAR Alliance experts. Intermediaries include verifiers and validators, brokers and marketplaces, and standard bodies.

Price discovery in the VCM depends on how each side of the market views the carbon offset. While buyers look for signals of quality, the supply side has to manage the economics of the project and demonstrate the offset quality (Figure 9).⁶¹ Higher prices and lower intermediation costs depend on having accessible and affordable MRV that demonstrates the value of the carbon credit and its co-benefits.

Figure 9. Price discovery in the VCM



Source: BFA Global, Gold Standard, and S&P Commodity Insights

The low price and inconsistency of carbon credit pricing make it challenging for small land stewards, small project developers, or investors to ascertain what the market will pay for their credits in the future. Only premium and large developers can access forward contracts, which is a new approach to funding and investing in projects. Without clear signals or floors on carbon prices, or consensus on how to structure forward contracts in the futures market, all project developers take on the burden of financial risk (to set up a project), execution risk (to implement and sustain the project), and price risk (uncertainty about price and viability). Price incentives are not currently strong enough for small land stewards to transition or offset the risk of project development. Also, carbon credit payouts often do not materialize for years after implementation due to sequestration timelines.

While a single land steward might not have an incentive to set up a project, bundling or embedding modular solutions as part of a value chain approach could pull individuals into the market system. Embedding or bundling carbon credits in irrigation system payments, agricultural insurance, or input marketplaces may be an effective way of subsidizing key inputs for smallholder farmers and other nature-dependent livelihoods (e.g., eco-tourism).⁶² For example, Etherisc is interested in building agri-insurance tools that embed carbon credits, helping farmers pay for climate insurance premiums.⁶³

⁶¹ Gold Standard, "Carbon pricing: What is a carbon credit worth?", n.d.; S&P Global Commodity Insights, "Voluntary carbon markets: how they work, how they're priced and who's involved", June 10, 2021.

⁶² Expert interview with Leander Raes, IUCN, June 23, 2022.

⁶³ Kyle Mile, "Carbon Credits can be Used by Poor Farmers to Get Climate Insurance", 2022 <https://cryptosnews.com/carbon-credits-can-be-used-by-poor-farmers-to-get-climate-insurance/>.

Box 2. Credibility is at the heart of the voluntary carbon market

Over the past 15 years, the carbon credit market has matured into a set of robust global frameworks. At its core are internationally recognized certification bodies that ensure every tonne of CO₂ offsets they certify is rigorously measured, monitored, and verified. **Verified Carbon Standard (Verra)** and **Gold Standard** are widely considered the two highest standards for quality carbon offsetting in the world.

They guarantee that every tonne of CO₂ offset is:

01

Additional

Would not have happened without the support.

02

Contained

Will not cause emissions to go up elsewhere.

03

Permanent

Is protected against destruction by human or natural causes.

04

Sustainable

Has a positive impact on local communities and the environment.

05

Verified

Is inspected and verified by an independent third party.

06

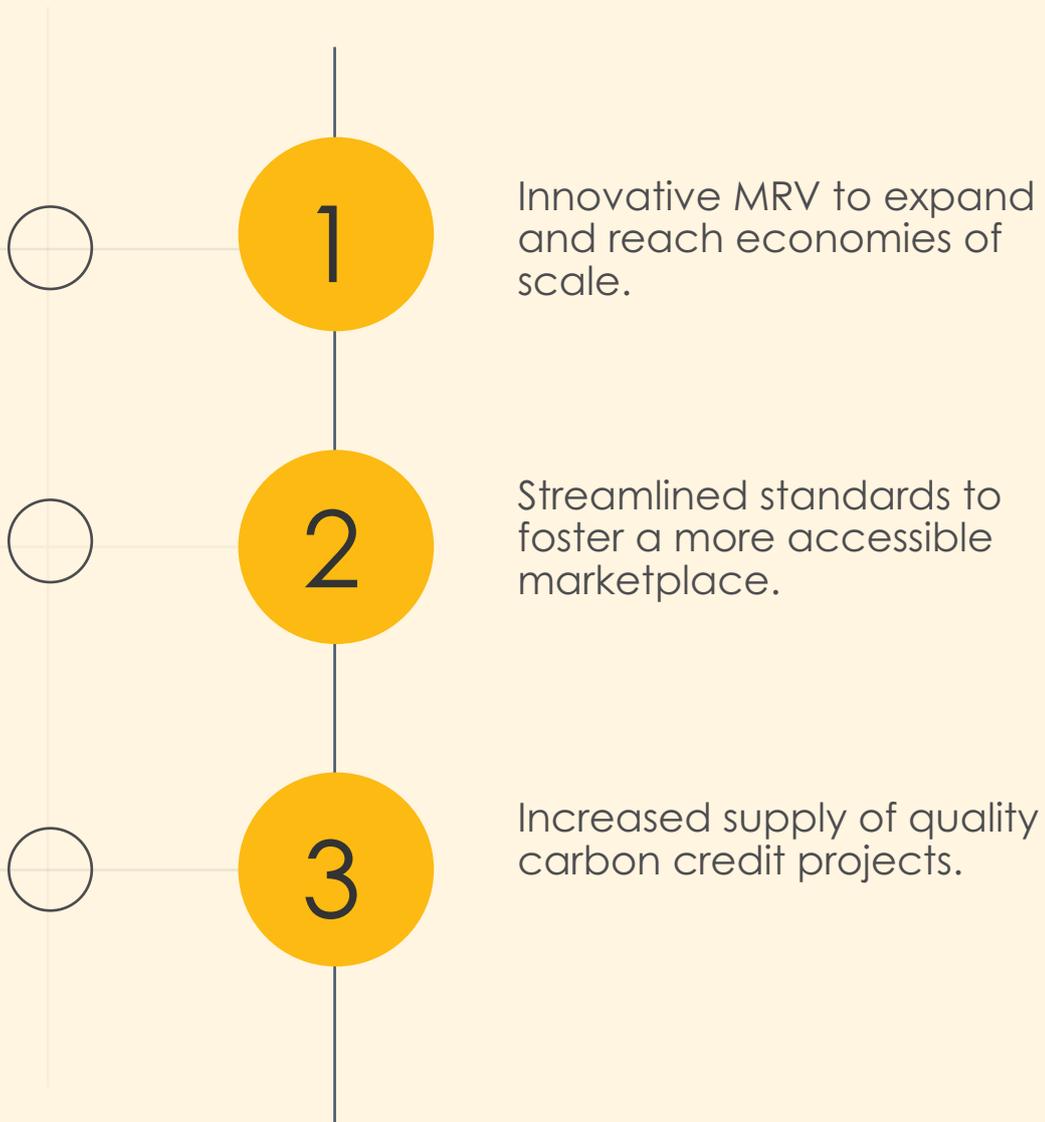
Unique

Has a unique ID on a public ledger and can only be counted once.

The **International Carbon Reduction and Offsetting Alliance (ICROA)** offers a similar set of best practices for quality carbon credits.

In the VCM today, additionality, permanence, and leakage (containment) are real concerns with many carbon credits, making it challenging for buyers to decipher the quality of the credit. While companies such as Sylvera are building tech solutions to validate the quality and risk of VCM projects, the requirements vary from agency to agency. For example, the Science Based Targets initiative, which maintains the net zero standard for non-state actor goal setting, does not permit carbon credits for net zero emissions accounting unless they are “permanent carbon removal” in geological time scale. Most nature-based standards do not meet this criteria and the emphasis on permanence would not encourage actors to do more than conservation.

For finance to flow to the right projects (including small projects) at the right price, a well-functioning VCM is necessary. To overcome the barriers and ensure the VCM is more inclusive for low-income individuals and communities, funders need to invest in three key areas:



1

Innovate in MRV to expand and reach economies of scale

OPPORTUNITY 1

Reduce the costs of MRV

The foundations of monitoring, reporting, and verification (MRV) solutions are already in place (remote sensing, blockchain, etc.) and served by a number of longstanding certifying bodies, such as Verra, Gold Standard, and the American Carbon Registry. Legacy MRV costs can be up to half the price of carbon credits, making verification of many projects unfeasible, especially for small-scale developers.⁶⁴ Currently, it is estimated that only projects over **10,000 hectares are financially viable due to high MRV costs**, although this is dependent on geography.

While innovation aimed at improving unit economics will be important, it is less clear what tools would best solve the problem. Technology innovators providing remote sensing, artificial intelligence (AI) and decentralized finance (DeFI) may be able to lower costs, which could make MRV solutions more accessible and the unit economics of small-scale projects work. Private-sector collaboration between tech innovators and standards bodies, such as The Open Collaboration between ClimateCHECK, Gold Standard and IOTA Foundation, are aiming to provide open source, high data integrity MRV solutions that are available without user fees.⁶⁵ Fintech solutions, such as 4R Digital's CAVex platform, can drive out costs and increase transparency, facilitating many smaller clean energy projects to access climate finance, while Open Forest Protocol is building a Web3 community to apply innovative blockchain approaches to validation.⁶⁷

OPPORTUNITY 2

Enhance the quality of carbon credits

Corporate buyers are currently struggling to make credible claims about net zero and climate neutrality because of limited capacity to monitor and verify the quality of carbon credits.⁶⁸ Innovation in MRV will help to establish accurate baselines and monitor leakage and reversal, both of which are needed to promote permanent, quality solutions. This is especially needed in more complex solutions such as regenerative farming that involve different species with different sequestration rates and potentials. To promote price discovery, validators should help improve the process for assessing the value of NbS projects, as well as the cost of not investing in these solutions.⁶⁹ For example, for one large Africa-based project developer, every US\$0.20 invested in reforestation generates US\$9 in ecosystem services and livelihood value, even without carbon credits.⁷⁰

Beyond MRV, the quality of carbon credits will be determined by consensus on governance structures and agreed-upon guidelines. The Integrity Council for Voluntary Carbon Markets (ICVCM) has developed Core Carbon Principles (CCPs) and an Assessment Framework (AF) to provide better standards for high-quality credits and guidance on how to supply them.⁷¹ These will be released after public consultation at the end of 2022.

⁶⁴ Julia Grimault et al., "Éléments clés du suivi, de la certification et du financement des projets carbon forestiers", 2018, I4CE, <https://www.i4ce.org/wp-content/uploads/2022/07/11106-i4ce2934-PC58-VF-1.pdf>.

⁶⁵ ClimateCHECK, "Open Collaboration", 2021, <https://www.climate-check.com/open-collaboration>.

⁶⁶ CAVex facilitates the collection and aggregation of data for small-scale, climate-positive activities to allow for the creation of carbon credits.

Their solution enables buyers or investors in climate action to purchase these carbon credits from small-scale projects on an aggregated or unit basis using digital payments. Proceeds from the sale of carbon credits are digitally transferred to the individuals involved in the small-scale actions, greatly improving access to climate finance for smaller projects. See: <https://www.cavex.io/>.

⁶⁷ See: <https://www.openforestprotocol.org/>.

⁶⁸ Expert interview with Jaxon Love, PayPal, June 23, 2022.

⁶⁹ Expert interview with David Ferrand, FSD Africa, June 20, 2022.

⁷⁰ Expert interview with John Mundy, One Acre Fund, June 21, 2022.

⁷¹ The Core Carbon Principles: <https://icvcm.org/the-core-carbon-principles/>.

2

Streamline standards and make the marketplace more accessible

While there is general consensus on what constitutes a quality carbon credit, standards are evolving to become more streamlined, target the last mile, and incorporate co-benefits in a meaningful way. Importantly, the passing of Article 6 at COP26 was a milestone for the VCM as it helps to avoid double counting in the market.⁷²

OPPORTUNITY 3

Reduce transaction costs and increase access

Entering the voluntary carbon market as a supplier is quite difficult, even for those with resources.⁷³ Part of the solution lies in developing marketplaces that are tailored to vulnerable populations, making it easier to access and navigate the VCM while maximizing the share of the price the supplier receives.

Small land stewards often cannot meet the standards of international accreditation bodies due to a lack of capacity and finance. The variety of standards and accreditation protocols in the VCM has created a fragmented landscape that is difficult to navigate. Emerging marketplaces like CAVex aim to integrate the full range of accreditations so that project developers can easily select the ones most applicable to their projects. Earthbanc is another marketplace that links buyers and sellers more directly to eliminate the costs of intermediaries.⁷⁴

Local NGOs that represent vulnerable communities generally have minimal capacity to meet due diligence standards for direct purchases and navigate complex contracts for transferring rights. The development of standardized contracts in the VCM will help with the complexities of carbon credit legal structures, but the legal nature of voluntary carbon credits will differ between jurisdictions.⁷⁵

⁷² World Bank, "What You Need to Know About Article 6 of the Paris Agreement", May 17, 2022.

⁷³ Expert consultation with Jamil Wyne, Oxford Climate Tech Initiative, September 22, 2022.

⁷⁴ See: <https://earthbanc.io/services/>.

⁷⁵ ISDA, "Legal Implications of Voluntary Carbon Credits", 2020, <https://www.isda.org/a/38ngE/Legal-Implications-of-Voluntary-Carbon-Credits.pdf>.

“

I'm convinced we've got some tools at our disposal now with digital technology that let us radically rethink the way we can talk about getting access to climate markets and finance. I think we're at the stage a little bit like the early days of M-Pesa.



Nick Hughes

OBE, founder and managing director of CAVex

OPPORTUNITY 4

Make markets transparent

Enhancing the transparency of the VCM will help to build a more accessible marketplace, reduce costs, and improve carbon credit prices. Transparent carbon registries are also critical for identifying the double counting that can damage the reputation of the market. To mitigate this risk, the Climate Warehouse connects registries to aid in compliance reporting, transactions, and benchmarking.⁷⁶

Beyond registries, voluntary carbon marketplaces have evolved to focus on solutions that encourage direct purchasing. Buyers and sellers often do not understand or have access to the information that allows for price discovery. This includes a lack of transparency around what

intermediaries keep in transactions and how much makes it back to end suppliers. Large corporations currently spend a considerable amount on research to mitigate risk in purchases. To strengthen their leadership in the sustainability space, increase market transparency and reduce validation costs, **these corporations could make their risk criteria public**, preferably by industry.⁷⁷

In more developed segments of the VCM, marketplaces can utilize public ledgers, for example, through DeFi technology, to track where funds go and to increase the total share that reaches vulnerable communities. DeFi technology (e.g., Automated Market Makers or AMMs) can enable interoperability between carbon products, transparency and price discovery, and build liquidity in the market, raising carbon credit prices.⁷⁸ For example, Flowcarbon plans to use DeFi to enable market makers and traders to arbitrage, reducing price discrepancies between tokens and their underlying carbon assets. This will help to make prices less volatile and enhance price discovery.⁷⁹

⁷⁶ Climate Warehouse: <https://www.theclimatewarehouse.org/>.

⁷⁷ Expert interview with Philip Fogel, Flowcarbon, July 22, 2022.

⁷⁸ KlimaDAO, "KlimaDAO: A catalyst for

innovation within the Voluntary Carbon Market", January 22, 2022.

⁷⁹ Expert interview with Philip Fogel, Flowcarbon, July 22, 2022.

OPPORTUNITY 5

Mitigate risk through carbon credit insurance

While there is a growing emphasis on the quality and integrity of carbon credits, there will also be latent risk in the VCM. The carbon credit insurance market is still nascent⁸⁰ and requires expansion and innovation in sub-sectors such as blue carbon. Standard property insurance can cover natural assets

like forests,⁸¹ while insurance companies can invest in NbS like mangrove restoration after storms to reduce future payouts.⁸² Insurance incumbents can diversify their portfolios to include carbon credit coverage (e.g., Descartes has begun offering parametric wildfire insurance⁸³ and Respira has created a new product to cover third-party negligence and fraud in the VCM⁸⁴) while new startups need investment to tackle the complexities of insuring carbon credits.

3

Invest in the supply of quality carbon credit projects

Demand for NbS credits in the VCM largely outweighs supply. In response, the number of new solutions and providers has been growing rapidly. However, targeted investment in last-mile solutions is needed to reach small-scale projects that have a more direct impact on vulnerable populations.

project financing and rapid transfer of technical knowledge), startup investment that diversifies supply solutions (including market solutions such as agri-inputs, digital marketplaces, and processing), and catalytic funding that scales promising local solutions. The International Finance Corporation (IFC), together with Cultivo, Aspiration and Chia Network, has launched the Carbon Opportunities Fund, "backing a blockchain-enabled platform to trade carbon offsets, aiming to attract more support from institutional investors for climate-friendly projects in emerging markets."⁸⁵

OPPORTUNITY 6

Invest in the innovation ecosystem

Demand for carbon credits outweighs supply in part because of a lack of projects in the pipeline. At current prices, the cost and risk of carbon offset project development are simply not economically viable for larger projects, let alone for small ones. Areas vulnerable to climate change, particularly sub-Saharan Africa, would benefit from new pre-venture resources (e.g., pre-

Initiatives such as the CIFAR Alliance aim to bring together ecosystem actors to accelerate the development of the VCM and promote innovation. Initiatives such as BFA Global's TECA, supported by FSD Africa, and Mercy Corps Ventures are launching ventures and investing in new VCM paradigms to open the VCM to smaller players.⁸⁶

⁸⁰Ali Smedley, "Climate risk: the need for carbon credit insurance", Instech, April 8, 2022.

⁸¹Swiss Re Institute, "Protecting and Enabling Nature-Based Solutions", 2020, <https://www.swissre.com/dam/jcr:19ebcb33-03c6-41bb-9047-917c95116b43/nature-based-solutions-pss.pdf>.

⁸²Mischa Repmann et al., "The insurance rationale for carbon removal solutions", Swiss Re Institute, 2021, [https://www.swissre.com/dam/jcr:31e39033-0ca6-418e-a540-](https://www.swissre.com/dam/jcr:31e39033-0ca6-418e-a540-d61b8e7d7b31/swiss-re-institute-expertise-publication-insurance-%20rationale-for-carbon-removal-solutions.pdf)

[d61b8e7d7b31/swiss-re-institute-expertise-publication-insurance-%20rationale-for-carbon-removal-solutions.pdf](https://www.swissre.com/dam/jcr:31e39033-0ca6-418e-a540-d61b8e7d7b31/swiss-re-institute-expertise-publication-insurance-%20rationale-for-carbon-removal-solutions.pdf); AXA XL, "Insurance solutions can help to restore mangroves as natural coastal defences", October 22, 2022.

⁸³Descartes, "Parametric Wildfire Insurance", n.d., <https://www.descartesunderwriting.com/wildfire/>.

⁸⁴Simon Jessop et al., "Howden offers first insurance against fraud in voluntary carbon markets", Reuters, September 6, 2022.

⁸⁵Simon Jessop et al., "EXCLUSIVE World Bank's IFC taps blockchain for carbon offsets", Reuters, August 17, 2022.

⁸⁶TECA, "Launching fintech ventures for climate resilience", n.d., <https://bfaaglobal.com/teca/>; Mercy Corps Ventures, "Reforestation, Emerging Markets, and The Voluntary Carbon Market", August 24, 2022.

OPPORTUNITY 7

Diversify financing strategies to provide upfront financing and tailor them to small-scale projects

Many NbS projects do not initially yield quality carbon credits due to sequestration timelines (e.g., trees take four to six years to mature and sequester carbon). Pre-financing in the form of future/forward contracts, concessionary capital, and/or grants can

help suppliers bridge the risk of the first few years and overcome upfront costs.⁸⁷ Today, even large project developers struggle to get financing and small project developers have yet to access the VCM. An estimated US\$200 million in capital investment for reforestation and afforestation in the form of blended finance could unlock US\$720 million in carbon revenue for farmers while creating natural assets that would provide co-benefits over the coming decades.⁸⁸

Funders have several approaches to investing and financing in small-scale projects to unlock supply (Table 3) and access to a wider range of project sizes and approaches that reach more vulnerable individuals and communities.

Figure 8. Estimated share of the carbon credit price in the VCM

	Approach	Instrument	Desired outcome	Examples
	Project origination	Grants, loans, venture capital	Build the project pipeline from the bottom up and in vulnerable communities.	Apply a standard and methodology to a selected site and develop the overall business model.
	Risk mitigation	Guarantee	Change the risk profile for investors and secure a long lead time to carbon maturity for developers.	First-loss guarantee for 3–10 years until the project produces an offset.
	Mitigation as part of an organization's strategy	Purchase credits in the VCM	Long-term and forward contracts, and prioritizing NbS-focused or small projects in Africa.	Targets for project types and marketplaces/platforms; consumer or project climate strategies for mitigation.
	Seeding innovation	Grants, loans, venture capital	Identify and test new opportunities in entry points across the VCM value chain.	Build locally led carbon finance innovation ecosystems in Africa to increase pipeline and supply.
	Proofs of concept to scale	Grants	Grant funding to de-risk early-stage innovation and test pathways to scale.	Venture building support along with investment/flexible grant capital.
	Financing to incentivize a broad range of innovation and impact	Additional impacts/co-benefits	Grants	Allocating the financial value of benefits as a result of intervention (socio-economic, environmental, community-level).

Source: BFA Global

⁸⁷ Expert interview with John Mundy, One Acre Fund, June 20, 2022.

⁸⁸ Personal correspondence with One Acre Fund, June 2022.

04

The path forward: COP27 and beyond

At the COP27 conference in Egypt in November 2022, adaptation and agriculture will both be central to the negotiations. This will be an invaluable opportunity to elevate nature-based solutions in the VCM for small-scale projects. **The need to cultivate innovation for an equitable and resilient VCM will be critical to emphasize.**

Figure 10 maps out and summarizes the key opportunities. While investors and donors are tasked with opportunity 6 (Invest in the innovation ecosystem) and 7 (Diversify financing strategies to provide upfront financing and tailor it to small-scale projects), additional investment will be needed to seize opportunities 1–5, meaning that investors and donors have a role to play across the VCM ecosystem.

Figure 10. Investment entry points in the VCM ecosystem

Entry points	1. Innovative MRV to expand and reach economies of scale		2. Streamlined standards and an accessible marketplace			3. Supply of quality carbon credit projects	
Areas of opportunity	1. Reduce the costs of MRV	2. Enhance the quality of carbon credits	3. Reduce market transaction costs and increase access	4. Make markets transparent	5. Mitigate risk through carbon credit insurance	6. Invest in the innovation ecosystem	7. Diversify financing strategies to provide upfront financing and tailor it to small-scale projects
Stakeholders							
Investors and donors						■	■
Climate tech innovators	■	■		■	■		
Venture builders and accelerators						■	
Verifiers and validators	■						
Brokers and marketplaces	■		■	■			
Standards bodies	■						
Alliances and coalitions		■				■	

The CIFAR Alliance strives to jumpstart an equitable, nature-powered VCM by mobilizing donors and investors to take action under the DF4CR framework.⁸⁹ In particular, we aim to:

1

Unite existing initiatives to avoid fragmentation and redundancy in the VCM, taking a whole market approach. The CIFAR Alliance strives to become more inclusive, incorporating actors from across the VCM value chain and encouraging the various task forces to share what they have learned, collaborate, and act in partnership.

2

Build locally led carbon finance innovation ecosystems in sub-Saharan Africa. While acting at a global level, CIFAR Alliance members will continue to nurture and connect innovators across the region and encourage access to the VCM for vulnerable or under-resourced communities (e.g., youth, women, low-income populations, Indigenous peoples) and ecosystems (e.g., blue economy, fragile environments).

3

Increase venture and catalytic capital in innovation to unlock the business case for NbS in the VCM, especially those with sustainable co-benefits. Alliance members will aim to launch or cultivate companies that provide scalable solutions using cutting-edge technologies.

Learn more about the CIFAR Alliance at <https://www.cifaralliance.org> and explore the DF4CR Framework for Action at <https://www.df4cr.org/>. If you are a collaborator, co-creator, or innovator working to democratize access to carbon finance in sub-Saharan Africa, we encourage you to connect with us through the contact form on the CIFAR Alliance website.

⁸⁹ See: <https://www.df4cr.org/>

Glossary of terms

Adaptation – In human systems, the process of adjustment to actual or expected climate and its effects to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.

Automated Market Maker (AMM) – A system that automatically facilitates buy-and-sell orders on a decentralized exchange via smart contracts.
Avoidance credits (ACs) – Certified emissions reductions from projects that reduce emissions compared with the most likely course of action (i.e., the baseline scenario).

Blue carbon – Carbon captured by the world's ocean and coastal ecosystems.
Blue economy – All economic activities related to oceans, seas, and coasts. It covers a wide range of established and emerging sectors and the ocean economy as a growth opportunity for both high-income and low-income countries. It fully integrates the need to address the environmental and ecological sustainability of the oceans, and includes economic benefits that may not be marketed, such as carbon storage, coastal protection, cultural values, and biodiversity.

Carbon dioxide (CO₂) – A naturally occurring gas, CO₂ is also a byproduct of burning fossil fuels (such as oil, gas, and coal) and biomass, of land-use changes (LUC) and of industrial processes (e.g., cement production). It is the principal anthropogenic greenhouse gas (GHG) that affects the Earth's radiative balance.
Carbon offset – A credit that an individual or organization can purchase to reduce their carbon footprint.

Carbon removal – Anthropogenic activities that remove CO₂ from the atmosphere and durably store it in geological, terrestrial, or ocean reservoirs

or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical sinks and direct air capture and storage, but excludes natural CO₂ uptake not directly caused by human activities.
Carbon sequestration – The process of storing carbon in a carbon pool, such as oceans, soils, or forests.

Co-benefits – The positive effects that a policy or measure aimed at one objective might have on other objectives, thereby increasing the total benefits for society or the environment. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors.
Compliance Carbon Market (CCM) – The segment of the carbon market used by countries and companies to meet legally binding climate change mitigation obligations.

Decentralized finance (DeFi) – Uses cryptocurrency and blockchain technology to manage financial transitions. It aims to democratize finance by replacing legacy, centralized institutions with peer-to-peer relationships that can provide a full spectrum of financial services.

Ecosystem services – Ecological processes or functions that have monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance; (2) provisioning services such as food or fiber; (3) regulating services such as climate regulation or carbon sequestration; and (4) cultural services such as tourism or spiritual and aesthetic appreciation.
Gigatonne – A billion metric tonnes, often used when discussing human carbon dioxide emissions. The planet currently releases around 40 gigatonnes of carbon into the atmosphere every year.

Greenhouse gas (GHG) – Greenhouse gasses are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself and by clouds. This property causes the greenhouse effect. Water vapor (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), and ozone (O₃) are the primary GHGs in Earth's atmosphere.

Internet of Things (IoT) – A system of interrelated computing devices, mechanical and digital machines, objects, animals, or people that are provided unique identifiers and the ability to transfer data over a network without requiring human interaction.

Livelihood diversification – The process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and improve their standard of living.

Mitigation – A human intervention to reduce emissions or enhance the sinks of GHGs.

Monitoring, reporting, and verification (MRV) – A multi-step process to measure the amount of GHG emissions reduced by a specific mitigation activity over a period of time, such as reducing emissions from deforestation and forest degradation, and report these findings to an accredited third party. The third party then verifies the report so that the results can be certified and carbon credits issued.

Nature-based solutions (Nbs) – Actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature.

Net zero – A target that many corporations aim for where GHG emissions to the atmosphere are balanced by anthropogenic removals over a specified period, including via carbon offsetting.

Non-fungible tokens (NFTs) – Assets on a blockchain with unique identification codes and metadata that distinguish them from each other. They can represent real-world items like carbon credits.

Paris Agreement - A legally binding international treaty on climate change. It

was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

REDD+ – Approach to Reduce Emissions from Deforestation and forest Degradation, and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks. **Removal credits (RCs)** – Emissions offset projects that adsorb additional CO₂ back from the atmosphere to remove the GHG potential. This includes photosynthesis of all kinds into timber, peat and seagrasses, as well as engineered methods, such as direct air capture and accelerated mineral weathering.

Resilience – The capacity of social, economic, and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure while also maintaining the capacity for adaptation, learning, and transformation.

Silvopastoralism – A farming practice integrating trees and grazing livestock operations on the same land. These systems are intensively managed for both forest products and forage, providing both short- and long-term income sources.

tCO₂e – Tonne of carbon dioxide equivalent. Ton and tonne are not used interchangeably. Tonne is a metric measurement (UK) and ton is an imperial measurement (US). One tonne is equivalent to 1.10231 US tons. This brief uses ton or tonne based on how the source literature cited figures.

Voluntary Carbon Market (VCM) – The segment of the carbon market for carbon credit transactions outside government-related regulatory schemes (i.e., credits purchased by organizations wishing to offset their carbon on a voluntary basis).



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