



Natural allies

Nature-based solutions for climate and biodiversity

A report by The Nature Conservancy and the UBS Sustainability and Impact Institute

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Executive Summary

Our reliance on nature is absolute. Human society can no longer afford to choose between its progress and environmental sustainability. Today, the imperative is clear: The world must invest in and work with nature to address both the climate and biodiversity crises, for the sake of current and future generations.

Leveraging every proven and scalable tool we have to avoid these crises escalating is crucial. Reducing fossil fuel emissions is at the forefront; yet additional climate mitigation strategies are also needed, particularly in the land sector. Natural climate solutions (NCS) offer some of the most immediately scalable and cost-effective options for this additional climate mitigation, reducing greenhouse gas emissions from land use as well as capturing carbon from the atmosphere in the biosphere.

NCS encompass a range of practices aimed at protecting, managing, and restoring forest, grasslands, wetlands, and agricultural lands. However, not all land management practices qualify as effective climate solutions. To be considered as such, they must deliver measurable climate mitigation that exceeds baseline conditions and persists over time. They must not compromise biodiversity and must be equitable and developed in partnership with local communities. When executed effectively, NCS can also contribute to cleaner air and water, improved livelihoods, and more resilient communities.

While new tools are available to optimize climate returns from finite investments, NCS implementation is currently hindered by insufficient policies and lagging financial investment. Governments can help by redirecting subsidies from environmentally harmful activities toward climate-positive ones. Corporations can help by reducing emissions within their own supply chains, financing environmentally sustainable practices, and funding additional climate initiatives through high-quality carbon markets. Financial institutions have a role to play as well, by supporting more climate- and nature-positive investments and fostering new transition finance mechanisms. No sector can accomplish these goals single-handedly. Only through synergistic collaboration can a nature-positive world become reality.



Find more insights in our latest white paper: “Bloom or bust—Aligning technology and finance to address biodiversity challenges”

www.ubs.com/bloom-or-bust

1. Working with nature to tackle climate change

At a glance

- Natural climate solutions (NCS) can effectively reduce greenhouse gas emissions from land use and agriculture, and capture carbon in ecosystems.
 - NCS are nature-based, sustainable, additional, measurable, and equitable. They can be highly cost-effective and scalable in the near term.
 - NCS can be categorized into three main types—land protection, improved management, and restoration—each of which varies in terms of cost-effectiveness, speed of mitigation impact, and additional benefits offered.
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1.1. Nature offers scalable solutions to reduce emissions today

The climate crisis looms larger with each passing year. It's clear from the science that "every bit of warming"¹ contributes to more severe, and often exponentially rising, consequences. Given the growing magnitude of these impacts, time is of the essence. It's imperative that the world reaches net-zero greenhouse gas (GHG) emissions as soon as possible. Immediate action is needed, deploying every ready, proven, and scalable tool to reduce emissions and capture carbon from the atmosphere.

Decarbonizing the energy, transportation, building, and power sectors is the first critical step in climate action. Emissions from fossil fuels and industrial processes are responsible for nearly 80% of the GHG emissions from human activities.² Without addressing these, the risks of climate change are too great and the costs of adaptation too high.³

However, even if all fossil fuel emissions were eliminated tomorrow, more than 20% of emissions—from deforestation, land use change, and agriculture—would continue, as would the negative impacts of climate change. Technological solutions to remove carbon dioxide from the atmosphere, such as Direct Air Capture, are under development. However, these technologies are costly, energy-

¹ IPCC 1.5°C Report (2018), *Summary for Policymakers*, <https://www.ipcc.ch/sr15/chapter/spm/>

² Emissions Database for Global Atmospheric Research (2023), *GHG emissions of all world countries*, https://edgar.jrc.ec.europa.eu/report_2023

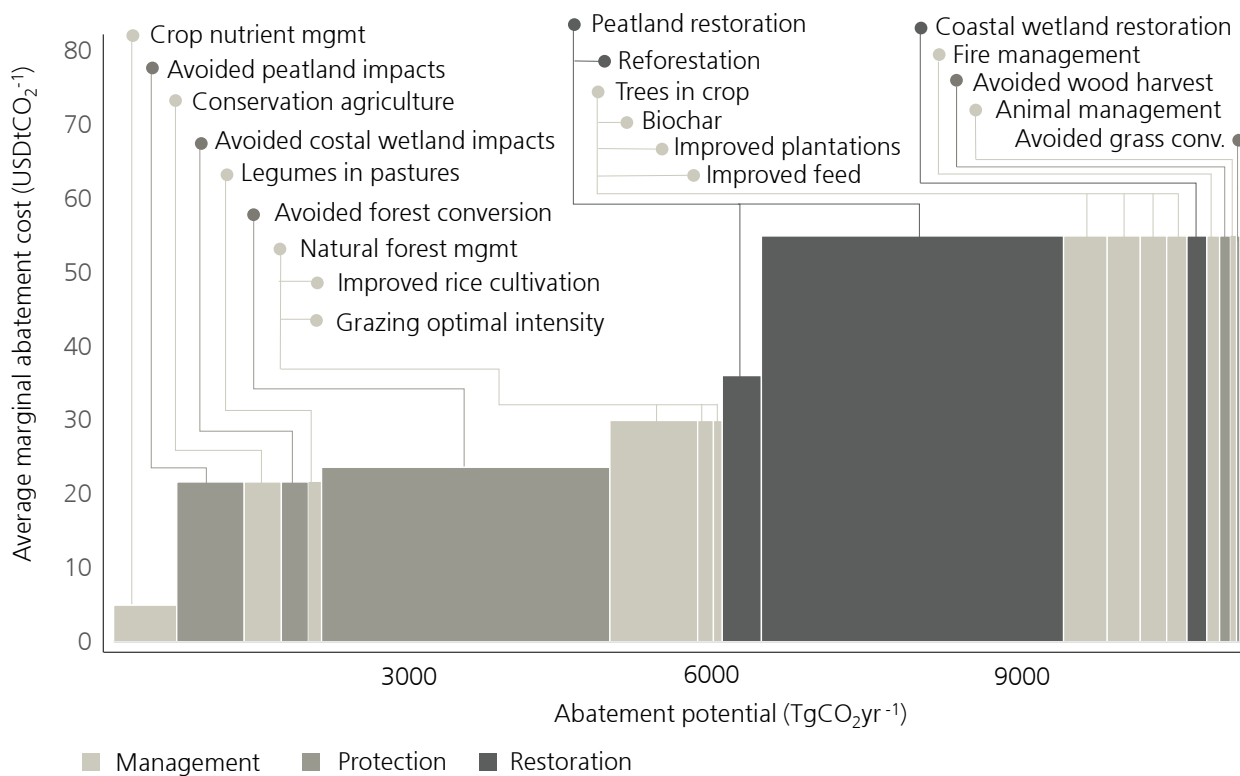
³ The Nature Conservancy (2023), *Renewable Energy Transition: Accelerating a Clean, Green, and Equitable Future*, <https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/choosing-clean-energy/>

intensive, and unlikely to scale in the near term. In the short-term, nature’s inherent power offers a promising set of solutions to reduce GHG emissions from land use and agriculture, and to draw down carbon from the atmosphere.

Natural Climate Solutions (NCS) include a broad range of actions aimed at conserving, better managing, and restoring forests, grasslands, wetlands, and agricultural lands. These solutions can either reduce GHG emissions from land use and agriculture, or take up carbon from the atmosphere and store it in the biosphere, or both.⁴ While NCS should not compensate for emissions that can be reduced, they offer near-term solutions that can help close the gap between the emissions reductions urgently needed to reach the goals of the Paris Agreement, and those that can be accomplished in the short term. They are also some of the most immediately scalable opportunities, offering substantial mitigation at USD 100 or less per ton of carbon dioxide, and often as low as USD 10–20 per ton (Figure 1).⁵ In contrast, future technological solutions like direct air capture currently cost orders of magnitude more at USD 600 to USD 1,000 per ton of carbon dioxide removed.⁶

Figure 1: NCS offer cost-effective measures to reduce emissions and capture carbon dioxide

Some options, like cropland nutrient management, are very low cost. Others, like reforestation, offer substantial mitigation, but they are also more expensive per ton of carbon



Notes: Bar height indicates the average cost per ton of carbon dioxide emissions per NCS, width indicates the amount of emissions each NCS could reduce or capture. The bars are ordered from left to right by lowest to highest unit cost (USDtCO₂⁻¹) and then largest-to-smallest mitigation potential. This assessment assumes a carbon price of ≤USD 100 tCO₂e⁻¹ in 2030; when the labels share a branch, the left-to-right position of the circular node indicates the left-to-right position in the chart. TgCO₂yr⁻¹ = teragrams of carbon dioxide per year. Source: Adapted from Cook-Patton et al. (2021), *Protect, manage and then restore lands for climate mitigation*, Nature Climate Change

⁴ The Nature Conservancy (2023), *Natural Climate Solutions*, <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/natural-climate-solutions/>

⁵ Leavitt, S.M. et al. (2021), *Natural Climate Solutions Handbook: A Technical Guide for Assessing Nature-Based Mitigation Opportunities in Countries*, The Nature Conservancy, https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_Natural_Climate_Solutions_Handbook.pdf

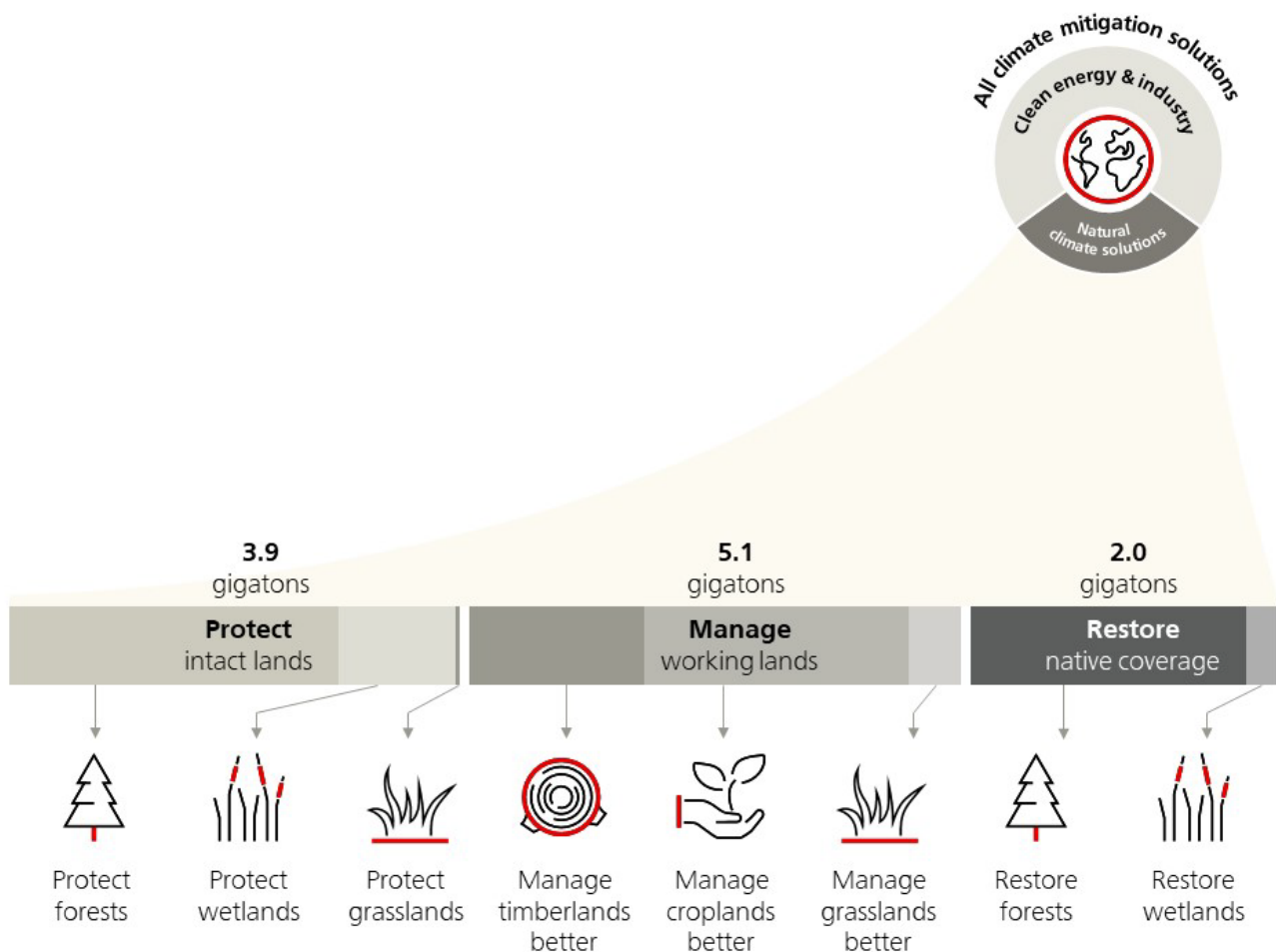
⁶ Keating, C. (2023), *What will scale direct air capture? A 75 percent price drop, report says*, GreenBiz Group, <https://www.greenbiz.com/article/what-will-scale-direct-air-capture-75-percent-price-drop-report-says>

Natural solutions can be cost-effective

Whether a solution is cost-effective depends on an assumed price of carbon. The greater the emissions reductions for a specific carbon price, the more cost-effective it is. Figure 1 assumes a price of USD 100 per ton of carbon dioxide (tCO₂). While this is higher than the market cost of carbon today, it is less than the “social cost of carbon”—the cost of climate change impacts to society per ton of carbon, which the US Environmental Protection Agency recently raised to USD 190/tCO₂.⁷ A 2017 study⁸ found that at USD 100/tCO₂, NCS can deliver approximately 11 billion tons of avoided GHG emissions and increased carbon capture each year, globally (Figure 2). This is up to a third of the mitigation needed to avoid more than 2° Celsius of warming by 2030. Many of these solutions also advance the Global Biodiversity Framework by conserving and protecting land and water and the United Nations Sustainable Development Goals by maintaining food, fiber, and wood yields. Some NCS may even result in net financial savings, such as when farmers reduce fertilizer use on farms to reduce GHG emissions.

Figure 2: Nature can provide up to 11 billion tons of climate mitigation

Protecting intact forests, improving the management of croplands, and restoring forest cover offer some of the most cost-effective mitigation potential among all NCS



Source: Adapted from Griscom et al. (2017), *Natural climate solutions*, Proceeding of the National Academy of Sciences

⁷ EPA (2023), *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

⁸ Griscom, B. et al. (2017), *Natural climate solutions*, Proceeding of the National Academy of Sciences (PNAS), <https://doi.org/10.1073/pnas.1710465114>

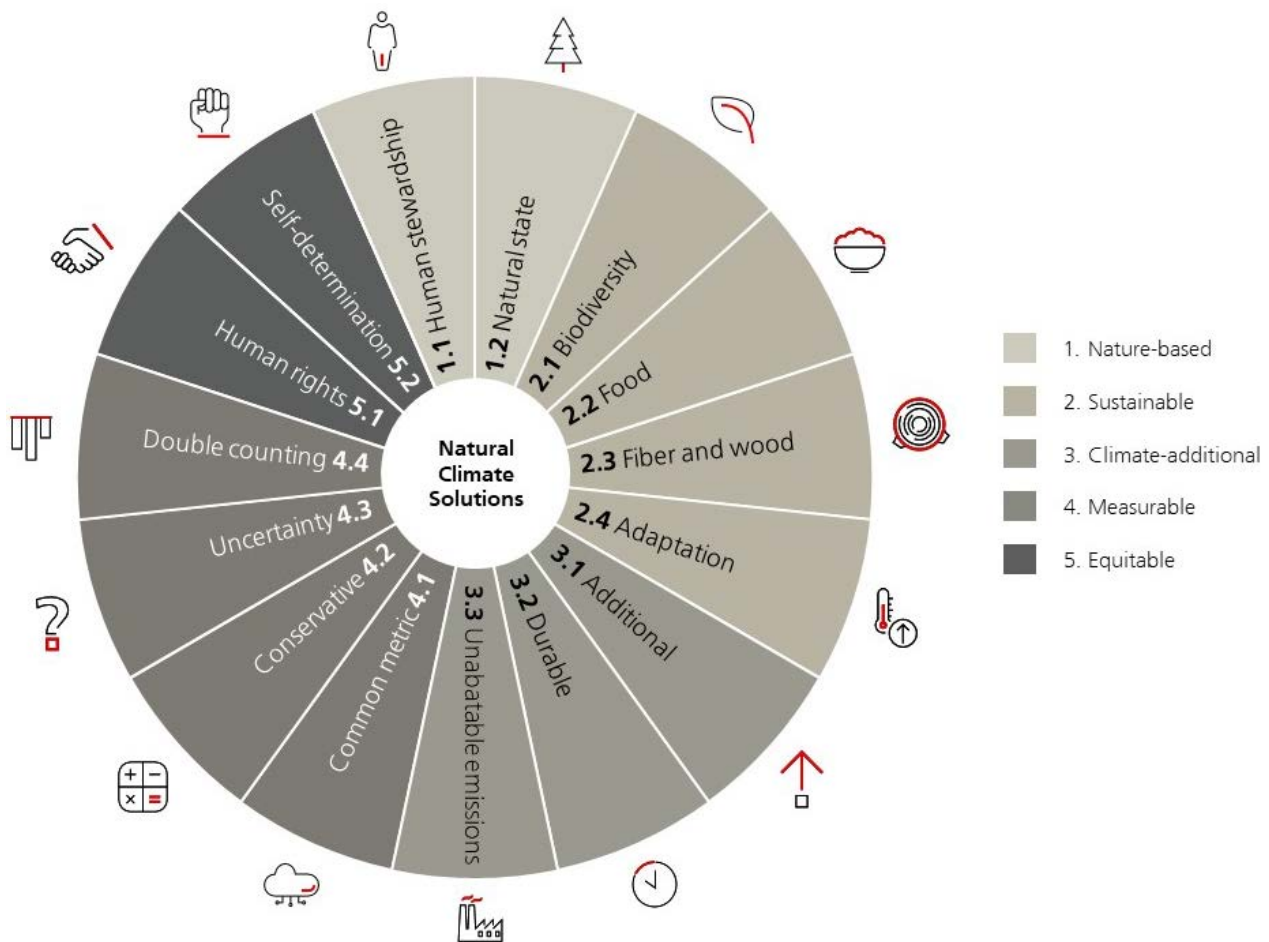
1.2. NCS must meet five stringent criteria to be credible

Over the past six years, discussions about NCS have surged. Its presence in climate-related social media conversations has more than tripled, from less than 2% to over 6%. As visibility has increased, so too have funding commitments, doubling over the same time frame.⁹ However, as interest has grown, there has been an increase in confusion and controversy over what constitutes credible NCS, as compared to actions that may have no additional climate impact, or might even be considered greenwashing.

Understanding the five foundational principles—that NCS must be nature-based, climate additional, sustainable, measurable, and equitable (Figure 3)—is essential to ensure effective implementation.¹⁰

Figure 3: The wheel of natural climate solutions

Foundational principles are shown along the outer edge of the wheel, while “operational principles” help inform how to implement the foundational principles



Source: Ellis, P. et al. (2024), *The Principles of Natural Climate Solutions*, Nature Communications

⁹ Chiriac, D. et al. (2022), Landscape of Climate Finance for Agriculture, Forestry, Other Land Uses, and Fisheries, Climate Policy Initiative, <https://www.climatepolicyinitiative.org/wp-content/uploads/2022/11/Landscape-of-Climate-Finance-for-Agriculture-Forestry-Other-Land-Uses-and-Fisheries.pdf>

¹⁰ Ellis, P.W. et al. (2024), *The Principles of Natural Climate Solutions* (Nature Communications), <https://doi.org/10.1038/s41467-023-44425-2>

First, NCS are nature-based. This means human stewardship of natural or managed ecosystems does not shift their structure and function toward less natural conditions. For example, agricultural improvements such as biochar and cover-cropping¹¹ are considered NCS because they take place in managed ecosystems, but do not over-engineer the ecosystem further from its unmodified state. In contrast, planting trees in native grasslands would not be an NCS, because that would fundamentally alter the natural ecosystem structure.

Second, NCS must sustain biodiversity, the delivery of food and wood products, and other ecosystem services. Implementing NCS cannot harm biodiversity, since the looming biodiversity and climate crises are too interlinked to be addressed separately. Similarly, natural and working lands provide food, wood products, and other key ecosystems. If NCS negatively impact those services, they will not be durable because people's needs will not be met. For example, blindly replacing agricultural lands with forest may limit food supply and lead to land clearing elsewhere. However, working with local communities to convert agricultural lands into agroforestry systems can simultaneously boost food and/or wood production, while enhancing carbon storage.

Third, NCS are climate additional; namely, any changes in land use and management provide additional climate mitigation above and beyond baseline conditions. For example, protecting a forest that is not at threat of disturbance would not change the trajectory of carbon stocks within that forest, and thus provides no additional climate mitigation value. However, protecting a forest that is about to be cut down prevents emissions that would happen otherwise, and therefore count as an NCS. Demonstrating additionality can be challenging, and improved methods are underway to increase transparency, accuracy, and efficiency. New dynamic global monitoring systems can compare project sites to control sites that have identical starting conditions as the project site but no investments in natural climate solutions. A coordinated network of field measurement and improved remote-sensing technologies can then determine if and how much the project site is outperforming the control site, which determines the additional climate benefit.¹² That climate benefit must also be durable, meaning that it persists over time.

Fourth, NCS must be measurable, meaning that the climate benefits can be quantified. For example, the climate benefits of mangrove protection are well established, whereas other actions like kelp farming remain too uncertain to yet call them an NCS. There are also multiple potential actions that can occur in a given landscape. Quantifying both the magnitude of opportunity and uncertainty around those estimates can help focus efforts on the actions that are most likely to offer the largest mitigation returns. For example, in the United States, improved forest management offers more cost-effective mitigation than other NCS, whereas in Canada it is the agricultural sector that offers the most. A new platform called *naturebase* uses the best-available science to allow these comparisons across NCS and geographies (see details below).¹³

Lastly, NCS must be equitable. This requires the establishment of safeguards to ensure the protection and consideration of human rights throughout the execution of NCS initiatives.^{14,15} Historically,

¹¹ Biochar involves converting plant biomass into charcoal and applying it to soil. This helps lock carbon into the soil and improve soil fertility. Cover crops are plants that are grown before and after the main cropping season to increase soil carbon storage, while also preventing soil erosion and enhancing soil fertility.

¹² The Nature Conservancy (2022), *New Approach to Forest Carbon Accounting Aims to Enhance Accuracy and Transparency*, <https://www.nature.org/en-us/newsroom/verra-voluntary-carbon-market-accounting-methodology-dynamic-baseline/>

¹³ www.naturebase.org

¹⁴ Camino et al. (2023) Indigenous Lands with secure land-tenure can reduce forest-loss in deforestation hotspots; <https://doi.org/10.1016/j.gloenvcha.2023.102678>

¹⁵ The Nature Conservancy (2020) *Human Rights Guide for Working with Indigenous Peoples and Local Communities*, <https://www.tnchumanrightsguide.org/>

Indigenous Peoples and Local Communities (IPLCs) have demonstrated effective stewardship of lands.¹⁶ Collaborating with IPLCs in developing NCS can yield significant benefits, including enhanced air and water quality, increased resilience against droughts and floods, creation of recreational areas, and support for livelihoods that are increasingly vulnerable to climate change. Globally, many Indigenous communities already manage lands and water bodies, drawing on their deep-rooted wisdom, traditions, and values. In the past, protection efforts that removed people from the land exacerbated long-standing injustices. Recognizing and empowering the leadership of these rightsholders is essential for NCS to ensure the maintenance of livelihoods and delivery of both climate and biodiversity benefits.

1.3. Not all NCS are equal

Natural climate solutions are typically grouped into three main categories that should be prioritized as follows: protect, manage, and restore. Each category varies in its potential for cost-effective mitigation, the timeframe over which these mitigation effects can be realized, and the range of additional benefits it provides (Figure 4). Other benefits may include biodiversity conservation, enhancement of ecosystem services, and socio-economic improvements for local communities. Developing a portfolio of NCS that follows this hierarchy can help to optimize the unique advantages and opportunities of each type of NCS.

Figure 4: Different NCS support different outcomes

A portfolio of NCS best optimizes for multiple outcomes. For example, NCS that improve land management can be fast acting and lower cost but offer more limited biodiversity and mitigation benefits per hectare of investment than NCS related to protecting natural lands. Thus, combining improved agricultural land management while protecting remnants of natural lands within an agricultural landscape would better help to achieve multiple outcomes.

	Maximum mitigation potential (GtCO ₂ e yr ⁻¹ in 2030)	Cost-effective mitigation potential (GtCO ₂ e yr ⁻¹ in 2030)	Time horizon	Cost-effectiveness	Biodiversity value	Land use Change	Mitigation per hectare
PROTECT	5.1	3.9	medium	moderate	high	changes	highest
MANAGE	6.8	5.1	faster	lowest cost	lowest	maintains	lowest
RESTORE	11.8	2.0	slower	highest cost	medium	changes	medium

Note: GtCO₂e = gigatons of carbon dioxide equivalent.

Source: Adapted from Cook-Patton et al. (2021), Protect, manage and then restore lands for climate mitigation, Nature Climate Change

Protection NCS avoid the release of greenhouse gases by conserving intact ecosystems. When peatlands are converted for human use, for example, they can release 1,480 metric tons of carbon dioxide per hectare. Converting mangroves can release 1,405 tCO₂/ha.¹⁷ Per hectare, that is the equivalent of 300 passenger cars driving for over a year. These immense carbon stores are effectively

¹⁶ Benzeev et al. (2023), Formalizing tenure of Indigenous lands improved forest outcomes in the Atlantic Forest of Brazil; <https://academic.oup.com/pnasnexus/article/2/1/pgac287/7005261>

¹⁷ Roe, S. et al. (2021), *Land-based measures to mitigate climate change: Potential and feasibility by country*, Global Change Biology, <https://doi.org/10.1111/gcb.15873>

irrecoverable,¹⁸ in that it would take centuries and millennia to recover them if lost. Preventing this loss helps to mitigate GHG emissions, safeguards against biodiversity loss, and maintains ecosystem services upon which humanity depends. “Protect” solutions are at the top of the NCS hierarchy for all these reasons,¹⁹ as well as because they offer high mitigation per hectare of investment and can be realized quickly and at a comparatively low cost per tCO₂e (Box1).

Box 1: PROTECT: Cubango-Okavango River Basin, Angola

In Angola, the Cubango-Okavango River is home to significant peat deposits which, although currently relatively undisturbed, have not been studied in detail due to the region’s history as a post-conflict area. The peatlands are vital, providing clean water to over a million people, sustaining biodiversity across the region, and supporting local livelihoods. Presently, researchers are engaged in identifying the locations of these peat deposits, assessing how much carbon they store, and evaluating the extent of their vulnerability.²⁰ Gathering this data is crucial, as it will guide the prioritization of areas for financial investment and Angola’s NDC (Nationally Determined Contribution) strategies.

TNC staff and partners at HALO trust take soil cores of peat to estimate carbon stocks



Source: TNC/Nathaniel Robinson

Management NCS enhance the management of working lands in ways that both mitigate climate change and sustain commodity production. In forestry, this includes improving logging practices to minimize collateral damage to the standing forest, which can reduce the emissions associated with

¹⁸ Noon, M. et al. (2022), *Mapping the irrecoverable carbon in Earth’s ecosystems*, Nature Sustainability, <https://doi.org/10.1038/s41893-021-00803-6>

¹⁹ Cook-Patton, S. et al. (2021), *Protect, manage and then restore lands for climate mitigation*, Nature Climate Change, <https://doi.org/10.1038/s41558-021-01198-0>

²⁰ <https://nccsprototypingnetwork.naturebase.org/projects/angola-peatlands>

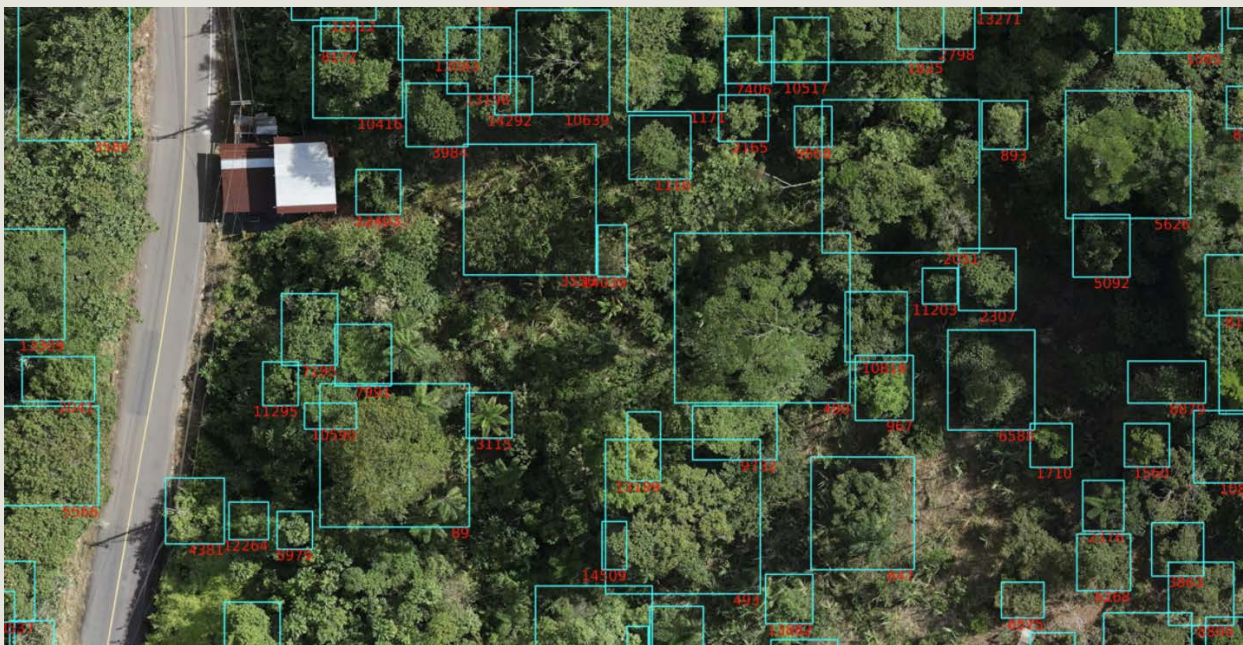
timber harvest by as much as half.²¹ In agriculture, it can involve integrating trees into farms (“agroforestry”) to provide new revenue streams, such as timber, fruit, or fodder. Agroforestry increases overall carbon storage, while also improving yields and potentially enhancing habitat for biodiversity.

In the hierarchy of NCS strategies, improved management practices are ranked second. Although they often present more cost-effective opportunities for mitigating climate change,²² per hectare climate and biodiversity benefits typically fall short of what can be achieved through protection or restoration NCS.

Box 2: MANAGE: Indigenous “Chakra” systems, Ecuador

In Ecuador, researchers are studying the climate change mitigation potential of traditionally managed Indigenous agroforestry systems known as “chakras.” Chakras are used by Indigenous cultures to obtain food and natural medicine and participate in other cultural practices. The chakras maintain biodiversity and allow the regeneration of ecosystems. Some of the most effectively managed chakras have demonstrated the capacity to sequester up to half the carbon of the nearby primary forest, while still generating food and income for landowners and supporting habitat for biodiversity. Work is ongoing to identify model chakras and encourage other land users to transition their current working lands to these more carbon-rich systems, to enhance carbon sequestration while strengthening the capacity for landowners to adopt best management practices.²³

Drone imagery and machine learning can be leveraged to identify species and estimate the carbon of individual trees



Source: TNC/Ecuador

²¹ Ellis, P. et al. (2019), *Reduced-impact logging for climate change mitigation (RIL-C) can halve selective logging emissions from tropical forests*, *Forest Ecology and Management*, <https://doi.org/10.1016/j.foreco.2019.02.004>

²² Cook-Patton, S. et al. (2021), *Protect, manage and then restore lands for climate mitigation*, *Nature Climate Change*, <https://doi.org/10.1038/s41558-021-01198-0>

²³ <https://ncsprototypingnetwork.naturebase.org/projects/ecuador-agroforestry>

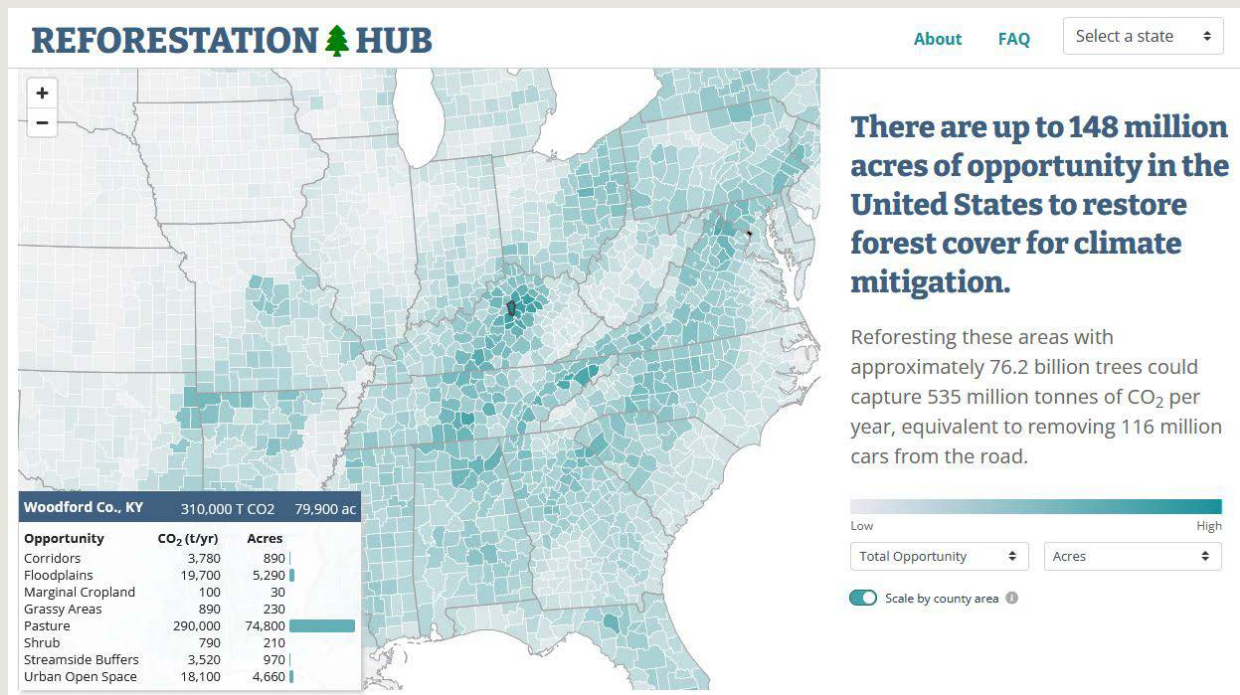
Restoration NCS increase the land area or enhance the functionality of ecosystems that have been previously degraded or altered from their original state. This can involve initiatives such as planting trees in cities, regrowing forests, or bringing back natural flows to coastal wetlands and peatlands. Restoration NCS not only offer substantial potential for climate mitigation, but also play a crucial role in restoring habitat for biodiversity and generating ecosystem services that benefit local communities.

Restoration NCS are ranked third. This is primarily due to the higher costs associated with these projects, even though they offer short-term employment opportunities in fields like construction, engineering, and conservation. In addition, realizing the climate and biodiversity benefit often requires time, as ecosystems need time to develop fully (Box 3).

Box 3: RESTORE: Mapping lower-cost and more feasible reforestation options in the US

In the United States, reforestation has been highlighted as a particularly promising NCS.²⁴ However, it is not always clear where those new forests could go. The Reforestation Hub²⁵ provides a menu of options for every county in the US to help determine the types of incentives and programs that can scale reforestation. For example, many of the opportunities in western US are on federal lands suggesting a strong role for the government, whereas opportunities in eastern US are concentrated on private lands indicating a potential role for private sector investment.

A tool by The Nature Conservancy and American Forest provides an interactive way to explore opportunities to restore forest cover across the US



Source: Reforestation Hub (2023), www.reforestationhub.org

²⁴Fargione, J. et al. (2019), *Natural climate solutions for the United States* (Science Advances), <https://www.science.org/doi/10.1126/sciadv.aat1869>

²⁵www.reforestationhub.org

2. Harnessing nature: Strategies for swift action

At a glance

- Emissions from land use and agriculture must be addressed as part of a global strategy to tackle the climate and biodiversity crises.
 - NCS adoption can be accelerated by increasing availability of data and information regarding effective implementation.
 - Nature-positive changes in policy and increased financing from the public, private, and financial sectors are required to implement NCS at scale.
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2.1. NCS implementation is behind where it needs to be

Land use change and agriculture account for more than 20% of global greenhouse gas emissions. The essential role of nature in combatting catastrophic climate change and biodiversity loss is becoming increasingly clear.²⁶ Despite this, the land sector remains a significant and growing source of emissions.²⁷ The latest Forest Declaration Assessment, which tracks progress toward deforestation, forest degradation, and reforestation goals, revealed that 6.6 million hectares of forests, much of that primary forest area, were cleared last year. This rate of deforestation is 21% higher than what is needed to halt deforestation by 2030.²⁸

There is also a significant shortfall on policy and financial commitment to NCS. IPCC analysis shows that policies implemented from 2010 to 2019 resulted in mitigation of about 0.65 billion t/CO₂ per year.²⁹ This is only 6% of the mitigation needed by 2030. Financially, only about USD 0.7bn per year has been spent on NCS, far below the necessary USD 400bn per year needed to achieve all cost-effective NCS in forests (and more needed to achieve other NCS). While USD 400bn per year may

²⁶ Intergovernmental Panel on Climate Change (2018), Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, <https://www.ipcc.ch/sr15/>

²⁷ Intergovernmental Panel on Climate Change (2022), Climate Change 2022: Mitigation of Climate Change Summary for Policy Makers, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

²⁸ Forest Declaration Assessment (2023), Off track and falling behind: Tracking progress on 2030 forest goals, <https://forestdeclaration.org/resources/forest-declaration-assessment-2023/>

²⁹ Kikstra, J. S. et al. (2022), The IPCC Sixth Assessment Report WGIII climate assessment of mitigation pathways: from emissions to global temperatures, Geoscientific Model Development, <https://doi.org/10.5194/gmd-15-9075-2022>

sound substantial, it is relatively modest compared to current subsidies for agriculture and forestry.³⁰ In addition, an investment in NCS is not a lost cost to society, but rather a valuable investment to mitigate future climate damage to ourselves and future generations.

2.2. Tools can help to unlock NCS potential

Maximizing the impact of NCS with limited time and resources requires prioritizing the locations and actions that provide the greatest mitigation potential per hectare of investment. A key obstacle has been the fragmentation and inaccessibility of data and information on NCS. Often, they have been scattered across multiple sources, unavailable for specific locations, and/or stakeholders lack the means to access or analyze them.

Nature4Climate recently launched *naturebase*,³¹ an innovative online platform designed to facilitate and democratize access to crucial information (Figure 5) to address this challenge. This tool combines technology, science, and synthesis to help investors, governments, and policy makers identify where, why, and how to implement high-integrity nature-based climate projects with the greatest carbon mitigation impact, while also protecting livelihoods and biodiversity.

Carbon and conservation project developers can leverage the platform to help deliver high-integrity projects by evaluating the carbon opportunity of different NCS interventions, estimating the associated benefits for humans and biodiversity, and conducting human rights assessments.³² For Indigenous nations and local communities, *naturebase* can help inventory the opportunity for NCS on their lands. This information can aid in developing NCS projects, assist in negotiating equitable agreements, and attract necessary financial investments.

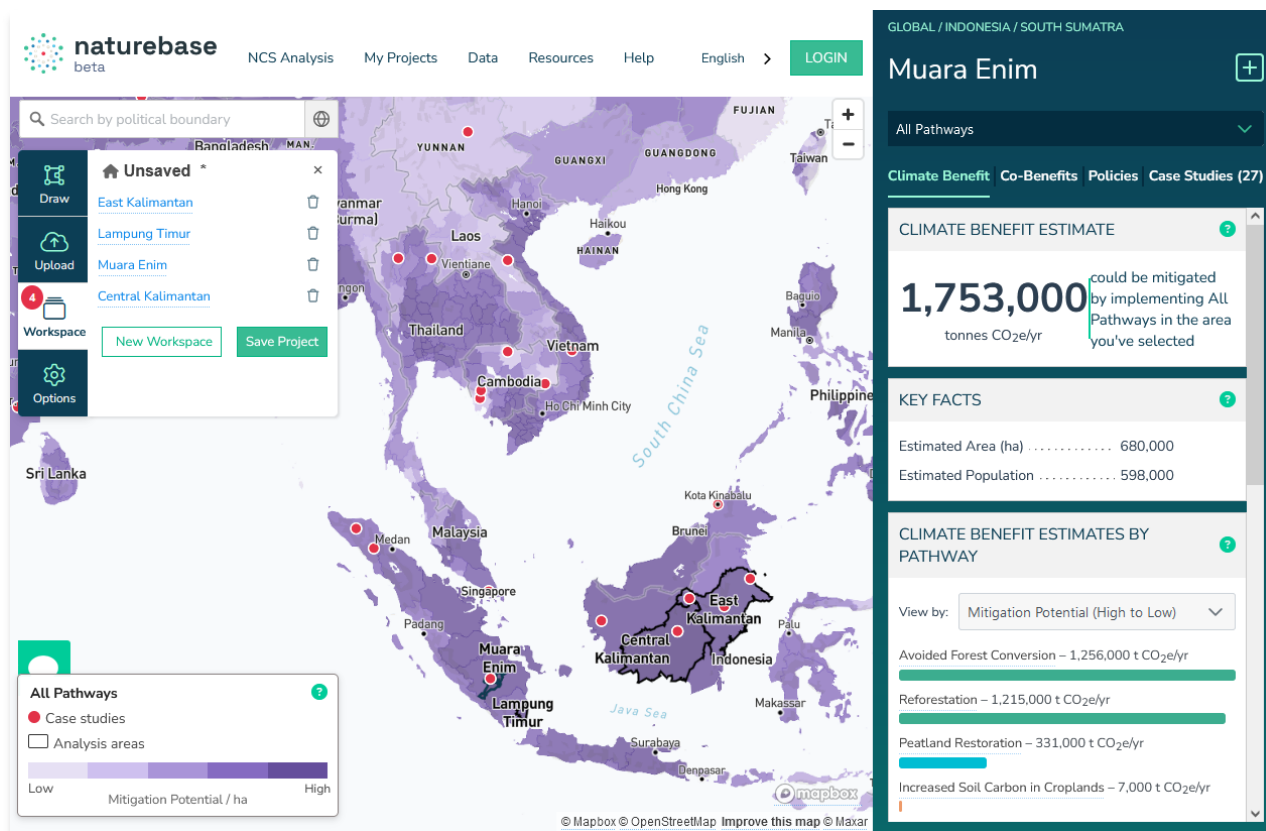
³⁰ Kikstra, J. S. et al. (2022), *The IPCC Sixth Assessment Report WGIII climate assessment of mitigation pathways: from emissions to global temperatures*, Geoscientific Model Development, <https://doi.org/10.5194/gmd-15-9075-2022>

³¹ The platform delivers peer-reviewed scientific data for any global location, and enhances mitigation potential estimates with insights into benefits for ecosystems and human well-being. It also provides information on enabling policies and showcases case studies from around the world, making it a comprehensive resource for NCS planning and implementation. *naturebase* (2023), <https://www.naturebase.org/>

³² The Human Rights Screening Tool, from *naturebase*, was originally designed for natural climate solutions projects but can be applied much wider to a variety of land management projects. <https://humanrights.naturebase.org>

Figure 5: The *naturebase* platform

This is an online platform that synthesizes information on NCS to empower a wide range of stakeholders to engage more effectively and knowledgeably in the design and implementation of nature-based climate solutions



Source: naturebase (2023), www.naturebase.org.

2.3. Financial barriers to NCS can be eliminated

To effectively address the climate and biodiversity crises, we need to close the gap in NCS funding and regulation between where we are today and where we need to be. This requires a mix of policy reforms, strategic incentives, and effective market structures. Such measures are vital to catalyze financial contributions from the private sector. That's why scaling NCS necessitates increased engagement and action from three categories of stakeholders: governments, companies, and the financial sector.

Government support is a critical enabler of NCS

Public funding is currently the largest overall driver of NCS.³³ However, it is estimated that governments around the world currently spend between USD 500bn to USD 1tr on environmentally

³³ The Nature Conservancy (2023), *Funding Natural Climate Solutions: Understanding the needs, gaps, and potential sources of Natural climate solutions funding across several countries*, https://www.nature.org/content/dam/tnc/nature/en/documents/Natural_Climate_Solutions_Funding_Study_2023.pdf

harmful subsidies for fisheries, agriculture, and fossil fuels.³⁴ Redirecting these subsidies toward NCS could greatly enhance their implementation and effectiveness. In addition, it's essential that governments better quantify the value of environmental assets, such as timber or fisheries; and ecosystem services, such as water filtration and carbon sequestration. These assets and services are essential for human well-being and provide significant economic and social benefits. Recognizing and investing in these natural resources is fundamental to achieving sustainable development and fostering economic growth.

Companies need to align their activities with climate-friendly goals

Companies can contribute by reducing emissions in their supply chains, financing eco-friendly initiatives, and supporting climate action through high-quality carbon markets. A few private sector leaders are pioneering best practices such as monitoring supply chains, ensuring traceability, and engaging suppliers to prevent deforestation. They are also adopting better land management practices to lower emissions and increase carbon sequestration. However, these progressive companies represent only a small fraction of the global market and resources. For example, most major companies in forest-risk commodity supply chains still lack effective policies to eliminate deforestation.

The Taskforce on Nature-related Financial Disclosures (TNFD) has established a framework for organizations to assess their nature-related dependencies, impact, risks, and opportunities. This also increases transparency. Similarly, there are now voluntary climate standards and frameworks for companies. These include the Science Based Targets initiative (SBTi), Greenhouse Gas Protocol (GHGP), and the Voluntary Carbon Market Integrity Initiative (VCMI), among others. These frameworks provide standards and guidance for companies on measuring and reducing emissions related to land use within their supply chains, as well as guidelines on using carbon credits to adhere to corporate climate best practices.

To date, the private sector's efforts to reduce supply chain emissions have largely targeted sectors such as energy, industry, and transportation, with minimal focus on emissions from land use and management. In fact, most companies with significant land-related emissions have not accounted for them in their GHG inventories. However, that dynamic is starting to change with the introduction of new guidelines. The GHGP's forthcoming Land Sector and Removals Guidance advises companies on how to account for their land-related emissions.³⁵ Similarly, the SBTi's Forest, Land, and Agriculture Guidance provides direction for setting science-based targets to reduce their land-related emissions.³⁶ Together, these standards aim to provide much-needed guidance for companies, establishing systems and incentives to incorporate NCS into their decarbonization strategies. The VCMI's Claims Code of Practice is designed to promote credible, Net Zero-aligned participation in voluntary carbon markets by providing guidance on how companies can credibly use carbon credits as part of their climate strategies.³⁷

Although these standards and guidance represent much-needed progress, there are still key areas that require attention. First, there is a need for clearer alignment and guidelines on the use and

³⁴ Damania, R. et al. (2023), *Detox Development: Repurposing Environmentally Harmful Subsidies*. World Bank. <http://hdl.handle.net/10986/39423>

³⁵ Greenhouse Gas Protocol (2024), *Land Sector and Removals Guidance*, <https://ghgprotocol.org/land-sector-and-removals-guidance>

³⁶ Science Based Targets (2023), *Forest, Land and Agriculture (FLAG) Guidance*, <https://sciencebasedtargets.org/sectors/forest-land-and-agriculture>

³⁷ Voluntary Carbon Markets Integrity Initiative (2023), *Claims Code of Practice: Building integrity in voluntary carbon markets*, <https://vcmintegrity.org/wp-content/uploads/2023/11/VCMI-Claims-Code-of-Practice-November-2023.pdf>

claims of credits, both as insets³⁸ and offsets, in corporate decarbonization strategies. Second, there is a need to align incentives with the NCS hierarchy that prioritizes emissions reduction through protection and improved management before enhancing sequestration through restoration. Currently, there is an overwhelming emphasis on removals and restoration credits, which can overshadow the importance of protecting existing large carbon stores and pursuing opportunities in improved management that are less prone to leakage. Finally, there is a need for the rapid adoption of these standards, even as they continue to evolve. This will ensure that companies take immediate and effective action to invest in NCS, both within their supply chains and in broader contexts.

Financial institutions can help plug the investment gap by providing transition finance

Financial institutions can prevent negative climate impacts and promote positive change. Some financial institutions are already seeking to ensure that their investments do not harm the environment. However, in 2022 alone, private financial institutions provided USD 6.1 tr to companies most at risk of driving tropical deforestation through agricultural commodity production. This highlights the urgent need to align financial practices with climate-positive outcomes.

Financial institutions can also introduce innovative funding mechanisms to promote transition finance. Emerging options for financing carbon and other ecosystem services include results-based payments for tropical forest protection and restoration. Other innovative financial tools also present fresh avenues for funding. For example, Nature Bonds help governments refinance debt and generate new funding that can be invested in conservation, climate mitigation, and climate adaptation. New lines of credit and market demand for zero-conversion or low-carbon products also represent promising avenues. These emerging mechanisms can play a significant role in enabling NCS. For more details, see the recent UBS white paper “Bloom or bust—Aligning technology and finance to address biodiversity challenges.”³⁹

Carbon Markets are an essential component in the broader spectrum of sectors above, serving as an accelerator for public and private initiatives. Carbon credits, when held to high standards of integrity and social benefits, are an important tool in the decarbonization process. However, they must be used judiciously, not to compensate for emissions that are easily reducible by other means. They should be independently verified here, given recent revelations of carbon credit programs that did not deliver what they promised.⁴⁰ When developed in partnership with local communities and monitored for outcomes, carbon projects can provide a sustainable source of revenue, fostering behavioral changes and financing NCS.

Lack of confidence in the ability of NCS to deliver real climate mitigation represents a notable barrier to carbon markets. Several recent analyses have found that some carbon offset projects related to avoided forest conversion and improved forest management may have over-inflated estimates of their mitigation potential.⁴¹ These very real issues highlight the need for a critical reassessment of the fundamental science, rules, and norms governing NCS financing options like carbon markets. The purpose of this reassessment and reform is not to discard key climate solutions but rather to refine them. Key improvements should include enhanced transparency, robust third-party monitoring, and independent verification in reporting.

³⁸ Insetting involves implementing nature-based solutions within a company’s own value chain rather than purchasing offsets from an external group.

³⁹ www.ubs.com/bloom-or-bust

⁴⁰ West, T. et al. (2023), Action needed to make carbon offsets from forest conservation work for climate change mitigation, <https://www.science.org/doi/10.1126/science.ade3535>

⁴¹ Ibid.

Uniting for Nature and Climate

Dr. Katharine Hayhoe, The Nature Conservancy Chief Scientist

2023 was a record-breaking year for climate. Where do we stand now?

2023 was the hottest year on record and contained many of the hottest months ever recorded. It was also characterized by record-breaking extreme weather across the globe, from heatwaves and wildfire to floods and storms. As a result, nearly everyone can point to a way in which they are being impacted by a changing climate. Climate change is no longer a future issue: It is affecting us here and now.

Solutions are at hand. The transition to clean energy is well underway, as is our long-overdue investment in nature. Resilience and adaptation planning is increasing rapidly, and at COP28 we saw new investments in everything from efficiency to ocean solutions. However, it's clear that these actions are not occurring quickly enough. Last year was a wake-up call to the world to tell us all that we need to move faster ... much faster.

Can you talk about the relationship between the climate and biodiversity crises?

A [cartoon by Graeme McKay](#) accurately portrays the situation we find ourselves in today: One crisis looming over us, with another even bigger one right behind it. Looming behind the already immense global crises of pandemic, recession and climate change is the tidal wave of biodiversity collapse. Why is the biodiversity crisis potentially even larger than the climate crisis? It's because our life literally depends on nature. Almost half the oxygen we breathe comes from tiny phytoplankton in the ocean. The water we drink is filtered through nature. The food we eat is grown through nature. Nature doesn't need us; we need it. That's why NCS are not about saving the planet, and it is a false dichotomy to argue that we must choose between people versus the planet, or the environment versus the economy. It's either all of us together, or nothing.

What do you think leaders today most need to know about climate and biodiversity?

What I most wish leaders understood is how simple and fundamental the concept of sustainability is. It's about behaving as though we live on a round, finite planet—which we do. Acknowledging this basic physical reality means learning to live within Earth's limits. Yet, we find ourselves grappling with and failing to meet this fundamental principle.

All too often, sustainability is perceived to be the sole responsibility of the Chief Sustainability Officer or the Department of the Environment. Yet, every decision we make is essentially a choice for a better or a worse future. Our decisions determine the amount of heat-trapping gases we emit and whether we contribute to or deplete nature. So, my message to leaders is clear: Every decision you make impacts the climate and the continued ability of our planet to support us, whether you realize it or not.

Lastly and most importantly, I believe that anyone can advocate for change within their spheres of influence. One might think, "I'm a business leader" or "I'm a politician" or "I deal with technology or finance, so this isn't my area." But addressing the climate crisis isn't about one's profession; it's about being a human being on this planet. If we don't fix the climate crisis, it will fix us. That's why it's essential that we embrace our shared humanity and our collective responsibility to care for our planet.

3. How to ensure NCS delivers

By 2030, natural climate solutions could deliver up to 11 billion tons of greenhouse gas mitigation, a substantial contribution towards meeting the targets of the Paris Agreement. While natural climate solutions are not a substitute for reductions in fossil fuel emissions, they are a necessary supplement to these efforts. Realizing their full potential will require an investment of more than USD 400bn per year. This sum is much greater than current levels of investments in NCS; however, it is roughly equal that of current agriculture subsidies, and much less than current fossil fuel subsidies.

Not all NCS are created equal—they vary in cost-effectiveness, time scale, and biodiversity outcomes among other factors. Adopting a portfolio of different NCS can thus aid in achieving the greatest returns across multiple axes. Science is increasingly able to identify how to maximize the benefits from limited funds, through the development of tools such as *naturebase* that combine technology, science, and communications to help users identify where, why, and how to implement high-integrity NCS projects.

To realize this potential and to scale up NCS, however, a concerted effort is needed across public, private, and financial sectors. Addressing the funding and policy gaps in NCS will involve a mix of policy reforms, smart incentives, and effective market structures:

- Governments can help by redirecting and aligning subsidies and incentives toward NCS, which could greatly enhance their implementation and effectiveness.
- Companies can contribute by reducing emissions in their supply chains, financing eco-friendly initiatives, and supporting climate action through high-quality NCS projects.
- Financial institutions can ensure their investments align with climate- and biodiversity-positive outcomes, as well support and advance innovative funding mechanisms.

Ultimately, investing in NCS to address the climate and biodiversity crises is not just financially prudent; it's a strategic investment in a better future for both people and nature.

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The UBS Sustainability and Impact Institute was founded in 2021 to contribute to the sustainability debate, with a focus on actionable and timely contributions. The Institute is a collaborative effort with sustainability experts from across UBS's business divisions. We strive to encourage objective and fact-based debate, provide new impulses for action, and identify innovations that will help shape our collective efforts and awareness about sustainability and impact.

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