SYNERGY SOLUTIONS 2025

How Nature Conservation Can Advance SDG and Climate Action

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Content editing was completed by July 2025.

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Referencing This Report

Bustamante, M. & Schüler, J. (2025). Synergy Solutions 2025: How nature conservation can advance SDG and Climate Action. Expert Group on Climate and SDG Synergy.

ACKNOWLEDGEMENTS

Partner Behind the Thematic Report

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The report's depth is indebted to the excellent inputs provided by eminent global experts through online consultation and in-person review in Copenhagen. We acknowledge the significant contributions from:

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Diana Urge-Vorsatz (IPCC and Central European University (CEU))

Elisabeth Gilmore (Carleton University)

Fabienne Babinsky (UN World Food Programme (WFP))

Felix Creutzig (Bennett Institute for Innovation and Policy Acceleration and Potsdam Institute for Climate Impact Research)

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Nobue Amanuma (IGES)

Yannick Glemarec (CIRED and Gold Standard)

Youba Sokona (South Centre)

Special Thanks

Special thanks go to the Governments of Denmark, the Netherlands, and Norway for their generous support.

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Key Messages

- **Interconnected Crises:** Biodiversity loss, land degradation, and climate change are deeply interlinked. Healthy ecosystems are essential for resilience, and goals of global conventions (such as CBD, UNCCD, UNFCCC) overlap significantly.

- **Mutual Benefits and Synergies:** Conserving biodiversity and restoring ecosystems helps stabilize the climate, while climate action supports ecosystem health. Quantified benefits of these synergies often outweigh costs, especially long-term.

- **Nature-based Solutions (NbS) as a Mutual Reinforcement of Multiple Goals:** NbS—including conservation, restoration, and ecosystem management—can deliver up to 37% of cost-effective CO_2 mitigation by 2030. Critical ecosystems like mangroves and peatlands offer major carbon storage and disaster protection services. Services like water supply, pollination, and climate regulation are vital for achieving the SDGs, though short-term trade-offs with poverty or growth goals may exist. Indigenous Peoples and local communities (IPLCs) manage high-carbon and biodiverse lands. They are key stakeholders in nature stewardship. Payment for Ecosystem Services (PES) programs align incentives for conservation with the potential to boost incomes and forest cover, based on evidence from successful case studies from different regions.

- **Economic Importance, and funding gaps:** Over 50% of global GDP depends on nature. Biodiversity loss causes economic and human health risks. Yet, harmful subsidies ($7 trillion/year) and externalities ($10–$25 trillion/year) far exceed conservation funding. There's a $700 billion annual shortfall for biodiversity and up to $359 billion for climate adaptation. Current funding is less than 1% of global GDP, while damaging subsidies dominate.

- **Policy levers to overcome barriers and accelerate action:** Fragmented governance and siloed financing hinder joint action. Integrated policies are urgently needed to align biodiversity and climate goals and financing, as well as to address trade-offs, and environmental injustice.

Executive Summary

The Rio Conventions are deeply intertwined, but siloed implementation leads to duplicate efforts and higher costs. Biodiversity and climate crises are intrinsically linked and mutually reinforcing. Global conventions like the Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification (UNCCD), and the UN Framework Convention on Climate Change (UNFCCC) address interconnected environmental issues with overlapping goals. Healthy ecosystems are essential for climate resilience, biodiversity, and land conservation. Biodiversity protection, land degradation prevention, and ecosystem restoration stabilize the climate, while climate action protects vital ecosystems.

The impacts of biodiversity decline, climate change, and ecosystem degradation negatively affect disproportionally vulnerable regions and communities. Global biodiversity loss is accelerating with severe socio-economic impacts. Recent reports show a 2–6% decline in biodiversity per decade over the past 30–50 years. Indirect drivers have intensified, compounding the effects of direct drivers. Loss of key ecosystems like coral reefs, one-third of species at high extinction risk and potential global collapse in 10–50 years, could impact 1 billion people. Air and water pollution caused around 9 million premature deaths in 2019, or 16% of global mortality. Case studies reveal direct degradation costs, such as a 581% increase in landslide risk in deforested Andean areas or massive losses in agricultural income and public health from the collapse of keystone species. Much of the global economy depends on nature and is thus vulnerable to degradation. In 2023, about $58 trillion—over half of global GDP—was generated by sectors moderately or highly dependent on nature. Over half of the world's population lives in areas severely affected by biodiversity loss, water scarcity, food insecurity, and health risks intensified by climate change.

Financial gaps in implementing the global Conventions remain. At the same time, economic decisions result in significant investment in activities harmful to climate and biodiversity—alignment of finances closing the financing gap for nature-positive action and cutting harmful subsidies and Investments. Current economic and financial decisions are misaligned and harmful to the environment, with vast external costs. Current biodiversity conservation financing is largely insufficient compared to needs and harmful subsidies. Global systems invest $7 trillion annually in activities that negatively affect biodiversity and the environment ($5.3 trillion/year from private financial flows, while public subsidies amount to about $1.7 trillion/year). Negative externalities from fossil fuels, agriculture, and fishing are estimated at $10–$25 trillion annually. Illegal resource extraction generates $100–$300 billion annually. Global biodiversity conservation funding is about $200 billion/year—less than 1% of global GDP. The biodiversity financing gap is $700 billion/year. Meeting SDGs related to water, food, health, and climate requires at least $4 trillion/year in additional investment. Inaction or delay in addressing biodiversity loss and climate adaptation significantly increases costs and risks. The cost of tackling biodiversity loss could double if action is delayed by a decade. The adaptation finance gap is estimated at $187–$359 billion/year. Climate risk exposure could double from 1.5°C to 2°C of warming—and double again from 2°C to 3°C—severely affecting multiple sectors.

A mutual reinforcement in the achievement of the Rio Convention goals is provided through Nature-based Solutions (NbS). Quantifying the negative impacts on nature and climate underscores the urgency of integrating Nature-based Solutions (NbS) into climate policies, such as conservation, restoration, and ecosystem management. NbS offer massive, cost-effective potential for climate mitigation and adaptation. NbS could provide 37% of the cost-effective CO_2 mitigation needed by 2030. Protecting natural ecosystems from conversion could mitigate 3.4 $GtCO_2e$ in 2030 and 4.6 $GtCO_2e$ by 2050. Restoring 350 million hectares of degraded land by 2030 could generate $9 trillion in ecosystem services. NbS may be more cost-effective than engineered alternatives, especially in lower-risk scenarios. Tropical forests store 200–300 Pg C, peatlands 550 Gt C, and mangrove conservation could prevent up to 15.51 $PgCO_2$ emissions. Protecting nature yields double and triple wins for climate, biodiversity, and people. Protecting 30% of land and oceans could safeguard 80% of species. The value of ecosystem services in high-biodiversity areas was 326% higher than the opportunity cost of conserving them. Restoring 30% of terrestrial and marine ecosystems could safeguard 500 Gt of carbon stocks and prevent 60% of projected extinctions. Southeast Asian mangrove conservation supports 15 million people through fisheries and storm protection, reducing poverty and disaster risks.

Ecosystem services are foundational for achieving Sustainable Development Goals (SDGs). Protecting and restoring ecosystem services advances climate resilience, poverty reduction, biodiversity, and human well-being. Pollination, essential for agriculture, is valued at $235–$577 billion/year globally. Forests provide 75% of accessible freshwater for cities and agriculture. Healthy soils boost crop yields by 20–30%. Coral reefs support 25% of marine species and generate $2.7 trillion/year in goods and services. Climate action positively interacts with health (SDG 3), energy (SDG 7), clean water (SDG 6), sustainable cities (SDG 11), and life on land (SDG 15). Ecosystem-based adaptation could directly support 62% of SDG targets.

The design and implementation of NbS should consider different contexts and approaches, such as Payment for Ecosystem Services and Indigenous Peoples and Local Communities Stewardship. Indigenous Peoples and Local Communities (IPLCs) are vital biodiversity stewards and key to climate mitigation and ecosystem service provision. Indigenous territories hold much of the world's remaining biodiversity and overlap with nearly 40% of protected and intact landscapes. In Brazil's Legal Amazon, Indigenous Territories cover 23% of the area but accounted for only 3% of deforestation from 2019–2023. Rainfall from these territories supports 80% of Brazil's agricultural activity, generating R$ 338 billion in 2021 (57% of the national total). Recognizing Indigenous land rights and integrating Indigenous and local knowledge are proven, cost-effective strategies for reducing deforestation and improving land management. Financial mechanisms like Payments for Ecosystem Services (PES) can align incentives and boost conservation and development. Programs like Costa Rica's PSA—which raised forest cover above 50% and sequestered 107 $MtCO_2$ by 2019—and the U.S. Conservation Reserve Program (CRP)—which reduced billions of tons of soil erosion and sequesters 49 $MtCO_2e$/year—show environmental and socio-economic benefits. China's Grain for Green, the world's most extensive PES program, restored over 34 million hectares. However, PES effectiveness depends on innovative design that considers climate impacts and includes scientific metrics. A lack of standardized metrics remains a challenge.

Synergies streamline monitoring, financing, and capacity-building, while simultaneously reducing transaction costs, optimizing resource use, and encouraging cross-sectoral policies. Policy levers are critical for breaking siloes, reducing trade-offs, and promoting social justice and equity. Despite synergies, institutional barriers and trade-offs require integrated strategies. Barriers include fragmented governance, competing agendas, and siloed funding, where climate finance dominates to the detriment of biodiversity. Trade-offs, especially short-term ones, exist when integrating climate action with poverty reduction and economic growth, potentially increasing poverty and reducing GDP temporarily. Top-down programs risk marginalizing small producers. Overcoming barriers demands integrated policy, cross-sector frameworks, blended and innovative finance, institutional reform, capacity building, and data harmonization.

Undeniable synergies and quantifiable benefits highlight the urgency of integrating conservation and climate strategies. Integrated action and strategic investment in nature are essential for a sustainable, resilient future. Global initiatives like the UN Decade on Ecosystem Restoration aim to restore 350 million hectares and advance nine SDGs. Investing $8.1 trillion in NbS by 2030 could create 395 million jobs. Nationally Determined Contributions (NDCs) increasingly include NbS. The Kunming-Montreal Global Biodiversity Framework (2022) aligns with climate goals. However, context-specific policies, SDG interlinkages, stronger regional cooperation, capacity-building, and technology transfer are crucial. Realizing the full potential of synergies requires moving beyond sectoral approaches to intertwine conservation, restoration, and climate action while addressing trade-offs and inequities.

Introduction

The Convention on Biological Diversity (CBD), the Convention to Combat to Desertification (UNCCD), and the United Nations Framework Convention on Climate Change UNFCCC are interlinked global frameworks addressing biodiversity loss, land degradation, and climate change, respectively. Their goals overlap significantly, as healthy ecosystems are critical for both climate resilience, biodiversity, and land conservation. The CBD goals include halting biodiversity loss, ensuring sustainable use of resources, and promoting equitable benefit-sharing (post-2020 Global Biodiversity Framework). The 30x30 Target encompasses protecting 30% of land/oceans by 2030. The UNCCD promotes practices that avoid, reduce and reverse land degradation in convergence with Sustainable Development Goal 15 (*Life on Land*) and Land Degradation Neutrality. The main goal of the UNFCCC, following the Paris Agreement, is to stabilize greenhouse gas concentrations to limit global warming well below 2°C in comparison to pre-industrial temperature (1.5°C target).

The three conventions are mutually reinforced. As protecting biodiversity, avoiding land degradation and restoring ecosystems stabilize the climate, and climate action safeguards ecosystems (e.g., forests, grasslands, wetlands, oceans), quantifying these impacts underscores the urgency of integrating Nature-based Solutions (NbS), that encompass nature conservation, restoration, and ecosystem management, into climate policies. Some examples of how nature conservation synergizes with climate action through significant carbon storage, cost-effective mitigation and adaptation, and biodiversity protection are presented in Box 1.

This report assessed studies quantifying the economic benefits of synergies between nature conservation and climate action. The economic benefits often outweigh the costs, especially when considering long-term and global benefits. However, upfront costs and local opportunity costs can be barriers. Quantification shows that synergies can lead to significant net positive outcomes.

Firstly, we will present the negative impacts of biodiversity loss based on recent reports of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and study cases in scientific literature. Later, we discuss the synergies between ecosystem services and Sustainable Development Goals and how strategic investments and policies that align incentives (e.g., payments for ecosystem services) can mitigate upfront costs and opportunity trade-offs. Quantitatively, these synergies present a compelling case for integrated biodiversity and climate policies.

BOX 1. Benefits from synergies between climate action and nature conservation and management.

1. Mitigation Potential and Adaptation

a. Forests: Tropical forests are critical repositories of global carbon; living tropical trees are estimated to hold 200–300 Pg C or about one-third of the levels in the atmosphere (Mitchard, 2018).

b. Peatlands: Covering 3% of land, peatlands store 550 Gt carbon globally, with degraded peatlands being responsible for 5% of global CO_2 emissions (IUCN, 2021).

c. Blue Carbon Ecosystems: Blue carbon in mangroves represents one of highest values of carbon stocks per hectare. Conserving remaining mangroves would avoid the release of up to 15.51 $PgCO_2$ to the atmosphere. Restoring mangroves can sequester up to 0.32 $PgCO_2$ globally (Jakovac et al., 2020).

d. Disaster Risk Reduction: Mangroves prevent $65 billion/year in flood damage (Menéndez et al., 2020).

e. Water Security: Forest conservation improves water quality and water security, reducing treatment cost (Caldwell et al., 2023).

2. Avoided Emissions from Conservation and Biodiversity protection

a. The total mitigation potential of options to protect natural ecosystems from conversion is fairly consistent, with a range from 3.4 $GtCO_2e$ in 2030 to 4.6 $GtCO_2e$ in 2050 (UNEP, 2021).

b. Protected areas currently store 15% of terrestrial carbon (Walker et al., 2022).

c. Biodiversity: Protecting 30% of land/ocean could safeguard 80% of species (Dinerstein et al., 2019).

3. Economic Valuation

a. NbS could deliver 37% of cost-effective CO2 mitigation needed by 2030 (Griscom et al., 2017).

b. Restoring 350 million hectares of degraded land by 2030 could generate $9 trillion in ecosystem services (Edrisi et al., 2022).

c. NbS can be more cost-effective than engineered alternatives, at least when it comes to less extreme hazard scenarios (Collentine & Futter, 2018).

d. The value of ecosystem services provided in areas of high biodiversity was more than three times (326%) the estimated opportunity cost of conserving those lands (Turner et al., 2012).

Decline of Biodiversity and Its Impacts

The recently released Thematic Assessment Report on the Interlinkages among Biodiversity, Water, Food and Health of the IPBES (IPBES, 2024), indicated the over the past 30 to 50 years, all evaluated indicators point to a biodiversity decline of 2% to 6% per decade. Since 2001, ten out of twelve key indirect drivers of biodiversity loss have intensified, amplifying the impacts of direct drivers.

About one-third of reef-building coral species are at high risk of extinction, and coral reefs could disappear globally within the next 10 to 50 years (Lyu et al. 2022). These losses would impact around 1 billion people living within 100 km of a reef (*circa* 13% of the global population) (Wong et al. 2022). Air and water pollution caused approximately 9 million premature deaths in 2019 (Fuller et al. 2022), accounting for 16% of all deaths worldwide.

The IPBES report (IPBES, 2024) highlights the misalignment of economic and financial decisions that harm biodiversity and consequently, climate integrity as biodiversity loss and climate change reinforce each other, reducing ecosystem resilience and affecting all interconnected elements. Current economic and financial systems invest $7 trillion annually in activities harmful to biodiversity and other environmental elements (UNEP, 2023). The negative externalities from fossil fuel, agriculture, and fishing industries are estimated at between $10 trillion and $25 trillion per year (IPBES, 2024). Private financial flows directly harmful to biodiversity are estimated at $5.3 trillion annually, while public subsidies for such activities amount to approximately $1.7 trillion per year. Illegal resource extraction activities generate between $100 billion and $300 billion annually (IPBES, 2024).

On the other hand, in 2023, approximately $58 trillion in economic activity, more than half of global GDP, was generated in sectors moderately or highly dependent on nature, more than half of the world's population lives in areas severely impacted by biodiversity loss, water scarcity, food insecurity, and health risks exacerbated by climate change (Evison et al. 2023).

Funding for biodiversity conservation represents significantly less than 1% of global GDP, totaling about $200 billion per year. The biodiversity finance gap – estimated at $ 700 billion per year – represents the shortfall in financial resources required to effectively protect and restore nature. Additionally, the extra investment required to achieve the Sustainable Development Goals (SDGs) most directly related to water, food, health, and climate change is at least $4 trillion annually (IPBES, 2024). However, the cost of addressing biodiversity loss could double if action is delayed by a decade (e.g., from 2021 to 2030). Additionally, the adaptation finance gap is estimated at $187-$359 billion per year (UNEP, 2024). Exposure to climate change risks could double between a global warming level of 1.5°C and 2°C and double again between 2°C and 3°C, severely impacting multiple sectors.

Four case studies, in different regions, are presented in Box 2 exemplifying the economic costs of the impacts of ecosystem degradation and biodiversity decline.

BOX 2. Case studies associating economic costs with ecosystem degradation and biodiversity decline.

- **Colombian Andes:** Landslides are 581% more likely to occur in deforested areas causing hundreds of dollars in damage to infrastructure and dozens of casualties yearly. Restoring forests proved to be 16 times more cost-effective in preventing and buffering the damage of new landslides on infrastructure (Grima et al., 2020).
- **India:** The collapse of vulture populations led to an increase of more than 4% in human mortality rates from all causes, implying approximately 104,386 additional deaths per year, resulting in estimated mortality damages of $69.4 billion per year (E. Frank & Sudarshan, 2024).
- **U.S.:** In counties affected by White-Nose Syndrome in bats, crop revenue declined by $7,960 per square kilometer, a decrease of 28.9%, and there were 1,334 additional infant deaths valued at $12.4 billion, totaling combined damages of $39.4 billion, or $1,932.20 per capita (E. G. Frank, 2024).
- **Netherlands:** A 2020 study estimated that at least 36% (€510 billion) of the financial investments held by Dutch institutions were highly or very highly dependent on one or more ecosystem services (Dasgupta, 2021).

Protecting up to 30% of terrestrial, freshwater, and marine areas, as agreed by the parties of CBD, could generate significant environmental and social benefits, provided they are effectively managed for both nature and people. Increasing this protection beyond 30% would bring additional benefits for biodiversity but could create trade-offs for food production.

Quantifiable synergies (e.g., carbon storage in biodiverse habitats) highlight the need for integrated policies, financing, and monitoring. Aligning the post-2020 biodiversity framework with the National Determined Contributions (NDCs) and ensuring Indigenous inclusion are critical to maximizing co-benefits. For example, Colombia, a megadiverse country, integrated its NDCs and biodiversity targets, pledging to reduce deforestation by 50% by 2025 (avoiding 10 Mt CO_2/year) and protect 30% of land/oceans and European Union in its Biodiversity Strategy 2030 links habitat restoration to climate goals (e.g., planting 3 billion trees to sequester carbon).

The role of fauna in sustaining forests, and thus preserving vital carbon sinks, is also significant and should not be overlooked. A study in the southern Amazon demonstrated that tapirs play a key role in facilitating the regeneration of degraded forests (Paolucci et al., 2019). Similarly, research conducted in a 30-hectare forest plot in Thailand found that tree species reliant on seed dispersal by large frugivores account for nearly one-third of the total carbon biomass. The decline or loss of these animals could result in a 2.4 to 3.0% reduction in stored carbon (Chanthorn et al., 2019).

Synergies Between Ecosystem Services and the Sustainable Development Goals (SDGs)

Ecosystem services (ES), the benefits humans derive from nature, are foundational to achieving the SDGs. Protecting and restoring these services can simultaneously advance climate resilience, poverty reduction, biodiversity, and human well-being. Table 1 presents a synthesis of key synergies, supported by quantitative and qualitative evidence while Table 2 shows cross-cutting co-benefits and quantitative synergies.

TABLE 1. Direct Contributions of Ecosystem Services to SDGs.

Ecosystem Service	Linked SDGs	Key Synergies
Provisioning Services (e.g., food, water, raw materials)	SDG 2 (Zero Hunger), SDG 6 (Clean Water), SDG 7 (Affordable Energy)	• Agriculture depends on pollination (valued at $235–577 billion/year globally) (IPBES, 2016). • Forests supply 75% of accessible freshwater for cities and agriculture (UN, 2021).
Regulating Services (e.g., climate regulation, flood control)	SDG 13 (Climate Action), SDG 3 (Good Health), SDG 11 (Sustainable Cities)	• Coastal wetlands avert $65 billion/year in flood damages (Herrera-Silveira, 2020). • Forests sequester ~30% of annual CO_2 emissions (Harris et al., 2021). • Peatlands sequester ~0.4 billion tons of CO_2 annually (Joosten, 2010).
Supporting Services (e.g., soil fertility, nutrient cycling)	SDG 15 (Life on Land), SDG 12 (Responsible Consumption)	• Healthy soils boost crop yields by 20–30% (FAO, 2022), critical for food security (SDG 2).
Cultural Services (e.g., recreation, spiritual value)	SDG 4 (Quality Education), SDG 8 (Decent Work)	• Nature-based tourism generates $343 billion/year globally, providing 21.8 million jobs and supporting education (WTTC, 2022). • Payments for ecosystem services have mobilized up to $42 billion per year from public and private sources (IPBES, 2024).

TABLE 2. Cross-cutting co-benefits of Sustainable Development Goals (SGDs) and quantitative evidence of synergies.

SDGs	Cross-cutting co-benefits
Climate Action (SDG 13) & Biodiversity (SDG 15)	Restoring 30% of terrestrial and marine ecosystems could safeguard 500 Gt CO_2 in carbon stocks and prevent 60% of projected species extinctions (Strassburg et al., 2020).
Poverty Reduction (SDG 1) & Health (SDG 3)	Mangrove conservation in Southeast Asia supports 15 million people with fisheries and storm protection, reducing poverty and disaster risks (Spalding et al. 2021). 56 - 57% of the global ecosystem service value (ESV) that benefits the world's poorest people originates from areas identified as high priorities for biodiversity conservation (Turner et al., 2012). More than 60 thousand species of plants, animals, fungi, and microbes are used to produce medicines (Landrigan et al., 2024).
Water Security (SDG 6) & Gender Equality (SDG 5)	Women in rural areas spend 200 million hours/day collecting water; restoring watersheds reduces this burden (UN Woman, 2023).
	Quantitative Evidence of Synergies
SDG 2 (Zero Hunger)	Conservation agriculture results in an average 21% increase in soil health and supports similar levels of crop production after long-term warming compared to conventional agriculture (Teng et al., 2024).
SDG 7 (Clean Energy)	Sustainably managed forests provide 40% of global renewable energy (biomass), reducing reliance on fossil fuels (FAO, 2018).
SDG 14 (Life Below Water)	Coral reefs support 25% of marine species and provide $2.7 trillion/year in goods/services (Souter et al., 2021).

Climate Action and Sustainable Development Metrics

Studies conducted across global, regional, and national settings report that climate action (SDG 13) affects sustainable development in measurable ways (Barbier and Burgess, 2022). Several papers state climate action, health (SDG 3) and energy (SDG 7) interact positively—with strong evidence linking improved health outcomes and increased renewable energy investments to reduced health care costs and better energy performance (Fujimori et al., 2020). Positive interactions are also noted between climate action, clean water (SDG 6), sustainable cities (SDG 11), and life on land (SDG 15). These interactions yield moderate benefits such as enhanced water-use efficiency and increased forest value through carbon pricing (Fujimori et al., 2020).

Conversely, studies highlight notable trade-offs (Campagnolo & Davide, 2019). Evidence shows that integrating climate action with poverty reduction (SDG 1), hunger alleviation (SDG 2), and economic growth (SDG 8) can result in adverse short-term effects, including increases in poverty rates (up to +4.2%) and declines in GDP (as much as –0.034%), with mixed findings for reduced inequalities (SDG 10) and land use (SDG 15) (Campagnolo & Davide, 2019). Economic metrics vary widely; for instance, GDP impacts range from –0.034% to +12,737% per capita and shifts in energy prices and health-related costs follow regional and policy-specific patterns (Barbier & Burgess, 2021).

Key areas of investment are renewable energy infrastructure, energy efficiency measures, climate-smart agriculture, research and development, and capacity building (Liu et al, 2020). In developed economies, climate action aligns with technological innovation despite challenges in transitioning to carbon-intensive industries, while developing economies face steeper short-term economic impacts but benefit from opportunities to leapfrog to cleaner technologies (Campagnolo & Davide, 2019).

Climate Change Mitigation and Biodiversity

Recent research highlights the potential for synergies between biodiversity conservation and climate action. Nature-based solutions play a key role in addressing both crises simultaneously (FANC, 2023). Implementing climate mitigation strategies with biodiversity considerations can lead to “win-win” outcomes, such as increasing offshore wind capacity and rehabilitating natural areas around onshore turbines (Gorman et al., 2023). The contribution of nature to climate change mitigation can strengthen links between international biodiversity and climate agreements (De Lamo et al., 2020). One promising approach is utilizing biomass from protected areas for bioenergy production. For instance, non-forest ecosystems in Natura 2000 could produce 17.9 Tg of dry biomass annually, potentially avoiding 12.5 Tg of CO_2 equivalent emissions and 1.2-2.8 million ha of indirect land-use change (Van Meerbeek et al., 2016). These synergies offer opportunities to address both biodiversity loss and climate change effectively.

While synergies dominate, mismanagement can create conflicts. For example, misaligned incentives and conflicting priorities such overexploitation of forests for bioenergy and large-scale afforestation with monocultures (e.g., eucalyptus) may harm biodiversity. Integrated policies (e.g., REDD+, "climate-smart conservation") can protect biodiverse carbon sinks like old-growth forests.

Climate Change Adaptation, Biodiversity, and SDGs

Unlike climate mitigation, which primarily yields global benefits through the reduction of greenhouse gas net emissions, climate adaptation demands localized responses. Effective adaptation requires local strategies tailored to specific social, ecological, and climatic contexts. In this sense, the participation of local communities and Indigenous Peoples is essential, as their traditional knowledge and active engagement are crucial for the sustainable management of ecosystems and long-term resilience.

The global application of an analytical framework has demonstrated that climate change poses a profound threat to the achievement of the 2030 Agenda. Out of the 169 Sustainable Development Goal (SDG) targets, 86% may be adversely affected by acute climate hazards, and 37% are more likely to be undermined than supported by slow-onset climate impacts (Fuldauer et al., 2022). The threat is particularly severe in the most vulnerable countries, where rapid adaptation in sectors such as wetlands, agriculture, infrastructure, and housing is critical to safeguard up to 68% of SDG targets by 2030 (Fuldauer et al., 2022).

Despite these risks, adaptation also offers significant opportunities to protect and advance progress toward the SDGs. Ecosystem-based adaptation can directly contribute to safeguarding 62% of targets (Fuldauer et al., 2022). Adaptation in essential public infrastructure could help protect up to 81%, while interventions in primary and secondary economic sectors support 40% of the targets (Fuldauer et al., 2022). Importantly, 21% of climate-sensitive targets require integrated actions across both ecological and socioeconomic domains, reinforcing the need for cross-sectoral approaches (Fuldauer et al., 2022).

Healthy ecosystems, through services such as pollination, water purification, flood control, and pest regulation, are foundational to human well-being and directly support 24% of all SDG targets (Fuldauer et al., 2022). Restoring forests, wetlands, and freshwater systems strengthens resilience in both ecological and human communities (IPCC 2022). However, the effectiveness of Ecosystem-based Adaptation (EbA) declines as global warming intensifies, underscoring the urgency of timely implementation (IPCC 2022).

Furthermore, the intersection between climate adaptation and gender equality (SDG 5) is increasingly recognized. A literature review of adaptation efforts found that while some climate adaptation actions yield mixed outcomes, those explicitly designed to promote gender equity, however, show consistently positive results and synergies with other nine SDGs targets (Roy et al. 2022). Yet, the current SDG 5 target framework may not fully capture the multidimensional and cross-cutting nature of gender-related impacts (Roy et al. 2022). An expanded framework (SDG 5+), encompassing 29 gender-relevant targets across 11 additional SDGs, has been proposed to better assess adaptation outcomes in this domain (Roy et al. 2022).

Payment for Ecosystem Services (PES): Regional Models, Multifaceted Benefits, and Challenges

Payment for Ecosystem Services (PES) programs have emerged as pivotal tools to align environmental conservation with economic incentives, addressing climate change, biodiversity loss, and sustainable development goals (SDGs) by providing financial incentives for landholders to implement good land management practices (Capodaglio & Callegari, 2018). Despite the potential of PES for multiple objectives, its effectiveness varies across contexts. A systematic review of the effect of programs on environmental and socioeconomic outcomes covered 18 programs from 12 countries in Latin America and the Caribbean, East Asia and Pacific, South Asia and Sub-Saharan Africa finding that PES may increase household income, reduce deforestation and improve forest cover. However, the quality of the evidence is low and very low and from a small number of programs (Snilsveit et al., 2019). Incorporating ecosystem services-based baselines and spatial targeting can enhance PES effectiveness in addressing regional development challenges (Ding et al., 2019). Also, climate change impacts should be considered when designing PES arrangements, as they affect ecosystem service provision (Ocampo-Melgar et al., 2024). Key factors influencing PES additionality include spatial targeting, payment differentiation, and strong conditionality (Ezzine-de-Blas et al., 2016).

Experts recommend integrating scientific knowledge and methods into PES design and implementation, emphasizing the need for guidelines to ensure effectiveness and scalability (Naeem et al., 2015). Schemes vary widely across regions, reflecting local ecological priorities, governance structures, and socioeconomic contexts. To evaluate quantifiable impacts on climate resilience, biodiversity conservation, and socioeconomic development, we present some cases in Latin America, North America, and Asia.

A. LATIN AMERICA: COSTA RICA'S NATIONAL PES PROGRAM AND CHILE'S CLIMATE-ADAPTIVE APPROACH

Costa Rica's PES Program (*Pagos por Servicios Ambientales* – PSA, (ONF, 2024) was launched in 1997 and is one of the earliest and most comprehensive national PES initiatives. It explicitly recognizes four ecosystem services: carbon sequestration, biodiversity protection, hydrological regulation, and scenic beauty. The program has increased forest cover from 21% in 1987 to over 50% by 2020, sequestering 107 million tons of CO_2 by 2019 (Salazar et al. 2021). Landowners receive direct payments when adopting sustainable land-use and forest-management techniques. The program is funded through Costa Rica's fuel tax and water charge, as well as its own initiatives, such as Certificates of Conservation of Biodiversity, carbon credits, and strategic alliances with the public and private sector. Between 1997 and 2019, more than 18,000 families have benefited from the program, with an investment of USD 524 million in the PES projects and more than 1.3 million hectares under PES contracts (UNFCCC, 2021).

In Chile's Altos de Cantillana Reserve region containing the only Mediterranean forests of South America, PES faces challenges from climate uncertainty, such as prolonged droughts impacting water-related ecosystem services. One study proposes bundling services (e.g., carbon sinks, habitat provision) and linking payments to climate risk assessments (Ocampo-Melgar et al., 2024). Adaptive payment models could adjust compensation based on projected changes in water availability or biodiversity resilience if institutional flexibility allows to address climate-driven uncertainties, a gap in traditional PES frameworks.

B. NORTH AMERICA: MARKET-DRIVEN AND REGULATORY MODELS - UNITED STATES' CONSERVATION RESERVE PROGRAM (CRP) AND SALT LAKE CITY'S WATERSHED MANAGEMENT

The CRP, established in 1985, is administered by the Farm Service Agency (FSA). It is a voluntary program that encourages agricultural producers and landowners to convert highly erodible and other environmentally sensitive land to vegetative cover, such as native grasses, trees, and riparian buffers. By 2020, it reduced erosion of more than 9 billion tons of soil, sequestered 49 million metric tons of CO_2 equivalent yearly (FSA, 2020). Biodiversity benefits include habitat restoration for pollinators and migratory birds, while generating economic payouts for farmers. Biodiversity benefits include habitat restoration for pollinators and migratory birds, while generating economic payouts to farmers.

The Salt Lake City's Watershed Management is hybrid model (Salt Lake City, 2025) that combines public funding with regulatory mechanisms, preserving 75% of its watershed through land purchases and conservation easements. This strategy provides more than half of the drinking water that 360,000 people depend on every day while supporting recreational tourism, illustrating how PES can integrate ecological and economic priorities.

C. ASIA: CHINA'S GRAIN FOR GREEN PROGRAM

China's Sloping Land Conversion Program (SLCP), initiated in 1999, is the world's largest payments for ecosystem services (PES) scheme (He and Sikor, 2019). It uses public funds to convert marginal cropland located in upper watersheds into forests, engaging millions of mountain-dwelling households in the process (He, 2014). The SLCP has restored over 34 million hectares of land as of 2020 (Deng et al., 2023). Li et al. (2021) concluded that the effect of the SLCP on sample rural households' total income per capita, including the SLCP subsidy, is not significant from 1999 to 2014, achieving the short-term economic objective of the SLCP because total income per capita does not decline when part of the cropland is withdrawn from production.

The Role of Indigenous Peoples and Local Communities Territories

Extensive scientific evidence highlights the vital role of Indigenous Peoples and local communities in safeguarding global biodiversity while ensuring ecosystem services and mitigating climate change. Indigenous territories host a significant share of the world's remaining biodiversity and overlap with nearly 40% of all protected terrestrial areas and ecologically intact landscapes (Garnett et al., 2018; Nitah, 2021). In regions such as Latin America and the Caribbean, studies show that when Indigenous peoples have secure land rights, their territories store more carbon, maintain denser forests, and support greater biodiversity compared to lands managed by other actors (FAO & FILAC, 2021).

In Brazil's Legal Amazon, Indigenous Territories (ITs) cover around 23% of the region and act as critical barriers to deforestation, accounting for only 3% of deforestation between 2019 and 2023 (Mattos et al., 2024). This effectiveness is directly linked to Indigenous land management practices, which are deeply integrated with ecosystem processes and promote species and ecosystem diversity. Despite the critical role of Indigenous Territories (ITs) in protecting forests and biodiversity, this contribution is not reflected in socioeconomic development. A study by Den Braber et al. (2024) shows that although Indigenous communities in the Brazilian Legal Amazon actively contribute to reducing deforestation, they experience lower income, sanitation and education levels, with higher rates of inequality compared to medium and large landholders in the same region. A technical report (Mattos et al., 2024) revealed the critical link between the Amazon's Indigenous Territories and Brazil's agricultural success. The study found that rainfall from these Indigenous Territories supplies 80% of the country's agricultural activity, generating a staggering R$338 billion in 2021 – 57% of the national total. The conclusion is that the impact of protecting Amazonian Indigenous Territories extends beyond environmental benefits, playing a vital role in ensuring Brazil's water security, food security, and economic stability.

Another study by Fonseca & Bustamante (2025), conducted in the Cerrado-Amazon transition zone, highlights the critical role of Indigenous Territories (ITs) in maintaining key ecosystem services related to water provision, water quality, and climate regulation. The research found a strong spatial correlation between ITs and areas of high groundwater recharge, sediment retention, carbon storage, and habitat quality across the four river basins analyzed.

Recognizing Indigenous territorial rights and integrating Indigenous and Local Knowledge (see Box 3, as an example of traditional strategies) into conservation strategies are proven, cost-effective approaches for reducing deforestation and enhancing land stewardship, both essential for meeting global biodiversity and climate goals.

BOX 3. The Satoyama Initiative

The Satoyama Landscape refers to a traditional Japanese rural environment characterized by a mosaic of managed ecosystems, including secondary forests (like oak, pine, and bamboo groves), grasslands, rice paddies, orchards, irrigation ponds, and villages (NCB, 2009). These landscapes have been shaped over centuries by local communities through sustainable agricultural and forestry practices. This long-term human-nature interaction has created diverse habitats that support a wide range of plant and animal species, many of them threatened. The active management of Satoyama is crucial for maintaining biodiversity, as it allows ecological and agricultural systems to coexist. Beyond its ecological importance, Satoyama holds deep emotional and cultural value for the Japanese people and continues to inspire traditional practices and cultural expressions.

These complex landscapes inspired the Satoyama Initiative, which spreads a vision for sustainable rural societies living in harmony with nature. Its main goal is to gather and share data about traditionally sustainable managed lands around the world and to promote a land and resource management approach that balances the dual needs of biodiversity conservation and sustainable use.

Implementing Synergies Between the Rio Conventions: Overcoming Barriers and Balancing Trade-offs

The Rio Conventions, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), and the United Nations Convention to Combat Desertification (UNCCD), were established to address interconnected planetary crises and share a common foundation: land and ecosystems. So, coordinated action can amplify benefits (Aleksandrova et al., 2024). In previous sections, synergies among their goals and opportunities for joint implementation were explored. Still, it is also crucial to identify key barriers and evaluate trade-offs inherent in integrated approaches.

Some barriers include fragmented governance and competing agendas as each convention operates with distinct mandates, funding streams, and reporting frameworks. Ministries and governance levels working in isolation exacerbate the fragmentation. Funding competition and misaligned incentives are also factors of concern as financial flows remain siloed, with climate finance dominating global agendas (Petorelli et al., 2021). In addition, monitoring and accountability gaps remain challenging. Two examples from the previous section exemplify this point. Costa Rica's PES program uses forest cover as a proxy for biodiversity, while Chile's adaptive models incorporate climate risk projections, highlighting the need for standardized metrics.

Strategies to overcome barriers and trade-offs, should be developed covering different aspects such as policy integration and cross-sectoral frameworks, financial mechanisms for blended action and innovative financing, institutional reforms, capacity building, and technology and data harmonization (regarding this topic, see previous report of The Expert Group on Climate and SDG Synergy advocating for standardized indicators to track cross-convention progress).

Trade-offs also include equity considerations when short-term costs are compared to long-term gains (for example, costs associated with land restoration against long-term savings). Top-down programs risk marginalizing smallholders demanding the establishment of safeguards and inclusive design for benefit distribution (Aleksandrova et al., 2024).

Realizing the full potential of synergies demands moving beyond a sectoral approach and embracing strategies to interweave nature conservation and restoration, as well as climate action, while addressing trade-offs and inequities.

Recommendations

To prioritize the protection of the undeniable synergies between nature conservation and climate action in policy frameworks (e.g., national climate plans, SDG localization) is critical to avoid siloed approaches and maximize synergies. Quantifiable benefits, from gigatons of carbon sequestered and increased resilience to disasters to billions in economic savings, highlight the urgency of integrating these strategies. Biodiversity and related ecosystem services are vital for achieving the SDGs, offering cost-effective, multi-dimensional benefits.

To align finances to close the financing gap for nature and climate-positive actions and to cut harmful subsidies and investments is fundamental to support synergies and streamline monitoring, financing, and capacity-building, reducing transaction costs, optimizing resource use, and encouraging cross-sectoral policies. Governments provide approximately $500 billion per year in direct subsidies that harm biodiversity. When including environmental externalities, the total cost of such subsidies rises to $4 to $6 trillion annually. In contrast, domestic public finance for biodiversity conservation and sustainable use amounts to only $68 billion per year, while total biodiversity-related finance flows (public and private) range between $78 billion and $143 billion annually, equivalent to about 0.1% of global nominal GDP in 2019 (Dasgupta, 2021).

To leverage synergistic efforts, global policies and initiatives can play a critical role. The UN Decade on Ecosystem Restoration (2021–2030) aims to restore 350 million hectares of degraded land, boosting progress on nine SDGs (FAO, 2020). Investing $8.1 trillion in NbS by 2030 could create 395 million jobs while addressing climate and biodiversity crises (IPBES, 2024). National Determined Contributions (NDCs) under the UNFCCC increasingly include NbS (e.g., Costa Rica's pledge to restore 1 million hectares of forest). The Kunming-Montreal Global Biodiversity Framework (2022) aligns with climate goals by targeting ecosystem restoration and sustainable land use, and Joint Funding Mechanisms implemented by the Global Environment Facility (GEF) funds projects that address both climate and biodiversity (e.g., Congo Basin Forest protection).

To maximize synergies and minimize trade-offs, emerging themes across regions point out the importance of context-specific policy design for integrated approaches that consider interactions between different SDGs, the potential for regional cooperation and knowledge sharing to enhance effectiveness, and the critical role of capacity building and technology transfer in enabling global progress.

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About the Expert Group on Climate and SDG Synergy

CO-CONVENED BY

United Nations | Department of Economic and Social Affairs

United Nations Framework Convention on Climate Change

This report is part of the *Synergy Solutions 2025* series, comprising three Thematic Reports and will contribute to the final Synthesis Report, which will be launched in September 2025. Together, this constitutes the 2025 edition of the Global Report led by the Expert Group on Climate and SDG Synergy.

The Expert Group was co-convened by the United Nations Department of Economic and Social Affairs (UNDESA) and the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in May 2023, and has evolved from an original composition of 14 experts to its current collaboration between 17 renowned experts from diverse thematic and geographic backgrounds. The Group provides up-to-date analysis and recommendations on how to tackle climate and SDG action in synergy, based on scientific evidence and innovative approaches. Its experts are composed as follows:

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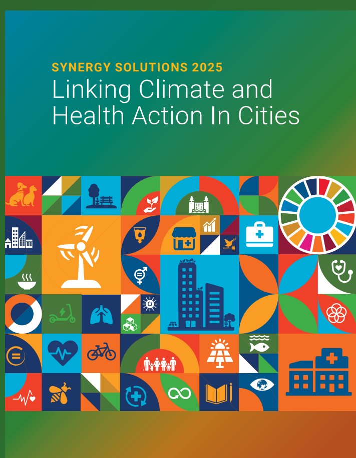

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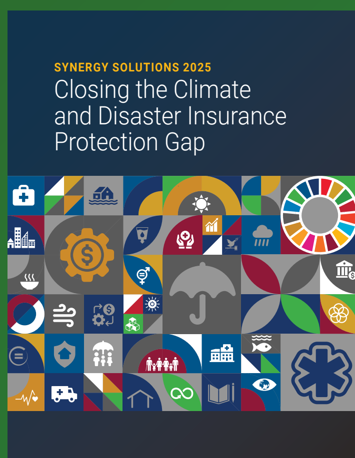

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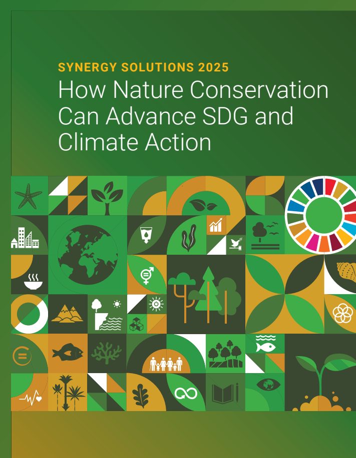

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