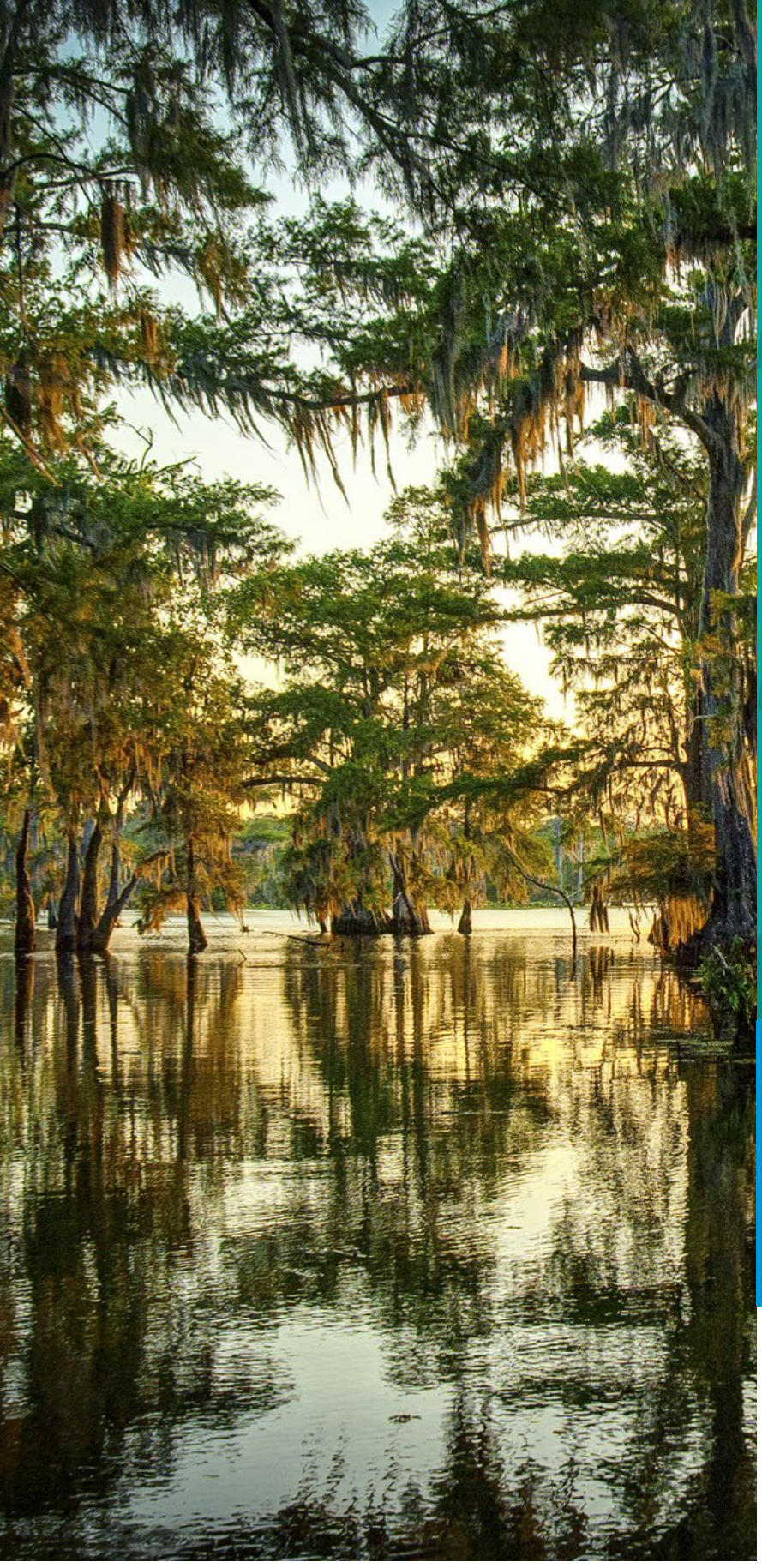


25

FINANCING NATURE

The Unabated Biodiversity Finance Crisis

PAULSON INSTITUTE

INTERIM REPORT

Table of **Contents**

FOREWORD

HENRY M. PAULSON JR.
Chairman, Paulson Institute

> ***"The natural world in which we live is nothing short of entrancing—wondrous. … Nor can I believe any of us really want a planet which is a lonely wasteland."***
>
> —Tom Lovejoy, the "Godfather of Biodiversity"

Five years ago, I warned that we were sleepwalking toward a crisis by undervaluing nature and, in the process, undermining the ecological stability of our planet and threatening our safety, health, and economy. Now, the crisis is worsening, and despite growing awareness of this existential threat, we find ourselves half awake and dangerously near a precipice.

The threat in numbers

Since the original *Financing Nature* report in 2020, biodiversity continues to disappear at an alarming pace. An analysis by PwC found that over half of global GDP, equivalent to an estimated US $58 trillion, is moderately or highly dependent on nature.[1]

Around the world, we see that 48 percent of species are declining, largely due to habitat loss.[2] The populations of vertebrates have fallen by an average of 73 percent since 1970.[3] If we stay on this trajectory, we face losing up to half of all species by the middle of the 21st century. In the Amazon, we are nearing the tipping point where hydrological changes caused by deforestation may permanently dry out millions of acres of rainforest and alter the entire Amazon climate, resulting in staggering economic costs. And in North America, the richest continent in the world, we've lost over half of our grasslands—the most imperiled ecosystem.[4]

Nature's degradation poses a significant threat to the economy, from sectors ranging from agriculture to tourism to health. Losing pollinators like bees, butterflies, and other insects could cause crop failures conservatively worth more than US$215 billion. When mangroves are destroyed, coastal communities lose natural protection, making storms and flooding more damaging and costly. According to experts, without mangroves, 39 percent more people would experience flooding annually, affecting around 18 million more people globally. And annual property damages would rise by US$82 billion.[5]

Even with these sobering numbers, the real costs of biodiversity loss are difficult to quantify, but we know the systemic risks extend far beyond the measurable. Indeed, what is the risk to humanity if we throw the global ecosystem or Mother Nature out of balance?

Climate and nature are inseparable

Biodiversity loss is, in some ways, more alarming than climate change because it is moving so quickly. There have been multitudes of studies done on the impact of climate change, but we know significantly less about the science of biodiversity loss and its impact.

A troubling trend is also emerging: climate policy that unintentionally accelerates biodiversity loss. Climate change demands urgent action, but not at nature's expense.

For example, renewable energy, solar and wind, is critically important, but it must be deployed wisely. Solar, with its dramatic reduction in cost, is a game-changer. But solar farms do immense ecological damage when poorly sited, destroying millions of acres of native prairies and forests. In the US, the push for solar in Virginia alone could lead to the deforestation of nearly 30,000 acres annually.

Over the next decade, trillions of dollars' worth of infrastructure will be built to support people and create jobs around the world; planners should be doing much more to mitigate needless harm to biodiversity.

Windfarm placement is another critical issue. The great turbines, particularly if placed in migratory corridors, present a significant threat to birds and bats, our small but mighty pollinators. With the expansion of wind farms, bird deaths from collisions could reach up to five million in the United States alone by 2030 if simple solutions are not deployed, such as shutting down plants for brief periods based on weather conditions during migration season.[6] In fact, simply painting one of the turbine blades in a red-band color could reduce collisions by 80 percent.[7]

Over the next decade, trillions of dollars' worth of infrastructure will be built to support people and create jobs around the world; planners should be doing much more to mitigate needless harm to biodiversity.

Value nature correctly. Fix the incentives.

Policymakers, especially those in finance ministries and treasuries, should attempt to estimate the real value of nature and the costs of destroying it. We recognize that this is charting new territory. While the costs cannot be precisely calculated, treating nature's economic value as zero is tantamount to considering it as a "free good." This sustains a huge flaw in the global financial system.

In just one month, governments spend more on subsidies harmful to nature than they spend on biodiversity protection in an entire year. Restructuring agriculture subsidies for farms, fisheries, and forestries to incentivize production while mitigating damage to biodiversity is essential if we are to halt biodiversity loss.

We will need fossil fuels for decades. But energy policies should be reformed to reduce carbon intensity to promote environmentally friendly practices when drilling for fossil fuels or mining for minerals including rare earths.

Nature loss threatens supply chains, food systems, public health and safety, and environmental security and stability. It accelerates the risk of famine resulting in massive increases in migration and social unrest, which pose huge hardships to humanity. Political leaders must recognize that protecting our ecosystem is a strategic investment in global stability.

Nature pays—if we give it a chance.

Nature-based solutions can serve as powerful economic multipliers, driving growth—particularly in countries where biodiversity is a great asset. By investing in nature, we protect vital ecosystems, generate employment, strengthen local economies, and advance sustainable development.

The world is overheating, and we will not come close to meeting the 1.5˚C target. This will bring increasingly intense weather shocks, imposing significant costs across the globe. Nature-based solutions offer a cost-effective way to strengthen resilience while delivering environmental and economic benefits.

Preserving natural wetlands provides a vital buffer against storm surges and flooding, while restored mangroves not only absorb floodwaters but also help filter and transform them into potable water. On land, well-managed wildfire prevention programs reduce the risk of catastrophic fires, protect habitats, and safeguard the species that depend on them. By preserving native vegetation and curbing invasive species, these measures enable ecosystems to recover and thrive—creating healthy, biodiverse landscapes that are more resilient to future fire threats.

In agriculture, farms that integrate natural habitats deliver 30 percent higher yields during droughts and reduce pesticide costs by 40 percent—a crucial advantage for a sector already under severe pressure. Research has also implied a value for forests in their role as carbon sinks alone of more than US$100 trillion.

Too often, policymakers blame budget constraints for their failure to address these issues. But in many cases, the issues are not budget problems; they're policy mistakes. When we recognize the value of nature, we make better policies.

Support communities and people.

Well-designed policies can unlock significant opportunities—especially in biodiversity-rich regions—through sectors such as sustainable tourism, enabling communities to benefit directly from preserving the natural wealth around them.

The protection of the most biodiversity-rich places on Earth, particularly in tropical and other emerging economies, can only effectively be done by creating jobs and income for locals and those living in buffer areas, who are often indigenous peoples.

Many conservation NGOs have programs and the knowledge to do just that, but success will require political will and much-needed capital. This report provides an array of financing mechanisms that may be of use.

We have the tools to close the financing gap. Government action is essential.

The biodiversity financing gap—originally estimated by the Paulson Institute's 2020 *Financing Nature* report at US$711 billion per year—is now projected to be US$942 billion per year[8], roughly equivalent to the annual GDP of Switzerland.

The good news is that over the last five years, great progress has been made in developing innovative green finance mechanisms for financing biodiversity conservation and restoration. NGOs and local governments have made progress in testing policies and programs, and we are learning what works. We have the tools, but governments have not taken action to implement them.

Governments everywhere should make sure management of climate and biodiversity risks is built into key finance and investment decisions. Most CEOs want to protect nature, but they will not invest heavily in conservation without a clear economic return. Philanthropy spends profits; investing generates them. To unlock large-scale private investment in nature, governments must create incentives—like tax breaks, risk guarantees, and regulatory requirements—that make such investments actionable and profitable.

One important and particularly innovative financing instrument is the Tropical Forest Forever Facility (TFFF), which the Brazilian government and a number of NGOs, private investors, and governments are trying to bring to fruition at COP30. An important measure of success will be their ability to do that.

A leadership moment: Climate COP30 in the Amazon

In 2026, ahead of the Biodiversity COP17 in Armenia, the Paulson Institute will release a full update of the *Financing Nature* report. PI's 2025 interim commentary offers a preliminary but important outlook in advance of the Climate COP30 this fall in Belém, Brazil.

Climate COP30, taking place in the Amazon, would be an excellent place to start a concerted effort to align biodiversity and climate solutions, as it is symbolically significant that it will be held in the Amazon—perhaps the world's greatest reservoir of biodiversity and one under severe threat.

More importantly, it is essential that the rapid extinction of species and destruction of natural capital must be recognized as one of the most pressing global crises and be fully integrated into climate policies and planning at COP30.

What I have seen.

I have seen firsthand that investing in nature works. My wife Wendy and I have witnessed how preserving nature, particularly if done at scale, pays huge dividends for biodiversity protection. We have been deeply involved, both nationally and internationally, in the preservation of ancient coastal wetlands and riverine systems, maritime and tropical forests, grasslands, and more. Restoration of native grasslands, the most threatened biome on earth, has been a particular focus where we live in the Midwest.

In a grassland preserve next to our property, we have restored a native prairie. The rebound of species—animal and botanic—is startling and gives us hope. Nature is resilient when given the opportunity to flourish.

To make real progress, we must fix the systems that are causing nature to decline.

The choice before us.

What is missing in the biodiversity debate is not knowledge of the threat. It's leadership. If there's one lesson I have learned throughout all my years as a conservationist, it's that nature needs advocates. At this critical crossroads, political will is needed. Action is essential. So is recognition that this work is not optional—it is foundational.

Nature is not a luxury. It is not free. It is our support system. And it is disappearing before our eyes.

We must act—not someday, not incrementally. Now.

And we must do so not only because the economic case is strong, but also because nature is beautiful, wondrous, and priceless. It is the source of inspiration, renewal, and everything that makes life on this planet worth living.

We cannot afford to lose it.

Recommendations

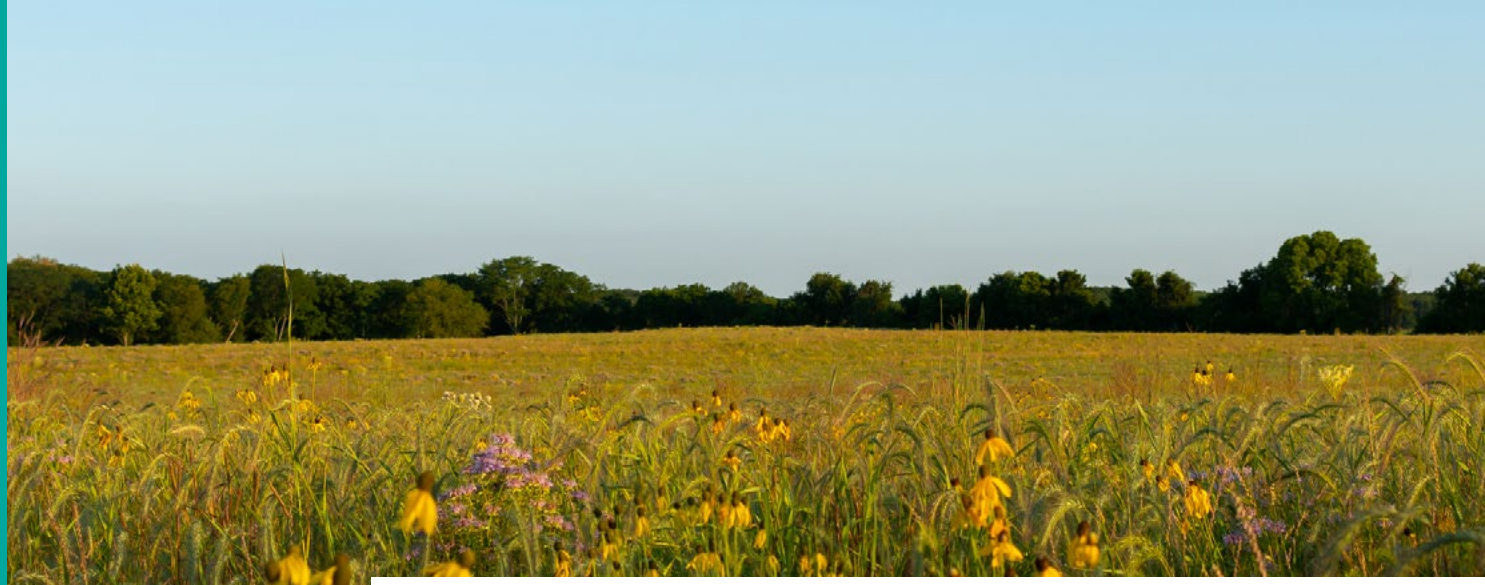
1. For National Governments

Build the foundation for valuing nature by:

- Incorporating Natural Capital Accounting into their treasuries, ministries, and country balance sheets.
- Making biodiversity risk management a part of national planning, budgeting, and fiscal policy.
- Integrating biodiversity into land-use and spatial planning including designation of “no-go zones.”
- Providing clear guidance for corporations and financial institutions to improve their biodiversity risk disclosure and management.

Align climate and biodiversity governance by:

- Enhancing coordination across finance, planning, energy, and environmental ministries to reduce siloed decision-making and encourage aligned policies and financing.
- Implementing a “No Biodiversity Harm” principle and enhancing spatial planning in public or private investments in climate, energy, and infrastructure projects, recognizing that both renewables and fossil fuels will remain in the energy mix for decades.
- Supporting sustainable supply chains and scaling up of more effective jurisdictional certification measures, especially for soft commodities, to curb land conversion that drives biodiversity loss and greenhouse gas emissions.



Reduce the size of the financing gap through harmful subsidy reform by:

- Taking immediate steps to phase out or repurpose the most harmful subsidies that impact not only forests but also other ecosystems such as grasslands, wetlands, peatlands, and oceans, while ensuring a just transition through strong stakeholder engagement, well-designed social safety nets, and rigorous monitoring and reporting frameworks.

Raise new revenue by:

- Developing policies, incentives, and enforcing programs to scale up the implementation of the seven mechanisms listed in the original *Financing Nature* report, namely biodiversity offsets, domestic budgets and tax policy, natural infrastructure, green financial products, nature-based solutions and carbon markets, official development assistance (ODA), and sustainable supply chains. Leveraging philanthropic grants to unlock additional finance.

Set the rules of the game for the private sector by:

- Enacting policies such as "No Net Loss," "Biodiversity Net Gain," and "Deforestation-free products" to create guaranteed demand for biodiversity credits and sustainable commodity supply chains, alongside mandatory due diligence laws (e.g., EU Deforestation Regulation).

- Continuing to strengthen regulatory and financial incentives to accelerate increased private investment in biodiversity conservation and restoration by providing de-risking instruments, tax incentives, and concessional loans.

2. For Multilateral Development Banks (MDBs) and Financial Institutions

National government shareholders should give MDBs the mandate and resources to protect biodiversity, including:

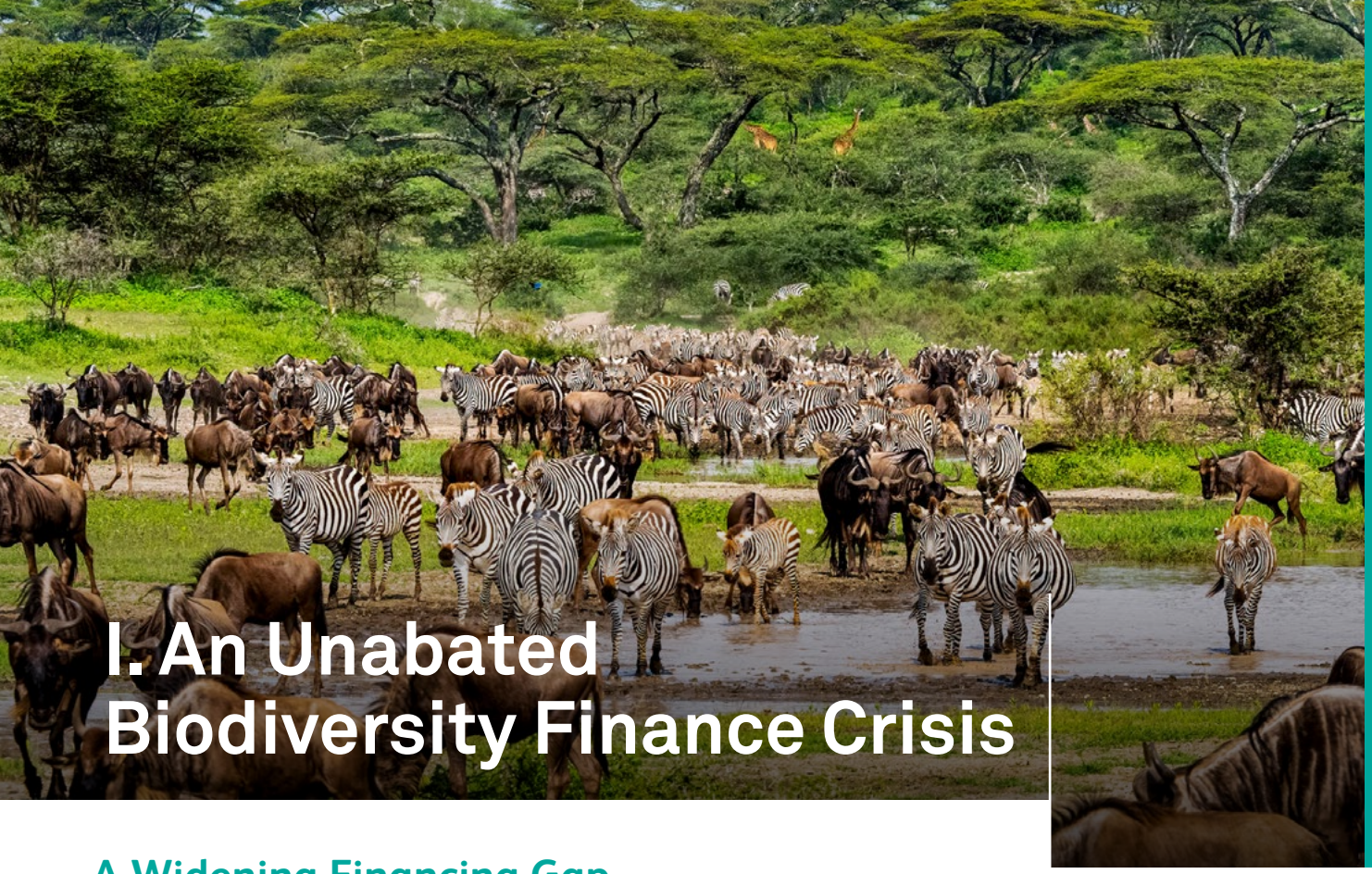
- Updating environmental and social safeguard policies to make biodiversity co-benefits a mainstream objective.
- Requiring rigorous biodiversity impact assessments for all climate, energy, infrastructure, and mining projects; applying the mitigation hierarchy—avoidance, minimization, restoration, and offsets—and withholding funding from non-compliant projects; and advancing planning to reduce impact on biodiversity hotspots.
- Recommending that shareholder governments consider making harmful subsidy reform a condition of fiscal support and policy loans, while providing technical and financial assistance to help countries identify, quantify, and redirect these perverse financial flows.
- Using concessional finance, first-loss capital, and guarantees to catalyze private investment in high-integrity Nature-based Solutions (NbS) and blended finance vehicles that deliver measurable climate and nature benefits.
- Promoting the Nature as Infrastructure (NAI) concept and practices, and only supporting NbS projects that use diverse native species, protect existing ecosystems, and deliver verified benefits for biodiversity and local communities.

3. For Global Community and International Organizations

- Continue to push for greater integration of the UNFCCC and UNCBD policies and negotiation processes and for closer scientific cooperation between IPCC and IPBES.
- Continue to push for the resolution of outstanding issues in international agreements and advocate for legally binding commitments on reforming the harmful subsidies. OECD, UNEP, and UNDP BIOFIN should accelerate their efforts in knowledge sharing, capacity building, and standardized methodology development.

4. For Companies and the Private Sector

- Reduce biodiversity and climate impacts by proactively aligning with government regulations and policies on biodiversity risk management and sustainable supply chains.
- Engage in sector-wide initiatives to level the playing field and build critical mass for sustainable, nature-positive business practices.
- Shape, adopt, and advance standardized biodiversity risk disclosure and management frameworks, reducing barriers and inertia caused by fragmented standards.
- Scale up sustainable sourcing through innovative, cost-effective approaches, such as landscape- or jurisdiction-based certifications for soft commodities.
- Set measurable, time-bound targets to improve transparency and traceability, and eliminate sourcing from high-risk countries and regions.



I. An Unabated Biodiversity Finance Crisis

A Widening Financing Gap

The continued loss of biodiversity is staggering. Since 1970, global wildlife populations have plunged by an average of 73 percent, and more than a quarter of our planet's species now face extinction.[3,9] In 2024 alone, 6.7 million hectares of tropical forest, an area nearly the size of Ireland, were destroyed, while wetlands continued to shrink and degrade.[10,11] Protected areas, the last refuge for many species and ecosystems, largely stalled at just 17.6 percent of land and 8.4 percent of the ocean—well short of the 30 percent target set for 2030 under the Global Biodiversity Framework (GBF), the international community's main agreement adopted at the UN CBD COP15 in 2022.[12,13]

This continued crisis stems from a deeper failure: the persistent undervaluation of nature. This is reflected in a widening biodiversity financing gap, which represents not just a funding shortfall but the clearest symptom of this distortion. In 2020, the *Financing Nature* report, a collaboration between the Paulson Institute, the Nature Conservancy, and Cornell University, estimated the gap at US$711 billion annually.[14] By 2024, BloombergNEF projected it had grown to US$942 billion, — underscoring the growing mismatch between ambition and resources.[8]

Despite adoption by member governments of the GBF in 2022, global progress on financing has been very limited. Biodiversity-related financial flows rose from US$133.5 billion in 2020 to US$208 billion in 2024, but meeting the US$1.15 trillion required annually by 2030 demands a daunting (and likely unachievable) fivefold increase.[8]

Since 1970, global wildlife populations have plunged by an average of 73 percent, and more than a quarter of our planet's species now face extinction.

FIGURE 1. **Widening global biodiversity financing gap**
(in US$ billion, based on projected global biodiversity financing needs by 2030)

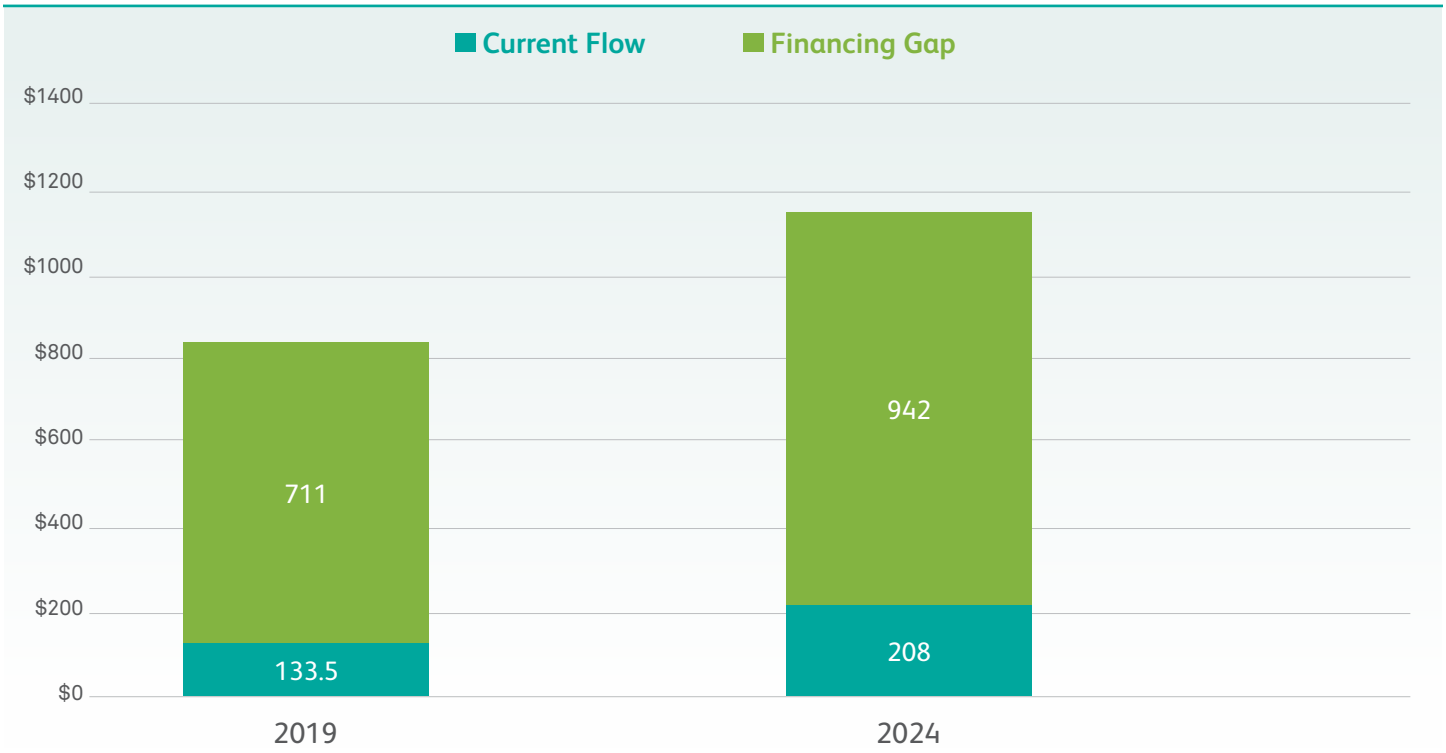
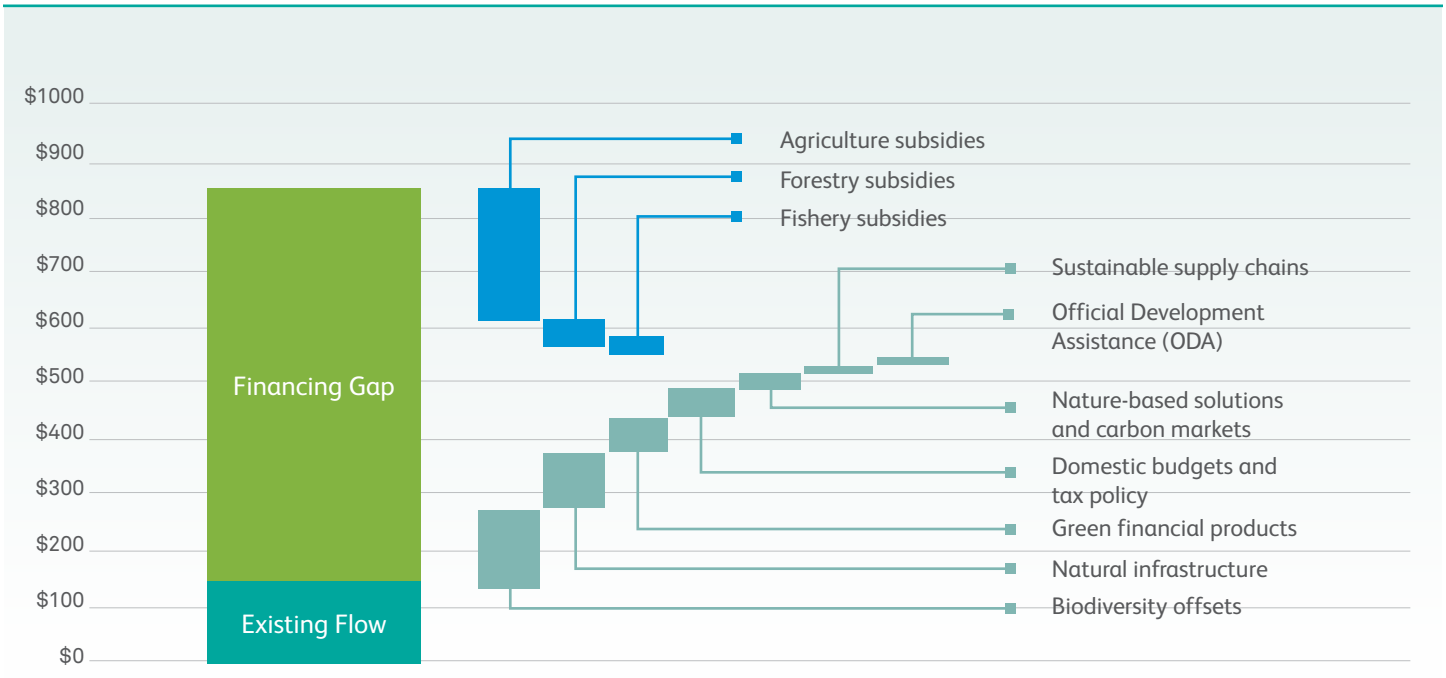
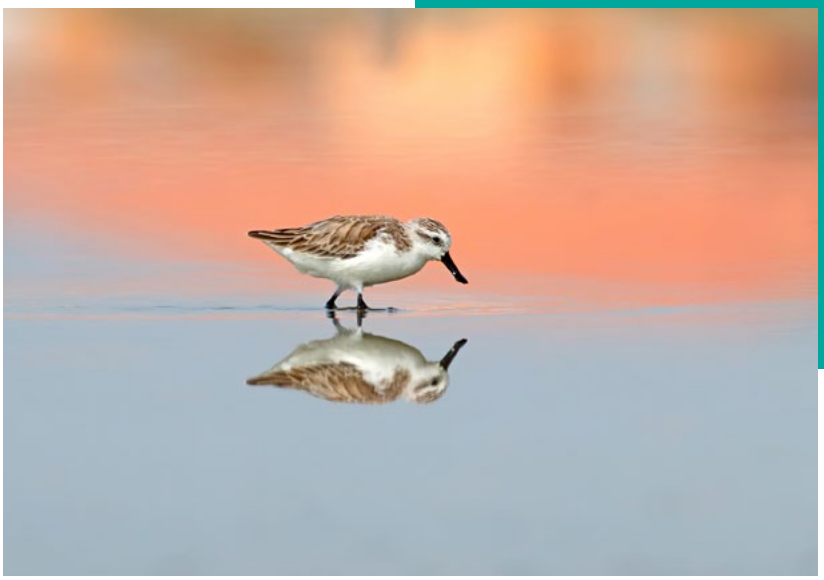


FIGURE 2. **Proposed mechanisms to close the global biodiversity financing gap by 2030**
(in US$ billion per year, as shown in the 2020 Financing Nature report)



This means governments spend more subsidizing nature's destruction in one month than they do on biodiversity protection in an entire year.



The 2020 *Financing Nature* report identified the most promising mechanisms to close the biodiversity financing gap, split into two categories: those that reduce harm to biodiversity and those that generate new revenue.

Of the mechanisms that could reduce overall biodiversity funding needs, **harmful subsidy reform** offers the greatest potential, and yet it remains the most glaring area of inaction. The GBF set the goal of reducing harmful subsidies by US$500 billion annually by 2030[13]; instead, spending on these subsidies has grown significantly since 2022. Agriculture, forestry, and fisheries subsidies rose from US$542 billion in 2019 to US$840 billion in 2024. When combined with fossil fuel, mining, construction, energy, and transport subsidies, global harmful subsidies reached US$2.6 trillion in 2024—an increase of US$800 billion since 2022.[8,14] **This means governments spend more subsidizing nature's destruction in one month than they do on biodiversity protection in an entire year.**

Even G7 countries, which pledged in 2009 to phase out inefficient fossil fuel subsidies by 2025, increased such subsidies to a record US$282 billion in 2023, up from US$71 billion in 2016, driven by energy price shocks.[15] Programs such as UNDP's BIOFIN have helped 23 countries complete subsidy assessments, with Colombia among the first to implement biodiversity screening in its agricultural finance facility.[16] Despite broad awareness of harmful subsidies' impact on biodiversity, meaningful reform remains elusive.

The original *Financing Nature* report identified seven financing mechanisms with the potential to raise new funds to close the global biodiversity financing gap, but only two show real momentum.

Natural infrastructure investment is a rare bright spot. Natural infrastructure refers to using, restoring, or emulating natural ecological processes to address human needs. A recent Forest Trends report documented US$49 billion invested in 880 nature-based water security projects across 140 countries in 2023, more than double the level of a decade earlier. Public funding dominates, with China alone allocating US$26 billion to its conservation and eco-compensation programs. Private investment, though minimal at about US$345 million, has seen substantial growth, but it comes in fits and starts, largely driven by regulation.[17]

Green financial products are expanding rapidly, with biodiversity-linked bonds, loans, and blended finance vehicles gaining momentum and attracting greater attention from mainstream financial institutions. Notably, the share of biodiversity-focused bonds has risen from five percent in 2020 to 16 percent of total green bond issuances in 2023.[18]

Most other mechanisms remain largely stagnant. **Biodiversity offsets** continue to generate only US$6–9 billion annually, far below the US$162–168 billion potential by 2030 projected in *Financing Nature*.[14,19] **Carbon markets**, after three years of contraction due to credit integrity concerns, are beginning to recover, with nature-based projects accounting for 45 percent of voluntary carbon market transaction volumes. They reached 37.6 $MtCO_2e$ and a transaction value of US$347.2 million in 2024.[20] **Sustainable supply chains**, once a leading area of corporate and government

commitment, have stalled under political pressure and certification challenges. **Domestic budgets and tax policy** remain largely unchanged, while **Official Development Assistance (ODA) for biodiversity** has increased modestly to just over US$15 billion per year—still shy of the GBF targets of US$20 billion by 2025 and US$30 billion by 2030.[21]

Taken together, these trends reveal a sobering reality: While natural infrastructure and financial innovation are advancing, progress elsewhere is stagnating or sliding backward. The overall financing gap is widening.

At the root of the widening biodiversity financing gap lies a persistent and deeply embedded problem: the systematic undervaluation of biodiversity and natural capital. This distortion has enabled the overexploitation of resources and the destruction of ecosystems by allowing businesses and governments to degrade nature without paying its true cost and, at the same time, offering little financial incentive for those who protect and restore it. For decades, biodiversity's contributions to economies—and the costs of its loss—have remained largely invisible and therefore ignored in economic decision-making.

Mis-valuation skews investment decisions in two critical ways. First, projects such as mining, fossil fuel extraction, and large-scale infrastructure, if poorly planned and lacking biodiversity safeguards, may deliver high short-term financial returns but at the expense of ecosystems, because the loss of biodiversity and ecosystem services is excluded from the balance sheet. With trillions of dollars set to flow into new infrastructure over the next decade, planners must act decisively to ensure rigorous siting and mitigation measures so that such investment does not inflict needless harm on nature. Second, under prevailing economic models, protection of ecological services that underpin human well-being cannot generate sufficient revenue or return on investment to compete with extractive industries, leaving it chronically underfunded and undervalued.

Compounding this systemic economic failure are recent trends that both reflect and reinforce undervaluation: a continuation of failed government leadership in biodiversity protection and financing, corporate wavering on nature commitments in the absence of government policy support, and the ongoing misalignment of climate and biodiversity policies and finance. Together, these forces have deepened the financing gap and accelerated the global loss of biodiversity.

Lacking Government Leadership in Policy Enforcement

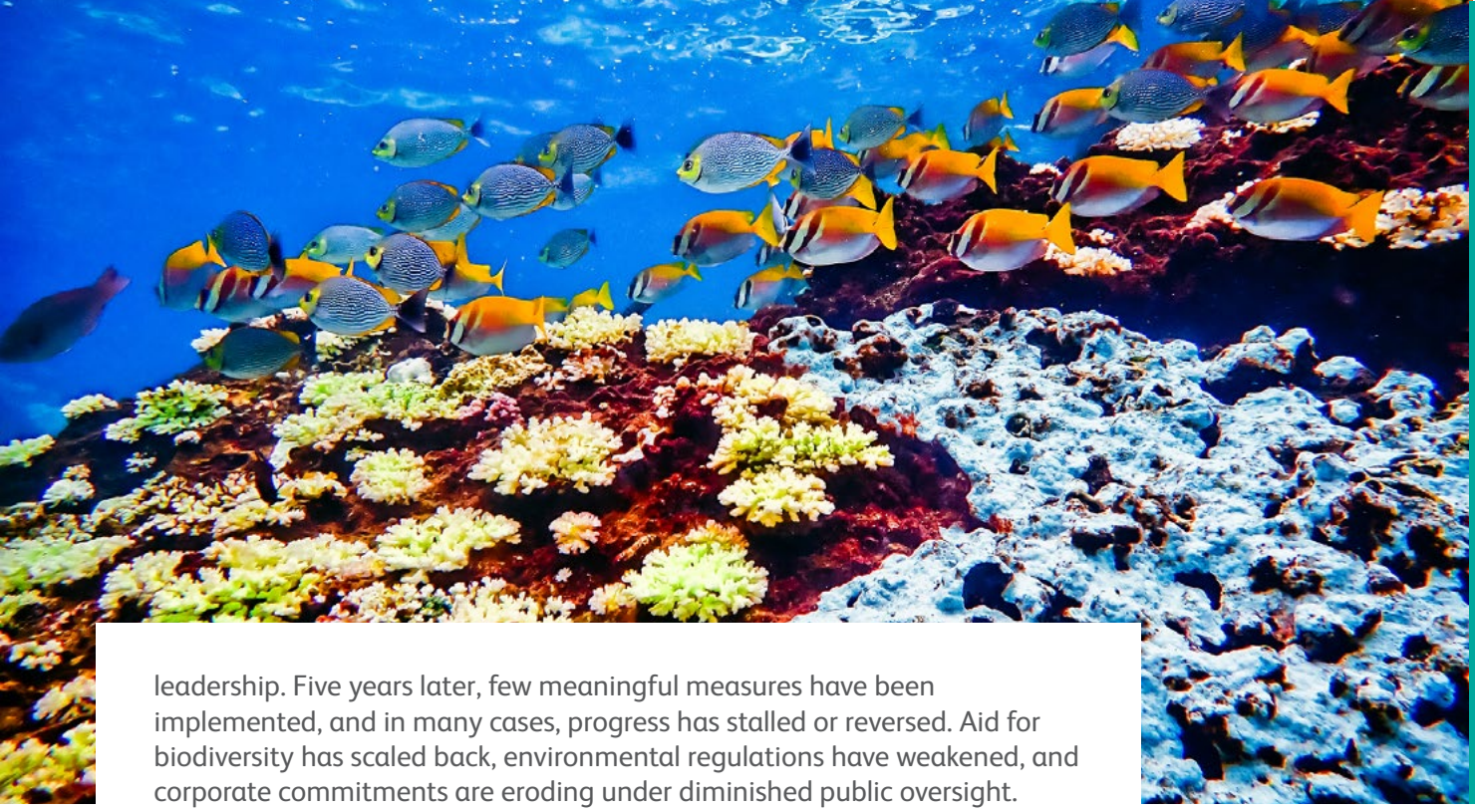
A major driver of accelerating biodiversity loss and the widening financing gap is the persistent failure of governments to enact and enforce policies that safeguard biodiversity or generate new funding. Evidence shows this challenge is worsening.

Government support is essential for tackling global biodiversity loss because it can provide the regulatory frameworks and policies necessary to protect biodiversity at scale. Governments have the power to create and enforce laws, designate protected areas, and reform or eliminate environmentally harmful subsidies, all of which are critical for reversing the decline of biodiversity.

Furthermore, only governments can play the lead role in closing the global biodiversity financing gap, using a mix of public finance, innovative funding mechanisms, and strategic policies to mobilize both public and private capital. By creating a supportive and credible policy environment, governments can incentivize the private sector to invest in biodiversity conservation and reduce their negative impact on nature.

The *Financing Nature* report outlined nine measures to close the annual financing gap, yet in critical areas—harmful subsidy reform, biodiversity offsets, domestic budgets, and ODA—governments have largely failed to act decisively.[14] Of the report's six overarching recommendations, five required direct government

A major driver of accelerating biodiversity loss and the widening financing gap is the persistent failure of governments to enact and enforce policies that safeguard biodiversity or generate new funding.



leadership. Five years later, few meaningful measures have been implemented, and in many cases, progress has stalled or reversed. Aid for biodiversity has scaled back, environmental regulations have weakened, and corporate commitments are eroding under diminished public oversight.

The slowdown in biodiversity-related aid provides a stark example. Many traditional donor countries are scaling back overall development assistance portfolios, with biodiversity programs often among the first to be cut. Long-standing initiatives that supported conservation across critical ecosystems are being downsized or eliminated, leaving gaps in regions that are biodiversity-rich but financially constrained. At the same time, several advanced economies are pursuing deregulatory agendas that could weaken long-standing safeguards designed to balance economic growth with environmental protection.

ODA funding underscores both the scale of underinvestment and its disproportionate importance. The Global Biodiversity Framework's Target 19 calls for biodiversity-related ODA to rise to US$20 billion by 2025 and US$30 billion by 2030. While biodiversity-related ODA rose to US$15.4 billion in 2022, it remains well short of the 2025 target. Even if the 2030 goal is achieved, US$30 billion annually is only a fraction of the US$1.15 trillion needed to close the global financing gap.[8] Yet ODA plays an outsized role, often underwriting capacity-building and enabling recipient countries to design and implement their own biodiversity finance strategies.

Commitments to tackle deforestation and biodiversity loss are also wavering. While new regulations and directives in Western markets aim to ensure deforestation-free supply chains and greater accountability for biodiversity, implementation has been slowed by trade disputes, legal challenges, and industry resistance. These delays are eroding momentum at a moment when urgent progress is needed.

Insufficient government leadership—evidenced by weak regulation and enforcement, stalled implementation of biodiversity commitments, and shrinking aid budgets—has widened the financing gap and hastened biodiversity loss.

Corporations Need Policy Reorientation

Corporations, by design, are profit-driven. Without the prospect of market returns, most corporations will not extend support for biodiversity beyond philanthropy or token Corporate Social Responsibility initiatives, even though many CEOs personally care about conservation. In the absence of strong government policy signals and effective incentives, businesses will continue to prioritize profitability over nature.

This reality explains why even symbolic corporate pledges are eroding. Over the past two decades, more than 700 companies linked to global commodity supply chains pledged to eliminate deforestation from beef, soy, palm oil, timber, pulp and paper, cocoa, coffee, and rubber—soft commodities driving more than two-thirds of tropical forest loss and contributing significantly to land-use change emissions, which account for up to 21 percent of global greenhouse gas emissions.[22,23] Many joined collective platforms such as the Consumer Goods Forum's Forest Positive Coalition of Action, the World Economic Forum's Tropical Forest Alliance, and the New York Declaration on Forests, reflecting a rise in awareness.

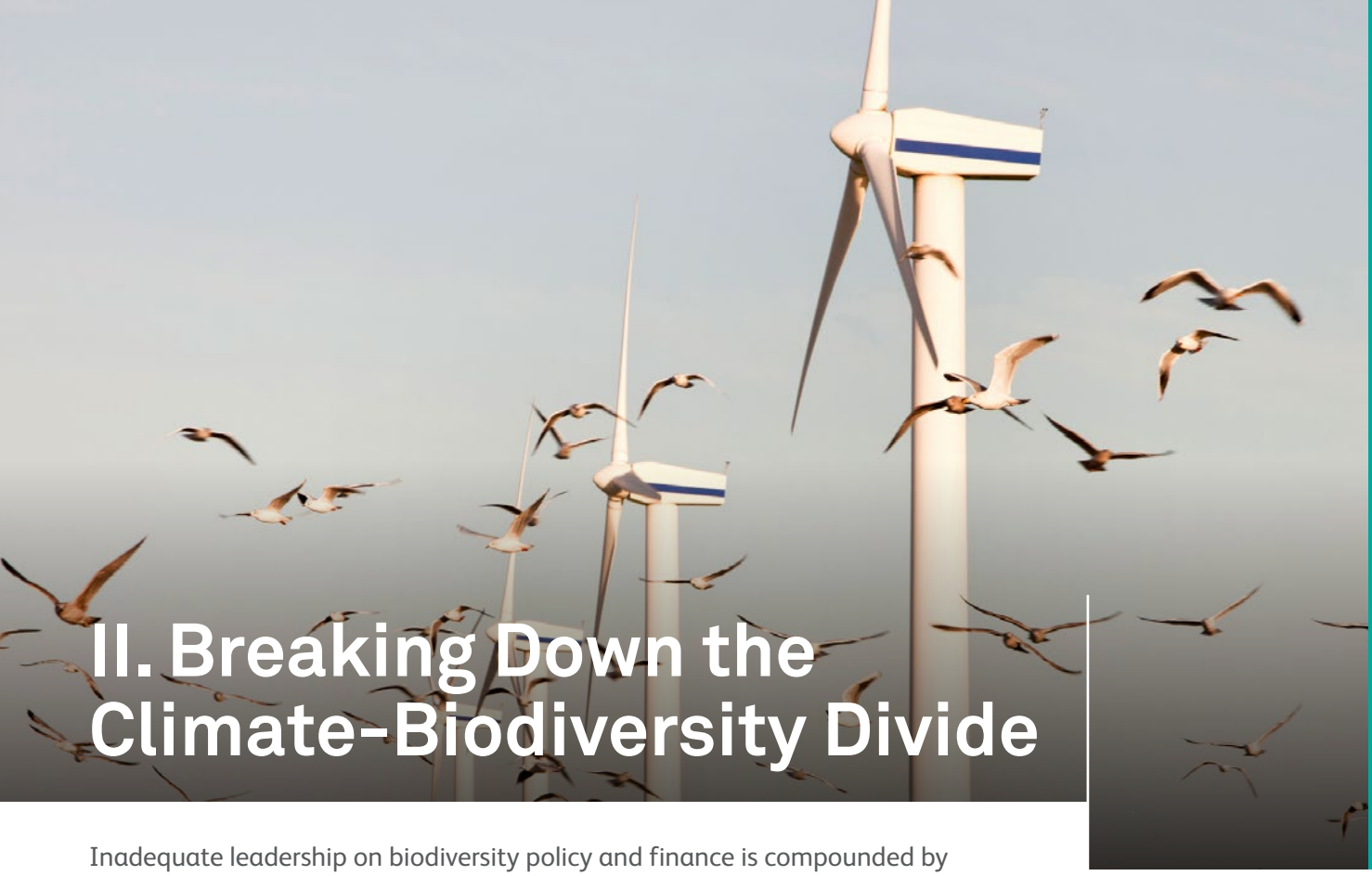
Yet these voluntary commitments are proving fragile. Global Canopy's 2025 Forest 500 reported troubling signs of companies quietly removing pledges without explanation. Among those maintaining commitments, progress remains limited: only 27 percent of assessed firms publish pledges covering all relevant commodities, down from 33 percent in 2023, and no major company can credibly claim to have fully eliminated deforestation from its supply chain.[22,24]

While deforestation has received the greatest attention, corporate commodity sourcing also continues to degrade grasslands, wetlands, and peatlands that are equally critical for biodiversity and climate mitigation and resilience. In Brazil's Cerrado, for example, conversion for cattle and soy has led to losses of grasslands and savannas as dramatic as those in the Amazon rainforest, eroding both biodiversity and natural carbon sinks.[25]

Financial institutions show a similar pattern of retreat. Some leading banks and asset managers have exited international sustainability coalitions such as the Net-Zero Banking Alliance and Climate Action 100+, signaling weakening collective action.[26]

Without strong government incentives and regulations to steer private capital toward nature-positive investment and sustainable commodity supply chains, the private sector's environmental footprint will remain heavy, its vast financial potential for nature conservation untapped, and biodiversity's decline will only accelerate.

While deforestation has received the greatest attention, corporate commodity sourcing also continues to degrade grasslands, wetlands, and peatlands that are equally critical for biodiversity and climate mitigation and resilience.



II. Breaking Down the Climate-Biodiversity Divide

Inadequate leadership on biodiversity policy and finance is compounded by the fact that climate and biodiversity agendas are pursued in isolation. The rapid scaling up of climate solutions—renewable energy projects, electrification, and associated infrastructure—has too often been driven by a singular focus on carbon reduction. Transmission corridors carve through habitats, sprawling installations imperil ecosystems, and the rush for critical minerals accelerates land and water degradation in some of the most ecologically vulnerable places on Earth. Far from easing the strain, today's climate agenda is deepening the assault on biodiversity.

Climate and Biodiversity in Silos

Climate change and biodiversity loss are inseparably linked, yet governance, policy, and finance for the two crises remain siloed, with a disproportionate emphasis on climate change. This disconnect has become an additional and increasing driver of biodiversity loss.

The scientific connection is clear: Climate change accelerates biodiversity loss through extreme weather, wildfires, flooding, coral bleaching, ocean acidification, and shifts in ecosystems and species ranges. Climate change as one of the five core factors, is responsible for more than 90 percent of nature loss in the past half-century.[8,27] At the same time, destruction of ecosystems feeds climate change by eliminating natural carbon sinks—deforested lands, drained wetlands and peatlands, and degraded coastal wetlands, and also releases massive greenhouse gas emissions.[28] Together, these crises form a self-reinforcing vicious cycle.

Financing for climate and biodiversity reflects the imbalance. In 2022, biodiversity ODA totaled just over US$10 billion, compared to more than US$90 billion for climate finance.[8] Yet halting global biodiversity loss requires annual investments

of US$1.15 trillion by 2030—five times today's levels. The fiscal gap reflects political choices. For example, achieving the GBF's 30x30 target—protecting 30 percent of land and oceans by 2030—would cost roughly US$140 billion annually, a fraction of global climate finance, and would safeguard ecosystems that also deliver climate mitigation and resilience.[29]

Now, climate policies developed through a narrow carbon lens are emerging as a new threat to biodiversity. Most climate finance flows into large-scale energy and infrastructure projects, which are land-intensive and often destructive to ecosystems. Solar, wind, and hydropower developments—while vital for decarbonization—can fragment habitats, degrade ecosystems, and imperil wildlife. Research indicates that wind and solar infrastructure can require up to 12 times more land than fossil fuels.[30] Poor siting of solar farms on grasslands or wind projects along migratory bird routes shows how climate solutions, when poorly designed, undermine biodiversity.[31,32] Even well-intentioned nature-based solutions, like large-scale tree planting, can harm ecosystems when implemented as monocultures, with non-native species, or in places that have historically not held trees.[33]

These trade-offs are no longer marginal. Pursuing climate goals at biodiversity's expense is not only wrong—it is self-defeating. In the early years, small wind and solar projects posed limited risks and attracted little scientific scrutiny. Today, however, renewable energy is being deployed at unprecedented scale, and the risks to biodiversity are significant. With lifespans stretching decades, poorly planned or sited projects risk causing irreversible ecological damage. The evidence is overwhelming: Rolling out large-scale renewable infrastructure without rigorous spatial planning and biodiversity safeguards is not just negligent, it is reckless. It amounts to trading one planetary crisis for another. Worse still, any short-term carbon gains may ultimately unravel under climate–biodiversity feedbacks, leaving both nature and climate in a deeper crisis.

Impacts don't stop at national borders. Industrial demand for critical minerals such as lithium and nickel—essential for electric vehicle batteries and renewable technologies—is fueling destructive mining in biodiversity-rich regions, shifting environmental costs onto fragile ecosystems and vulnerable communities. For example, nickel mining in Indonesia's Sulawesi and Maluku islands has cleared native forests and devastated biodiversity, while lithium extraction in South America's salt flats is draining water, polluting groundwater, and endangering both the Andean cat and local communities.[36,37]

Spotlight on Renewable Energy-Wildlife Conflict: When Wind Farms Block the Flyway[34,35]

Evidence is mounting that wind farms, when poorly sited and clustered, pose serious risks to migratory birds. It is estimated that, globally, the annual number of deaths caused by wind turbines could very well be in the millions. And while the "barrier effect" of a single offshore wind farm is often considered minor for non-marine species, the cumulative impact of multiple installations along key flyways can be very substantial.

The Black-faced Spoonbill, an endangered flagship species with a global population of just 7,000, offers a stark example. These birds migrate annually between breeding grounds on Korea's west coast and wintering areas across East and Southeast Asia. Their most perilous leg is the Yellow Sea crossing—precisely where the world's densest concentration of offshore wind farms now operates. In addition to bird deaths, recent GPS tracking documents individual birds altering routes, struggling to complete migration, and even returning and aborting migrating altogether after encountering successive wind farms.

Cumulative disruptions threaten species survival. For decision-makers, the lesson is clear. Biodiversity impacts must be rigorously assessed before siting wind farms along major flyways, and where overlap is unavoidable, mitigation measures—such as leaving wide corridors, coloring a single blade, or even using real-time weather radar to trigger relatively brief turbine shutdowns during peak migration—should be implemented. The Spotlight case study below on Jordan's wind farm provides a contrasting example, showing how thoughtful planning and well-designed safeguards can significantly reduce impacts on migratory birds.

Policy Shift Spotlight: The UK's Aligned Climate–Nature Plan[41,42]

The UK government offers a notable example of a national climate policy that explicitly integrates biodiversity concerns. *Unlocking Benefits: Actions to Jointly Address Climate Change and Biodiversity Loss in England* sets out the government's commitment to align climate and biodiversity strategies, recognizing the inseparability of the two crises. The policy paper emphasizes a clear conclusion: There is no pathway to tackling climate change without involving nature, and there is no route to nature recovery without accounting for climate change.

The policy outlines several areas of reform where previously siloed programs for climate and biodiversity would be better coordinated, if not directly combined. It thereby signals a shift away from reliance on purely engineered climate solutions toward scaled-up deployment of forest restoration and other nature-based solutions that also deliver biodiversity gains.

Yet the initiative has encountered early challenges. A proposed national Planning and Infrastructure Bill seeks to weaken environmental protection, including biodiversity provisions central to the policy paper. Equally pressing is the shortfall in funding: Current allocations fall well below what is required to fully align climate and biodiversity policies as envisioned.

The UK case is significant for three reasons. First, the scope of the policy paper illustrates the breadth and scale of reform required to integrate climate and biodiversity at the national level. Second, the political and financial obstacles it faces highlight the kinds of resistance likely to surface in attempts to align these agendas more broadly. Third, the UK stands out as the first G7 country to take on biodiversity–climate alignment in a systematic way, not only through this policy paper but also in communiqués to the G7 and at the Glasgow Climate COP26.

The root of this governance failure is structural. Climate finance is typically siloed within energy ministries, while biodiversity finance is relegated to comparatively weak environment ministries. Finance ministries—the true gatekeepers of fiscal policy—largely overlook both. Aligning climate and biodiversity, therefore, requires the direct engagement of finance ministers and heads of state to integrate governance and financing of these intertwined crises.

This imbalance is made even more conspicuous by the absence of political leaders at biodiversity COPs, in stark contrast to climate COPs, where heads of state compete for the spotlight. The upcoming Climate COP30 in Brazil has set aside two biodiversity-themed days—more a symbolic nod to nature's importance than a substantive step toward genuine climate–biodiversity alignment.[38]

The barrier is not technical feasibility or financial capacity, but political vision and leadership. Unless governments bridge the silos, they will continue funding climate solutions that erode the very ecosystems essential for the long-term resilience of all life on Earth.

Moving Toward Alignment

Correcting the climate–biodiversity disconnect requires two straightforward, low-cost policy shifts:

- All climate mitigation projects, regardless of scale, should undergo biodiversity impact assessments and include protection measures as a condition for public or private financing.
- Over time, both public and private investors should increase support for nature-based climate solutions (NbS).

NbS often costs less than traditional gray infrastructure alternatives while delivering broader benefits.[39] Intact forests store carbon and build resilience; mangroves buffer storm surges and hold four times more carbon per hectare than rainforests; diverse native reforestation resists pests, drought, and fire far better than monocultures. Well-planned NbS projects, implemented through compliance or voluntary carbon and biodiversity credit markets, can deliver significant emissions reductions while protecting forests, grasslands, wetlands, peatlands, and carbon-rich soils—ecosystems that also attract substantial private investment.

Clean energy infrastructure can likewise be designed to minimize biodiversity impacts through integration

with other land uses, if planned with foresight. In parts of Asia, for example, solar panels are combined with aquaculture, shading crab farms to offset rising water temperatures from climate change. This approach improves yields while lowering land costs for both the farmers and solar farm owners.[40]

In short, aligning climate and biodiversity finance unlocks powerful synergies. Countries can maximize value by steering investment away from ecologically damaging projects and toward initiatives that deliver dual climate and biodiversity gains. Integration is not merely an ecological imperative: It is a strategic necessity for building resilient, equitable, and sustainable futures.

Role of Government

The interplay between climate and biodiversity finance is complex, yet no actors carry greater responsibility or influence than governments. While philanthropy and private capital matter, governments remain the primary financiers, shaping allocations and determining project priorities. Most importantly, they alone can enact and enforce policies that ensure climate investments also protect natural ecosystems.

Beyond requiring biodiversity impact assessments for all climate mitigation projects and promoting nature-based solutions, governments should pursue ways to integrate and streamline jurisdiction over climate and biodiversity. Such coordination is essential to reduce policy conflicts, close efficiency gaps, and ensure that efforts in one domain do not undermine progress in the other.

This shift makes economic as well as ecological sense. Integrated projects could deliver stronger benefits: restoring peatlands or mangroves sequesters carbon, reduces flood risk, buffers storms, and sustains vital habitats. Such projects also attract private capital through green bonds, equity funds, or biodiversity credits, while providing local communities with tangible benefits such as clean water, fisheries, and pollination.

International frameworks are beginning to move in this direction. The Global Biodiversity Framework adopted at COP15 emphasizes minimizing negative impacts of climate action on biodiversity, highlighting nature-based climate solutions (NbS) as a key approach to protecting, restoring, and managing ecosystems to cut emissions, store carbon, and build resilience. Yet in practice, most public and private finance still flows to hard infrastructure projects that drive land-use change and biodiversity loss. Shifting this trajectory requires governments, and by extension multilateral development banks and companies, to embed biodiversity safeguards into all climate-related decisions.

International forums such as Climate Week and COP30 should support biodiversity assessments and mitigation for every climate project. Multilateral development banks, policy banks, and other finance institutions should adopt the same requirements as conditions for investment, building on frameworks such as IFC Performance Standard 6.

National and local governments should go further by:

- Mandating biodiversity assessments prior to policy and project approval and investment
- Ranking and prioritizing policies and projects that deliver measurable benefits for both climate and biodiversity
- Embedding biodiversity considerations into national and regional climate, energy, and infrastructure planning and monitoring
- Ensuring local communities participate in and benefit from biodiversity protection and restoration.

While governments hold the most leverage, the private sector is pivotal to scaling actions once policy signals are clear. Banks and investors can minimize risk by steering away from ecologically harmful projects, and they can channel capital into NbS and integrated projects that deliver multiple benefits and returns. International safeguards and national regulations provide ready frameworks for aligning private finance with truly sustainable outcomes.

Ultimately, aligning climate finance with biodiversity protection is less a question of technical feasibility than of political will. Governments must set the rules, and the private sector must respond by scaling solutions. Together, they can ensure that climate action reinforces rather than erodes the natural ecosystems on which long-term resilience depends.

Climate-Biodiversity Alignment Spotlight: Jordan's First Major Wind Farm[43–46]

The Tafila Wind Farm, commissioned in 2015 as Jordan's first utility-scale wind project, stands as a landmark in regional renewable energy development. With financing from the IFC, EIB, and other development finance institutions, it delivers clean electricity to roughly 78,600 households while advancing Jordan's national clean energy goals. The project applied international best practices for environmental and social impact assessments, setting an early benchmark for climate infrastructure in the region.

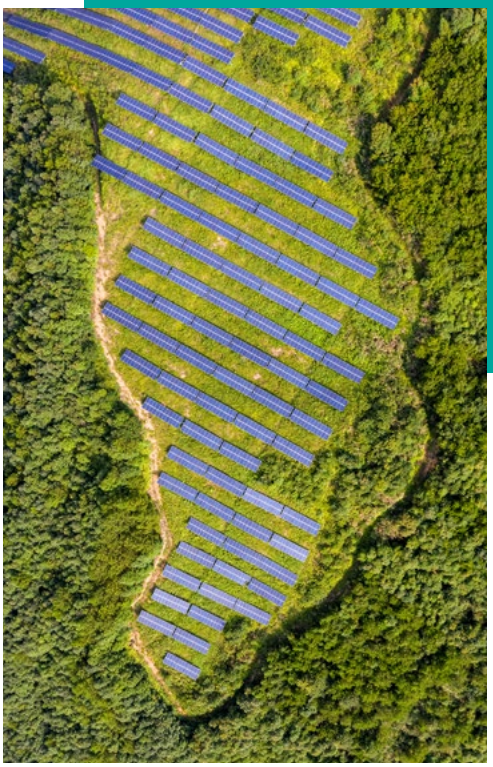
Because Tafila lies along the Rift Valley–Red Sea flyway, a critical route for migratory birds, the project's lenders mandated a rigorous Environmental and Social Impact Assessment (ESIA). This included avifauna baseline studies, collision-risk modeling, and consultations with BirdLife International and the Royal Society for the Conservation of Nature to identify risks to bird populations and design mitigation measures.

The ESIA identified thirteen priority bird species at highest risk, including migratory soaring birds such as the Steppe Eagle and Egyptian Vulture, as well as several resident raptors. Two priority bat species—the Desert Pipistrelle and Rüppell's Pipistrelle—were also flagged as vulnerable. In addition, one habitat type, the Thorny Salt Brush, was assessed as facing a minor level of risk.

The assessment led to targeted mitigation measures. These included internal cabling to reduce electrocution risks, real-time shutdown protocols when large bird flocks approached turbines, continuous monitoring during migration and non-migration seasons, and immediate shutdown procedures if collision risk was detected.

Government oversight, DFI financing, and local partner involvement have ensured that Tafila remains under close environmental scrutiny. The EIB and IFC apply safeguard policies and periodic reporting to enforce compliance. At the same time, the Royal Society for the Conservation of Nature continues to issue new guidelines for protecting migratory birds from wind farm impacts.

Although Tafila successfully identified and mitigated operational risks to avifauna in its early monitoring phases, its long-term effectiveness will depend on the strength of local law, sustained monitoring and funding, and adaptive management.



Ultimately, aligning climate finance with biodiversity protection is less a question of technical feasibility than of political will. Governments must set the rules, and the private sector must respond by scaling solutions.

Utilizing Carbon Markets to Advance Alignment

Carbon markets have become important vehicles for channeling finance into nature-based solutions. While their overall scale remains uneven, they represent one of the few areas where private investment in climate action has also delivered biodiversity co-benefits.

In global compliance markets, which are valued at US$ 949 billion in 2023[47], several emissions trading systems (ETS) now allow regulated companies to meet part of their obligations with NbS credits. California's Cap-and-Trade program, for example, permits up to six percent of compliance through offsets by 2030, with more than 80 percent of its issued credits to date derived from forests.[48,49] Beyond offsets, California channels allowance auction revenues into grants for wetlands, watershed restoration, and water quality improvements.[50] China's national ETS—launched in 2021 and already the world's largest—allows offsets covering up to five percent of compliance, with protocols for reforestation and mangrove restoration.[51] New Zealand's ETS integrates forestry both as a compliance sector and as a credit source, with millions of forest-based units expected annually.[52] South Korea and Japan also allow limited NbS credits, including forests, agriculture, and blue carbon.[53,54]

The voluntary carbon market (VCM), while modest in scale at roughly US$500 million in 2024, also plays a notable role in channeling finance to natural climate solutions. That year, nature-based credits accounted for nearly 45 percent of VCM transaction volume, reflecting a growing demand for removal credits, which are viewed as carrying higher integrity than reduction credits.[20] Approaches such as Afforestation, Reforestation, and Revegetation (ARR) and blue carbon are gaining momentum, offering pathways that better align climate and biodiversity. Strong demand and a price premium for nature-based credits such as ARR signal market appetite for dual solutions.[20] Similarly, the positive reception of Verra's Climate, Community, and Biodiversity (CCB) standard, which explicitly includes biodiversity co-benefits for carbon projects, also points to a growing need for more holistic approaches.

Still, caution is warranted. Many ARR projects rely on monocultures or non-native plantations—the "wrong trees," or the "right trees" in the wrong places, such as on grasslands or scrublands—undermining local biodiversity and resilience. A 2024 study of registered ARR projects flagged widespread ecological concerns, underscoring the need for safeguards to ensure that climate gains are not achieved at biodiversity's expense.[56]

More fundamentally, the voluntary market's scale is inherently constrained. Without firm policy support and government incentives, VCM transactions will remain limited to a narrow pool of buyers—often closer to CSR gestures than transformative investments.

Carbon markets therefore present both an opportunity and a warning. With strong policies and standards, they can align climate and biodiversity finance, channeling billions into ecosystem restoration and protection. Without them, they risk delivering carbon targets while accelerating nature's decline.

ARR Spotlight: The Green Trees Initiative[55]

One of the most prominent afforestation, reforestation, and revegetation (ARR) carbon removal projects in the United States is the Green Trees initiative in the Mississippi River's alluvial basin. Launched in 2008, the project now spans 600 private land parcels, from 5 to 3,500 acres. To date, Green Trees has restored 136,650 acres, planted more than 60 million trees, and sequestered 7.8 million metric tons of CO_2e.

The lower Mississippi alluvial plain once covered 22 million acres of hardwood forest, but 150 years of logging and agricultural expansion reduced it to less than 20 percent of its original extent. This deforestation devastated bird populations and other wildlife, while eliminating vital ecosystem services such as flood mitigation, water filtration, soil stabilization, and carbon storage.

Green Trees restores these landscapes by replanting low-lying farmland with a diverse mix of 27 native hardwood species. Its monitoring documents not only carbon gains but also improvements in water quality, soil health, and wildlife habitat. Today, Green Trees is the largest reforestation program in the U.S., providing 99.6 percent of all ex-post carbon credits and 44 percent of voluntary credits issued nationally. The program has maintained high integrity, with no recorded project reversals or credit losses.

Natural Infrastructure Spotlight: Restoring Lima's Watersheds [62]

Lima, Peru, faces seasonal water shortages that can last a month or more when its rivers run low during the dry season. The city's three main rivers originate in the high Andes, more than 5,000 feet above Lima. Historically, mountain watersheds stored rainfall and gradually released it, sustaining river flows through the dry months. In recent years, however, this natural storage has been severely diminished by wetland loss, land-use change, and soil and vegetation degradation.

Among the most critical water stores are high-altitude wetlands known as bofedales—peat meadows that have formed over centuries. These ecosystems hold millions of gallons of water, released slowly into rivers during the dry season. Yet illegal peat moss mining has destroyed many bofedales, stripping them of their water-regulating capacity.

In 2015, Lima's water utility, SEDAPAL, introduced a one percent surcharge on water bills to finance watershed restoration. Funds are directed to upstream communities to restore degraded peatlands and safeguard them against further mining. Beyond stabilizing water supply, these efforts provide significant carbon storage and sequestration benefits, while creating roughly 12,000 paid workdays for local residents.

The initiative is part of a portfolio of 22 natural infrastructure projects funded by SEDAPAL, marking a strategic shift from reliance solely on traditional gray infrastructure such as dams and pipelines toward a hybrid approach that integrates green solutions. By restoring ecosystems alongside conventional systems, Lima is building a more resilient water supply while delivering climate and biodiversity co-benefits.

The Shift to Climate Adaptation and Natural Infrastructure

Over the past two decades, climate finance has focused heavily on mitigation—mainly through large-scale clean energy and infrastructure projects. But as the world overshoots the 1.5˚C and even 2.0˚C benchmarks, adaptation and resilience are moving to the forefront of climate strategy.[57]

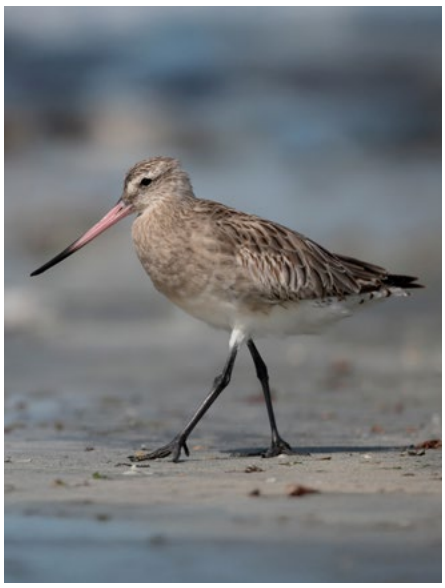
Governments are beginning to respond. France, for example, recently launched an adaptation plan based on projections of a 4˚C temperature increase across mainland France by 2100.[58] Dozens of countries have adopted adaptation strategies that range from "gray" infrastructure and early warning systems to nature-based solutions that deliver both climate resilience and biodiversity gains.

The shifting focus from mitigation to adaptation sends important signals to climate finance. A 2025 Boston Consulting Group report projects that private equity investment in climate adaptation and resilience could reach US$0.5–1.3 trillion by 2030.[59] If directed toward NbS, these flows could generate major biodiversity benefits. The Global Center on Adaptation's 2019 *Adapt Now* report similarly argued that US$1.8 trillion in adaptation investments from 2020–2030 could yield US$7.1 trillion in net benefits, while warning of a persistent deficit in political leadership.[60]

Within this shift, natural infrastructure is set to play an increasingly critical role. Restored mangroves and other coastal wetlands can blunt storm surges. Urban green spaces absorb stormwater and reduce flooding. Floodplains or polders can safely hold excess water. When scaled, often alongside traditional gray infrastructure, these systems harness ecosystems' proven capacity to buffer storms, floods, and other hazards while enhancing biodiversity and sequestering carbon.[61]

The implications are clear: Adaptation finance can potentially unlock trillions in capital, and nature is our strongest ally in building climate resilience. Yet this shift remains in its early stages. Strong government action to embed protection and restoration of natural ecosystems into adaptation strategies is essential to ensure that resilience gains strengthen rather than undermine the ecosystems on which they depend.

III. Innovation in Biodiversity Finance



While halting and reversing biodiversity loss ultimately requires a fundamental overhaul of government policies and incentives to correct the systemic undervaluation of nature, some promising green shoots in nature finance are emerging.

Governments are beginning to launch initiatives aimed at creating new markets and attracting private investment in biodiversity-related projects. These efforts have helped spur growth in green financial products, which are gaining traction with both issuers and investors.

This rise in green finance has gone hand in hand with growing recognition of biodiversity-related risks in the financial sector. Banks and institutions are increasingly assessing and disclosing their exposure to biodiversity loss through initiatives such as the Taskforce on Nature-related Financial Disclosure (TNFD)[63]. Many are adopting internal rules and screening tools to avoid investments with high biodiversity risk while prioritizing those that deliver positive ecological outcomes.

Governments are also exploring fiscal measures—such as new fees, taxes, and royalties—that could expand public budgets for biodiversity restoration and protection. Taken together, these developments suggest the early contours of a more diversified financing landscape for biodiversity. Yet we must remain clear-eyed: On their own, such measures will not be sufficient to halt the worsening biodiversity crisis in time.

Government Incentives for Private Sector Action

Much of the recent growth of private sector investment in biodiversity, particularly in green financial products, has been catalyzed by government policies and interventions. These range from direct public spending and blended finance to de-risking tools such as tax credits, guarantees, concessional lending, and insurance products that improve returns and reduce investor risk. While many of these mechanisms have long existed in financial markets, only recently have they been applied with increasing success to biodiversity protection and restoration.

The most visible success story remains the compliance and voluntary carbon markets, where government frameworks have directly created demand. Compliance systems compel companies to purchase credits, driving investment in carbon projects and funds. Biodiversity offset markets work similarly by linking development permits to offset requirements. Inspired by these examples, some governments are now helping shape a nascent voluntary biodiversity credit market, including advancing platforms, standards, methodologies, and performance metrics for biodiversity outcomes. [64,65] Ultimately, the ability of voluntary carbon markets to scale and deliver impact depends on governments uniting around robust, consistent standards.

Beyond markets, governments are expanding green finance tools to mobilize private capital. In the US, more than 20 state, city, and tribal green banks now operate alongside the International Development Finance Corporation (DFC), which provides loans, investments, and insurance, and has recently supported debt-for-nature swaps projected to unlock hundreds of billions in value over time.[66]

Other countries showcase equally innovative models. Costa Rica's fuel tax funds payments for ecosystem services, enabling reforestation, watershed protection, and carbon capture, while underpinning green bond issuance explicitly tied to biodiversity outcomes.[67,68]

Taken together, these initiatives are encouraging signs of progress—green shoots in the evolving landscape of biodiversity finance. They reflect governments' willingness to experiment with diversified, market-based approaches capable of leveraging private capital. Yet they remain far from ushering in a fundamental shift.

Spotlight on Biodiversity Offsets and Credits[64,65,69–73]

Since 2020, biodiversity offset and credit markets have evolved notably. Legally backed and market-tested offset programs remain the foundation, while voluntary biodiversity credits are only now beginning to move from concepts into pilot initiatives.

In 2024, the United Kingdom launched its Biodiversity Net Gain program, requiring all development projects to deliver at least a 10 percent net gain relative to pre-development biodiversity levels. The European Union followed in 2025 with its Nature Credit Roadmap, aimed at closing a €37 billion annual biodiversity funding gap, with pilots scheduled for 2027. Australia's Nature Repair Act (2023) created the world's first legally supported voluntary biodiversity credit market, while Colombia's habitat banking system pioneered a dual model that integrates compliance offsets with voluntary contributions. Other countries—including Ghana, Indonesia, and South Africa—are piloting or adapting similar mechanisms.

On the private side, voluntary biodiversity credits—designed to go beyond offsets by delivering net biodiversity gains—are gaining international attention. Bloom Labs has identified 53 active programs involving more than 1,000 organizations across 74 countries.

Yet this rising interest must be tempered with realism. Market activity remains minimal: the voluntary biodiversity credit market has only begun to see scattered pilot transactions, and investment in offsets has shown little growth since earlier assessments. Without smart policy design to embed biodiversity offsets and credits into national frameworks—and, critically, faithful enforcement—these markets will remain innovative in concept but marginal in impact, falling far short of the scale required to transform biodiversity finance.

Subsidy Reforms

Subsidies harmful to nature—across fossil fuels, agriculture, and fisheries—remain among the most destructive forces driving biodiversity loss and climate change. Reforming them represents the most powerful policy lever to curb ecosystem degradation and close the biodiversity financing gap.

Although subsidies remain the largest area of inertia, recent developments suggest a growing foundation for reform. Advances in subsidy reform include global policy databases that standardize benchmarking, new methodologies for national reviews, and converging principles to guide reform strategies.

Databases such as OECD's PINE have increased transparency by classifying subsidies by sector, impact, and intent, allowing policymakers to identify the most damaging incentives and redirect resources toward biodiversity-positive outcomes.[74] Similarly, frameworks from OECD and UNDP's BIOFIN program provide step-by-step approaches to assess fiscal incentives, quantify ecological impacts, and integrate biodiversity into budgets—an essential precondition for reform.[75,76]

At the same time, principles are converging around phased and socially equitable transitions, stakeholder engagement, and alignment with development goals. The consensus emphasizes that reform is not simply about removing harmful subsidies, but also covers repurposing financial flows toward nature restoration, climate resilience, and inclusive growth.

The WTO's landmark 2022 fisheries subsidies agreement was the first multilateral treaty to target subsidies that fuel overfishing and illegal, unreported, and unregulated (IUU) fishing. Though awaiting full ratification, it demonstrates the feasibility of targeted collective action.[77]

With these tools and precedents, governments now have a stronger case than ever to restructure existing subsidies to incentivize nature-friendly practices while sustaining production in farming, forestry, and fisheries, where perverse incentives continue to inflict widespread ecological damage. For example, instead of subsidizing agricultural inputs, governments could redirect funds to reward farmers for water and soil conservation or native vegetation restoration—investments that help secure both sustainable yields and long-term ecological benefits.

Still, entrenched interests, fiscal dependency, and political sensitivities impede progress. Without bold leadership and determined action, harmful subsidies will remain a dominant force undermining conservation at a scale no other policy instrument can counterbalance.

Subsidy Reform Spotlight: A Success Story and a Cautionary Tale[78,79]

For much of the 20th century, Costa Rica's economy depended on agriculture, with forests cleared for coffee, fruit, palm oil, rice, and other crops. Government support flowed heavily into farming, especially rice, until international pressure gradually forced a reduction in subsidies.

A turning point came with the introduction of a fuel tax in the late 1990s, which continues to fund the country's pioneering Payments for Ecosystem Services (PES) program. Farmers receive compensation to restore forests and provide public goods such as clean drinking water.

The results have been striking. Over the past generation, nearly one million hectares have cycled through PES contracts, and national forest cover has more than doubled from its 1980s low of 20 percent to over 50 percent today. Recent studies also show that reforested areas are boosting both the quality and supply of water for communities, including the capital city, San José.

In contrast, Nigeria's 2023 reforms removed fuel subsidies overnight, nearly doubling prices. The sudden shock triggered inflation, economic disruption, and widespread protests. Within two weeks, the government reinstated part of the subsidies.

The episode underscores the risks of poorly planned reforms. Abrupt removal without social safety nets or adequate communication imposed heavy costs on households and businesses, reducing incomes and fueling inflation. With fuel and energy subsidies still common worldwide, the lesson is clear: Reforms must be methodical, transparent, and supported by protections for vulnerable populations.

Green Financial Products

Since 2020, the issuance of green financial products and market-based mechanisms aimed at biodiversity conservation and restoration has grown markedly. Instruments such as green bonds, sustainability-linked loans, and private equity funds targeting nature-positive outcomes are increasingly embraced by investors ranging from institutional and sovereign funds to high-net-worth individuals and venture firms.

For green bonds, climate and energy projects still dominate issuance, but the share directed to biodiversity has risen from five percent to 16 percent of the total.[18]

Yet the surge in issuance masks a sobering reality—only a small fraction of this capital reaches biodiversity projects. Unlike philanthropic funding, green investments must generate returns, leaving only net deployed capital available to close the biodiversity finance gap. BloombergNEF reports that only 3.7 percent of all funds raised from green bonds were allocated to biodiversity projects directly.[8] The limited number of bankable projects and revenue streams, dependence on public or philanthropic support, and the added complexity of biodiversity metrics all constrain the flow of funds.

Even so, investor interest is rising sharply. In 2025, issuance of sustainable impact bonds (green, social, sustainable, and sustainability-linked, or GSS+) is expected to surpass US$1 trillion for the second year running.[80] Sustainability-linked loans remain steady, while Bloomberg's GSS index delivered a 9.94 percent return in 2023, underscoring the appeal of sustainable finance.[81]

New instruments with biodiversity relevance are emerging. Environmental impact bonds (EIBs) link repayment to ecological outcomes, shifting risk to investors and funding US projects on water quality, flood management, and climate resilience. Nature performance bonds embed biodiversity or climate KPIs into sovereign debt, with Uruguay's 2022 issuance tied to forest retention.[82]Sustainability-linked loans are also expanding, such as IFC's US$50 million facility for BTG Pactual TIG to support sustainable forestry in Brazil's Cerrado.[83]

Governments, multilateral entities, and corporations are tapping these tools. Starbucks and IKEA have issued bonds to strengthen supply chain sustainability, while Walmart, with HSBC, created a supplier finance program offering preferential credit tied to sustainability performance.[85,86] Private institutions are moving in as well: In 2025, Goldman Sachs launched a biodiversity bond fund in the EU to invest in corporate bonds delivering biodiversity gains alongside financial returns.[87]

Private equity is also growing. Funds in the US and EU now invest directly in forest management, wetland restoration, and other revenue-generating projects with ecological benefits. Ecosystem Investment Partners manages wetland and stream mitigation banks backed by pension funds and high-net-worth investors.[88] Venture funds are emerging, too. Superorganism supports startups in regenerative

Conservation Finance Innovation Spotlight: Tropical Forest Forever Facility (TFFF)[84]

The Tropical Forest Forever Facility (TFFF) is a proposed blended-finance mechanism designed to reward tropical forest countries for maintaining standing forests on a pay for performance basis. The Facility would deliver payments to rainforest nations based on the number of hectares preserved, with deductions for hectares deforested or degraded.

The current proposal from Brazil envisions sponsor countries investing US$25 Billion into a first loss tranche (crucially, these would be loans, not grants), which would then leverage the issuance US$100B in bonds to private investors. The capital would then be invested in a diversified portfolio of mainly emerging market sovereign and corporate bonds, expected to earn enough spread to pay tropical forest countries US$4 per hectare for standing forest.

The Brazilian government is working with a group of sponsor countries, tropical forest countries, NGOs and the World Bank towards a launch by President Lula at COP30. The TFFF is innovative in that it would use the balance sheet of the World Bank, or other multilateral development banks, to generate funds to protect tropical forests without requiring the World Bank's or MDBs' shareholders to inject funds or the sovereign nations who deposit their bonds to lose money.

This mechanism has great potential for allowing the advanced economies, and the World Bank or MDBs, to help pay to protect biodiversity in the developing world without adverse budget consequences. Getting even a small TFFF transaction done by COP30 would be a significant accomplishment.

Wildlife Conservation Bond Spotlight: The "Rhino Bond"[91]

In 2022, the World Bank, in partnership with the Zoological Society of London (ZSL) and others, launched a US$150 million Wildlife Conservation Bond—better known as the Rhino Bond—to support the recovery of South Africa's black rhino population. The bond's returns are tied directly to verified increases in rhino numbers, making it the world's first outcome-based conservation bond. Because of its single-species focus and impact-linked payments, the issuance sold out quickly to institutional and high-net-worth investors.

Unlike conventional bonds, this instrument does not pay coupons from project revenues. Instead, it directs up to US$10 million in "conservation investment payments" to rhino protection projects in South Africa. The Global Environment Facility (GEF) underwrites these payments, and if rhino numbers rise, investors also receive a "conservation success payment" from the GEF in addition to repayment of principal.

The bond was structured by Credit Suisse, with Citi as co–bookrunner and supported by many additional NGO partners alongside the World Bank, ZSL, and GEF. This complex web of financial and technical partners underscores both the innovation and the intricacy of the deal.

The Rhino Bond illustrates how performance-based returns can be incorporated into biodiversity conservation finance. Yet its limitations are clear. Only US$10 million of the US$150 million raised directly supports conservation; the structure depends heavily on external grant support; and the complexity reduces replicability and scalability compared with other sustainable impact bonds.

agriculture and ecosystem monitoring, while Mirova, a global asset management company with a primary focus on sustainable and impact investing, has expanded from climate into natural resources, the circular economy, and sustainable agriculture.[89,90]

Investment Screening and Risk Assessment

Over the past two decades—and especially since 2020—investment screening and risk assessment tools have shifted from fragmented approaches toward emerging global frameworks.

A major milestone was the launch of the Taskforce on Nature-related Financial Disclosure [92], which accelerated corporate assessment and disclosure of biodiversity-related risks. Along with TNFD, complementary standards such as the GRI Biodiversity Standards[93], and the EU's Sustainability Reporting Standards for Biodiversity and Ecosystems have emerged.[94] In parallel, financial-sector frameworks gained traction, such as the Partnership for Biodiversity Accounting Financials (PBAF) Biodiversity Footprint Standard and UNEP's Principles for Responsible Banking (PRB) Nature Target Setting Guidance.[95]

More than 500 organizations across 54 jurisdictions and 62 sectors have committed to TNFD-aligned reporting, including asset managers overseeing US$17.7 trillion in assets and listed companies with a combined market capitalization of US$6.5 trillion.[96] The PBAF Standard now counts 71 partners across 19 countries with US$15 trillion under management, while the PRB has over 345 signatory banks, representing more than half the global banking sector.[97,98] The PRB guidance, produced in collaboration with the Finance for Biodiversity Foundation (FfB), underpins the Finance for Biodiversity Pledge, signed by over 200 financial institutions managing US$26.4 trillion in assets.[99]

Despite this progress, major hurdles remain. No single, globally recognized disclosure standard exists, leaving companies navigating overlapping frameworks—TNFD, GRI, ESRS, and others. Compliance is costly, particularly for companies reliant on complex supply chains in developing regions, leading many to use proxy data or slip into greenwashing.

Assessments reveal the persistent gap between commitments and practice. BloombergNEF's 2024 Biodiversity Finance Factbook found that among 1,784 corporate reports, only 7.7 percent of financial institutions had board-level biodiversity oversight, and just 1.1 percent disclosed biodiversity risks or opportunities.[8] A 2024 Global

Association of Risk Professionals survey likewise showed that only 17 percent of banks and asset managers use metrics or targets to assess biodiversity risks, while 75 percent fail to identify them at all.[100]

These findings underscore a central truth: Tools and standards are advancing quickly, but meaningful application remains limited and inconsistent.

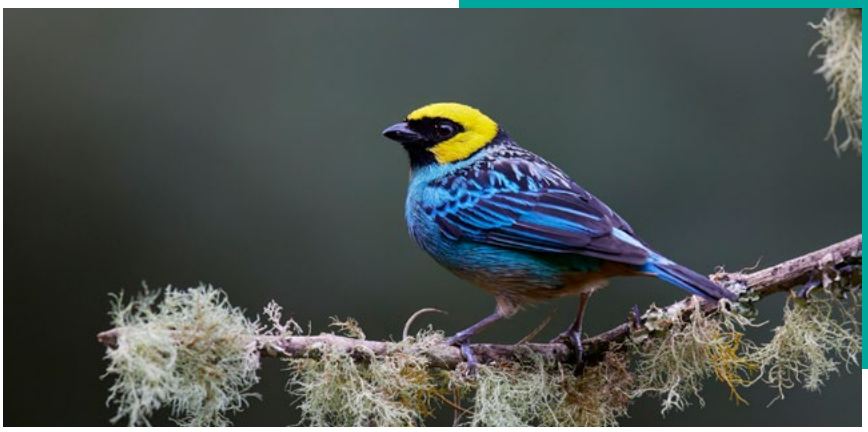
New Resource Usage Fees and Royalties

Domestic budgets are one of the most effective tools to mobilize resources for biodiversity, as emphasized in Target 19 of the Global Biodiversity Framework and the 2020 *Financing Nature* report. Though smaller in scale than subsidy reform, their importance is outsized. Building fiscal capacity is fundamental to countries' long-term ability to finance biodiversity conservation and restoration.

Recent examples show diverse approaches. Indonesia applies timber royalties and forest use fees.[101] Brazil levies concession royalties and compensation for deforestation.[102] Canada uses stumpage fees tied to sustainable practices[103]. Costa Rica backs green bonds with a fuel tax to fund reforestation, while Chile, South Africa, and Australia employ water use fees, and Australia adds water rights trading.[104] Oil, gas, and mineral royalties also contribute revenues in the US, Canada, and Australia.[105–108]

Many programs now blend tools—linking fees to environmental targets, allocating resources through rights trading or auctions, or integrating with carbon markets.

At the international level, China launched its first biodiversity fund with RMB1.5 billion (US$232 million) following its hosting of the CBD COP15.[109] Soon after, the Global Biodiversity Framework Fund was established and is now capitalized at US$386 million from 12 governments.[110]



Fund Innovation Spotlight: The Cali Fund[111,112]

An important innovation emerging from CBD COP16 in Cali, Colombia, is the Cali Fund for the Fair and Equitable Sharing of Benefits from the Use of Digital Sequence Information on Genetic Resources (the Cali Fund). Announced in early 2025 and set for further development at COP17 in 2026, the Fund aims to generate new biodiversity finance and to ensure that local communities and Indigenous peoples share in the benefits derived from commercial use of genetic data.

The Fund addresses a longstanding equity challenge: Resource-rich but economically poor countries often see genetic resources extracted for commercial use by industrialized nations without fair compensation. The Cali Fund seeks to rebalance this by requiring companies that use digital sequence information (DSI)—including pharmaceuticals, cosmetics, food and health supplement producers, biotechnology firms, animal and plant breeders, lab equipment manufacturers, and AI-driven genetic research services—to contribute financially.

Though non-binding and voluntary, proposed contributions are under discussion: about one percent of global profits or 0.1 percent of revenues. Many companies have voiced concerns over these rates, with negotiations expected to continue through CBD COP17. Another obstacle is political disfunction and social unrest in Colombia.

Funds raised will be managed by UNDP and UNEP, with at least 50 percent earmarked for local communities and Indigenous peoples. The remainder will support governments in preparing National Biodiversity Strategies and Action Plans (NBSAPs) and National Biodiversity Finance Plans (BFPs)—the latter now explicitly requiring assessments of subsidies harmful to biodiversity.

IV. Concluding Reflections

History shows that decisive leadership can shift trajectories, especially in times of profound crisis.

Biodiversity loss is accelerating, and climate change is already reshaping all life on Earth. Scientific advances are shedding new light on the biodiversity crisis, but knowledge still lags far behind climate science. As a result, humanity faces profound unknowns: We cannot fully grasp the scale of risks we are unleashing as ecosystems edge toward irreversible tipping points. That very uncertainty makes protecting and restoring nature indispensable as a safety margin for humanity's survival and prosperity.

Expanding financing for biodiversity conservation is essential, yet funding alone will not solve the crisis. Unless biodiversity underpins government policies and anchors corporate and investment decisions, efforts to close the financing gap will remain secondary, and emerging financing mechanisms will fall short of their potential.

The nature and climate crises are planetary in scale. Half measures and incremental fixes are no answer. What is required is bold vision, strong political will, and resolute action. Governments, with authority over policy and the ability to mobilize resources, must lead with purpose. History shows that decisive leadership can shift trajectories, especially in times of profound crisis.

At the height of unchecked resource exploitation in the early 20th century, the United States created its Forest Service and national park system. When ozone depletion threatened the planet in the 1980s, governments forged and enforced global agreements that set direction and spurred industry to deliver solutions at scale. These moments prove that decisive leadership can meet unprecedented challenges.

Similar intervention is required now,—because the fate of Mother Nature, and of humanity, hangs in the balance.

Guest Chapter

The Economics of Biodiversity Conservation

An Update

By Geoffrey Heal, Professor, Columbia Business School

Introduction

Biodiversity is essential to humanity. It provides the oxygen we breathe, which comes from plants as they photosynthesize and from microorganisms in the oceans. It provides the water that we drink, courtesy of the climate system and watersheds, complex multi-species ecosystems, and it provides the food that we eat. Cars, televisions, computers, etc., are nice to have, but oxygen, water, and food are in a different and higher category. Biodiversity was hugely important to the evolution of *Homo sapiens* and its dominance of the earth, and it remains essential to our continued functioning. However, despite the huge importance of biodiversity to us and our survival, it is extremely hard to make money out of conserving biodiversity. Monetizing the returns to biodiversity conservation is difficult: The services provided by biodiversity are mostly public goods, and it is a classic proposition in economics that it is challenging for the provider of public goods to capture the value that they provide.

The food we eat every day is totally dependent on biodiversity. This dependence occurs through several mechanisms. The domestication of crops and animals so that they provide a steady food supply could not have happened without biological diversity. The genetic diversity between, for example, wheat plants in the Neolithic era meant that some yielded more seeds than others: Breeding such plants together over many generations led to the evolution of higher-yielding varieties, a process that continues to the present day. The same process occurred with animals such as cattle, goats, and sheep. Biodiversity in its most elemental form, genetic diversity, continues to underlie our ability to develop foodstuffs. The security of our food supplies also owes a great deal to genetic diversity. A good example is provided by the rice grassy stunt virus, transmitted by the brown planthopper. In the 1970s and 1980s this virus was spreading through the rice crop in Asia, including Indonesia, the Philippines, India, Japan and Vietnam, destroying significant fractions of the rice harvest.

Unchecked, this could have led to a human tragedy on an immense scale, but biological diversity saved the day. At the International Rice Research Institute (IRRI) in the Philippines, researchers found a variety of rice no longer used commercially but resistant to the virus. Its resistance was transferred to commercial varieties, and the problem was solved. Genetic diversity within a species has a huge value as insurance.

In the 2020 *Financing Nature* report, some illustrations of cases are presented in which we can assign at least a partial value to biodiversity. For example, pollinators as an asset are worth at least US$14 trillion, and tropical forests in their carbon capture and storage role are at least US$9.5 trillion. These numbers are strictly lower bounds: We have calculated them by valuing only some of the services these assets provide. Hence, the "at least" before the dollar values. The total values may be a large multiple of these numbers. There are estimates of the value of other aspects of biodiversity, again all partial in nature, all lower bounds.[113] Others have examined the insurance role of biodiversity and asked what an insurance company would charge for the risk mitigation provided by biodiversity. All the resulting numbers are large, confirming that biodiversity has immense economic value, though all are partial and all have a large margin of error around them.

In spite of this immense economic value, the threat to biodiversity has only increased in the five years since the 2020 report: Greenhouse gas emissions and concentrations have increased every year, leading to a worsening of climate change, one of the greatest threats to biodiversity; tens of millions of acres of tropical forests, havens of biodiversity, have been destroyed every year, equivalent to 18 soccer fields every minute; and millions more acres of lower-grade habitat have been destroyed by development. There is appallingly little awareness both of this massive loss of biodiversity and of its vast value to society. Humanity is destroying some of its most important infrastructure, not as a result of careful calculations that we can do without it, but unthinkingly and without any awareness of what we are doing.

Mobilizing Finance

It is worth thinking carefully about why it is so hard to monetize the huge value of biodiversity. Looking at the case of climate change is a good place to start. A stable climate, like biodiversity, is a public good, and is threatened by our extensive and still-growing use of

There is appallingly little awareness both of this massive loss of biodiversity and of its vast value to society. Humanity is destroying some of its most important infrastructure, not as a result of careful calculations that we can do without it, but unthinkingly and without any awareness of what we are doing.

fossil fuels. Governments have made some progress in monetizing the value of a stable climate by requiring the use of carbon credits or carbon offsets. This effectively monetizes the reduction of CO_2 emissions and so the stabilization of the climate. The cost of carbon credits is far too low from an economic perspective –they trade for between US$3 (in the voluntary market) and US$100 (in the compliance market) per ton of CO_2, while estimates of the social cost of carbon, an estimate of the value of the damage done by the emission of a ton of CO_2, range from US$200 to over US$1,000.

Nevertheless, they provide some incentive to reduce CO_2 emissions. It is worth noting that progress in the voluntary carbon market has been held back by problems with the credibility of many of the carbon offsets for sale in that market. Many of them cannot legitimately claim to meet the conditions of additionality and no leakage. Additionality it requires that the reduction in CO_2 emissions represented by the offset would not have occurred if the payment for the offset had not occurred, and no leakage requires that the reduction of CO_2 emissions in one place does not lead to an offsetting increase in another place. Various voluntary bodies claim to certify that CO_2 offsets meet these and other requirements, but not all these claims can be verified.[114,115] This has led to a reluctance on the part of buyers to source offsets in these markets, and sales of voluntary offsets have declined from a high of 516 million tons in 2021 to 84 million in 2024.[20]

Biodiversity loss is harder to visualize and to measure than CO_2 emissions, which are a straightforward function of fossil fuel use. This makes it more challenging to establish a market in biodiversity credits, but it is clearly a route that must be followed. The US has had a market that could be seen as a precursor to a biodiversity credit market for several decades, the market for habitat banking under the Endangered Species Act (ESA). This provision makes habitat for endangered species tradable: A habitat banker can create habitat for an endangered species and then sell this to a developer who wants to destroy equivalent habitat for a development project. There is also a market for endangered species under the ESA: Most famous is that for the Red Cockaded Woodpecker, an endangered species threatened by forest clearing. Landowners are allowed to clear forests that provide habitat for the bird if they can prove that other actions they have taken have increased the total population. If they have more woodpeckers than needed for this purpose, the surplus can be sold (not physically but in title) to another landowner who needs it for compliance. There is some controversy about the effectiveness of habitat banking in species conservation.[116,117]

The Biodiversity Credit Alliance has proposed a definition of a biodiversity credit: "A biodiversity credit is a certificate that represents a measured and evidence-based unit of positive biodiversity outcome that is durable and additional to what would have otherwise occurred."[118] They go on to explain that "a positive biodiversity outcome is an improvement in measures of biodiversity, a reduction in threats to biodiversity, or prevention of an anticipated decline in measures of biodiversity." While satisfactory in principle, these definitions are far from operational, showing that there is still work needed here. None of the structures proposed for biodiversity credits represent a serious attempt to capture the vast economic value of biodiversity described above. None taps directly into the value of the biotech industry or of the contribution of genetic diversity to our food supplies.

Credits or offsets are not the only way of monetizing biodiversity. The 2020 *Financing Nature* report explained how some companies have managed to bundle biodiversity with their regular products and have enhanced the value of these products in the process. The most striking example is ecotourism, where the value of hospitality services is greatly enhanced by being linked to access to charismatic animals. A classic illustration is the safari business in Africa, which provides a significant fraction of the foreign currency earnings of several countries.[119] National Parks in the US operate in the same mode, effectively monetizing the attractions of natural landscapes and their biodiversity, which greatly enhances the public's willingness to pay to visit the region. A different but striking example is Central Park in New York City, a huge recreational facility for city residents and a massive reservoir of biodiversity. Frederick Law Olmsted and Calvert Vaux orginally proposed it, and when asked how the city would pay for it, Olmsted responded that it would generate an increase in proximate property values so great that the extra real estate taxes would more than pay for it. He was, of course, right.[119]

The limited progress that has been made so far on climate stabilization has resulted largely from the fact that there are three technologies that are climate-friendly and at the same time economically competitive: solar power, wind power and battery electric vehicles. These can replace fossil fuels at little or no extra cost, indeed in some cases at a saving,

Although it is still notoriously hard to monetize the services of biodiversity, there has been some progress in recent years.

and are currently the main drivers of progress on the climate front. These technologies were brought into being by government policies, but their costs have fallen to the point that they can now stand on their own. There are currently no equivalents in the biodiversity field: Candidates would include policies and technologies that enable increased agricultural yields without expanding land, or even with reduced land use, as well as policies that facilitate development without habitat destruction–likely through permitting greater density, and mandating more ecologically sensitive development. Combined with charges for the destruction of biodiversity, such technologies and policies could change the outlook for biodiversity.

Although it is still notoriously hard to monetize the services of biodiversity, there has been some progress in recent years. There is limited but growing interest on the part of private investors in investing in biodiversity. Some see this as a commercial opportunity, given the immense value generated by biodiversity, and are looking for a way of monetizing returns generated by species such as *Thermus aquaticus* and its contribution to the PCR. Others are willing to sacrifice returns in exchange for the social benefits from conservation: They are impact investors, to whom the social impacts of their investments are a part of the return, even though a non-cash part.

In response to the growing interest of private investors in biodiversity conservation, the financial community has spent time designing mechanisms to enhance the meager returns to conservation, to making them attractive to investors who seeking a commercial return. The key idea here is to blend funds from different sources. There are three principal sources of finance for biodiversity conservation: funding from multilateral institutions such as the World Bank and the various regional development banks; funding from governments, both local to the country of the project and foreign; and funding from private investors. Of these, the last is potentially by far the largest. Pension funds, insurance companies, mutual funds, and ETFs have the potential to invest vast sums if the risk-return profile is appropriate. The funds of multilateral development agencies (MDAs) are limited by their ability to raise capital, and those of governments are always constrained by competing priorities. The key insight of blended finance is that the funds of governments and MDAs, and perhaps those of private impact investors, can be used to structure the financing of a project in such a way that the return to the private investor is enhanced. The private investor may be given priority in access to returns, or may be insured against certain types of risk. To quote the Financial Times, "The term (blended finance) refers to a concept widely seen as a powerful means of mobilizing funds for development. By smartly deploying small amounts of capital to reduce risks for investors, public or philanthropic bodies can unlock far larger amounts of private sector money." [120]

The World Bank's International Finance Corporation (IFC) has been practicing blended finance for some time. Their support provides an illustration for sustainable cocoa sourcing in the Côte d'Ivoire. They provided a loan of €40 million at a concessionary rate, while other lenders provided the balance of €60 million at market rates. The IFC invested in 173 blended finance

deals in the five years between 2018 and 2023. The IFC is not the only MDA involved in blended finance. The European Investment Bank, the Asian Development Bank, the African Development Bank, and various United Nations agencies, such as the Green Climate Fund, are among a growing group blending concessional public finance with private funds. Although the number of institutions involved is growing, the total value of resources deployed via these deals is still quite small. Somewhere between US$5 billion and US$15 billion of concessional funds are typically deployed annually, catalyzing private investment that results in between US$20 to US$50 billion in total blended finance deals. These totals refer to all types of projects, not just those related to biodiversity.[121]

Also, the Tropical Forest Forever Facility (TFFF) is a proposed blended-finance mechanism designed to reward tropical forest countries for maintaining standing forests on a pay-for-performance basis. Leveraging returns from blended capital market investments in sustainable projects, TFFF would deliver payments to rainforest nations based on the number of hectares preserved, with a deduction for hectares deforested or degraded. The Brazilian government is working with a group of sponsor countries, tropical forest countries, NGOs, and the World Bank towards a launch at the COP30.

How Blended Finance Works

The basic idea behind blending finance from several sources is to use finance from sources that do not insist on a commercial rate of return to create a deal structure in which market-rate oriented investors can obtain market-like rates of return, even though the overall project return is below market. There are several ways in which this can be done.

- Giving **seniority** to private investors, so that they are paid first from the proceeds of the project.
- **Guaranteeing a minimum rate of return**, so that no other investor is paid until they have reached this return. Only then are returns shared with other investors.
- **Guaranteeing a certain return** to private investors, so that it compensates them if the realized return falls below this.
- Investing **concessional finance** in a part of the deal, concessional finance being funds that are willing to accept a return less than the market rate, coming perhaps from impact investors or philanthropic organizations. This makes it possible for the returns to go disproportionately to market-rate investors.
- Non-market investors agree to **assume certain types of risk**, such as exchange rate risks or country-specific political risks.

All of these are ways of making a conservation project more attractive to private investors, to attract more private capital to the project.

In practice, MDAs such as the World Bank's IFC and others use all these options. Conceptually, the key is to be able to raise the return and lower the risk to private investors at the minimum cost to other investors and thus attract the maximum private capital per dollar of non-private funds. This is referred to as "crowding in" private capital, and a measure of its effectiveness is "leverage," the ratio of the private dollars invested in a project to the public and philanthropic investment.

A recent study[122], admittedly of a rather small sample of 73, found the average leverage across blended finance projects to be four—each concessional dollar attracted US$4 of non-concessional funds. Leverage in individual projects ranged from one to 11. An average leverage of four, if it generalizes, suggests that US$100 billion of concessional funds could attract US$400 billion of private funds for a total investment of US$500 billion. However, it is difficult to know whether an average of four is realistic. The sample on which it is based is small, and theoretical modelling[123] suggests that leverage is sensitive to parameters of the problem such as the rates at which returns to conservation investment diminish, something about which we currently know little.

Within the last decade, several private investment management firms have established biodiversity investment funds, and Flammer et al[124] give detailed data on the operation of one such fund. The company, which remains anonymous but is called in the study Biodiversity Investment Manager (BIM), invested in 33 biodiversity conservation deals during the 2020s, most involving blended finance but a few relying only on private finance. These deals covered Latin America, Europe, India, Southeast Asia, and Australasia. Mean deal size was US$22 million, with a mean expected IRR of 13.5 percent. As one might expect, the deals that used purely private finance were on average more profitable than those using blended finance, and they produced outputs that were easier to monetize. The most widely used monetization route was the production of carbon credits resulting from forest conservation, showing that biodiversity conservation is still piggybacking on the financial infrastructure put in place to encourage the reduction of greenhouse gas emissions.

The World Banks's International Finance Corporation has a larger sample of blended finance deals, 173 between 2018 and 2023, with details available on their website. These deals are not restricted to biodiversity conservation but cover all aspects of economic development. The most common investment field is financial institutions and the second is agribusiness and forestry.[125] The IFC gives details of the type of blended finance used in these deals. Half the deals receive concessional funding, either in the form of concessional loans or a junior equity tranche; about one third have risk management provisions, the most common being cross-currency swaps and first loss guarantees. The average size of the IFC's deals is larger than those of the BIM discussed above. It is US$107.9 million[i], with 8.6 percent coming from concessional loans and 2.5 percent from a junior equity tranche, both coming from the IFC, in addition to providing some market-rate funding. The IFC calculates the effective "degree of concessionality" for each of its projects, using an algorithm that is not intuitively obvious. They claim, based on these calculations, that the effective subsidy to the average project is 5.15 percent of the total cost of the project, a surprisingly low number. If accurate, this suggests that many projects can be catalyzed at relatively low cost.

This discussion suggests that it could be possible to raise substantial finance for biodiversity conservation via blended finance, but that there are two obstacles: the availability of concessional finance from MDAs, governments, and philanthropic funds, and the difficulty of monetizing the returns to biodiversity, which is the cause of the low returns to conservation. Both problems could be tackled by determined government actions. Providing more funding for MDAs allowing them to make more creative use of their balance sheets or creating a biodiversity-specific MDA, would tackle the first. The second is harder, but in tackling it, we could learn from our experience with climate change. The benefits from preventing climate change are also hard to monetize, and this has been done to some degree by creating a demand for carbon offsets, which in turn has produced an incentive to reduce carbon emissions. A parallel move in the biodiversity field would be to create biodiversity offsets, forest offsets, or habitat offsets.

i. With a standard deviation of $213 million, very considerable variation in deal size.

Artificial Intelligence and Conservation

Artificial intelligence (AI) has the potential to contribute to biodiversity conservation. Two mechanisms have been used to date, habitat monitoring, and species population monitoring.

AI can scan images of landscapes from drones or satellites and detect and categorize changes, picking out loss of forests or other important habitats, the development of illegal roads or tracks, and other changes in the landscape that are likely to be associated with threats to biodiversity. However, AI cannot follow up: This requires government action, but it can greatly reduce the cost of monitoring threats to biodiversity and increase the risk of discovery for illegal operators.

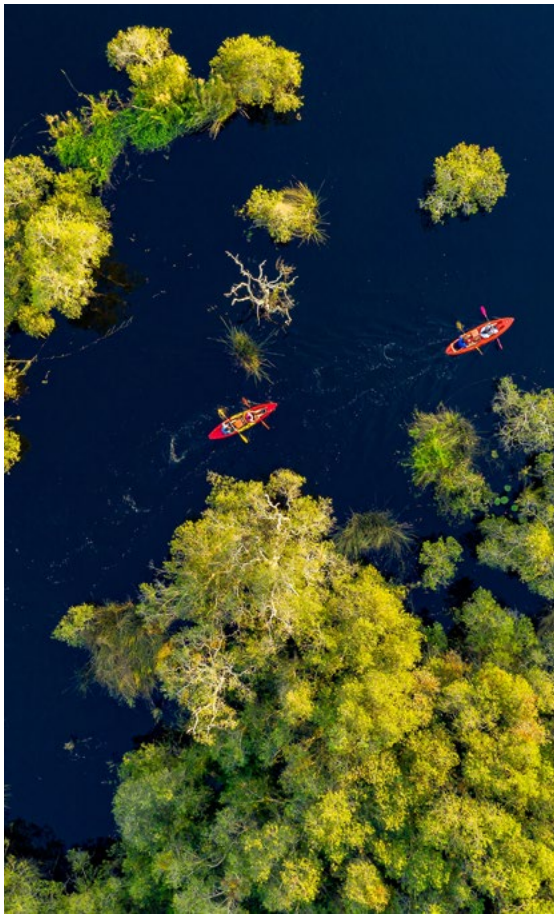
The same is true of monitoring the populations of endangered species. Cameras in forests can record and identify nearby animals, and perhaps more surprisingly microphones in forests can identify from their calls a wide range of birds, mammals, and insects, and detect changes in populations. They can also identify noises associated with threats to biodiversity, such as logging, the sound of vehicles, or other noises from humans. As with satellite or drone monitoring, acoustic monitoring cannot follow through and act: this requires government action, but it can greatly reduce the cost of monitoring.

There is a downside to the use of AI because it requires massive amounts of electrical energy to run its servers. If any of this is generated by fossil fuels then it contributes to climate change and worsens biodiversity loss. In addition, the data centers in which AI servers operate have huge physical footprints. Meta is currently planning a data center in Virginia that could occupy 1,400 acres. The growth of AI increases pressure on natural habitats and threatens biodiversity.

Conclusion

Biodiversity matters, yet we continue to destroy it despite our understanding of how essential it is to our daily lives. The fundamental economic problem is that it is hard to generate a monetary value from the services that biodiversity provides, even though these are massively important and largely irreplaceable. Financial institutions, NGOs, local governments, and the private sector are making some progress in developing green finance, packaging biodiversity conservation investments in a way that can make them attractive to investors, testing financial instruments, policies and programs as we learn what works. We have the tools, but a substantive resolution of the problem awaits government actions that attribute a cost to the destruction of biodiversity and a value to its conservation. When the market fails so egregiously, policymakers have to step in.

We have the tools, but a substantive resolution of the problem awaits government actions that attribute a cost to the destruction of biodiversity and a value to its conservation.



References

1. PricewaterhouseCoopers. PwC boosts global nature and biodiversity capabilities with new Centre for Nature Positive Business, as new research finds 55% of the world's GDP - equivalent to $58 trillion - is exposed to material nature risk without immediate action. *PwC* https://www.pwc.com/gx/en/news-room/press-releases/2023/pwc-boosts-global-nature-and-biodiversity-capabilities.html (2023).
2. Guynup, S. Global study of 71,000 animal species finds 48% are declining. *Mongabay Environmental News* https://news.mongabay.com/2023/06/global-study-of-71000-animal-species-finds-48-are-declining/ (2023).
3. *WWF Living Planet Report 2024 - A System in Peril*. https://wwflpr.awsassets.panda.org/downloads/2024-living-planet-report-a-system-in-peril.pdf (2024).
4. Water Resources Mission Area. Uncertainties: global change - The loss of the North American grassland biome | U.S. Geological Survey. *USGS* https://www.usgs.gov/media/images/uncertainties-global-change-loss-north-american-grassland-biome (2023).
5. The Global Value of Mangroves for Risk Reduction. *Coastal Resilience* https://coastalresilience.org/global-value-mangroves/.
6. Challenges. *American Bird Conservancy* https://abcbirds.org/program/wind-energy-and-birds/challenges/.
7. Welz, A. Birds vs. Wind Turbines: New Research Aims to Prevent Deaths. *Yale E360* https://e360.yale.edu/features/wind-turbine-bird-collision-solutions.
8. Bromley, H. *Biodiversity Finance Factbook Biodiversity COP16 Edition*. https://assets.bbhub.io/professional/sites/24/Biodiversity-Finance-Factbook_COP16.pdf (2024).
9. IUCN. The IUCN Red List of Threatened Species. *IUCN Red List of Threatened Species* https://www.iucnredlist.org/en (2025).
10. WRI. RELEASE: Global Forest Loss Shatters Records in 2024, Fueled by Massive Fires. *World Resources Institute* https://www.wri.org/news/release-global-forest-loss-shatters-records-2024-fueled-massive-fires (2025).
11. Convention on Wetlands. *Global Wetland Outlook 2025: Valuing, Conserving, Restoring and Financing Wetlands*. https://www.global-wetland-outlook.ramsar.org/ (2025) doi:10.69556/GWO-2025-eng.
12. UNEP-WCMC & IUCN. *Protected Planet Report 2024*. https://pp-digital-report-document.s3.eu-west-2.amazonaws.com/Protected+Planet+Report+2024.pdf (2024).
13. CBD. COP15: Nations Adopt Four Goals, 23 Targets for 2030 In Landmark UN Biodiversity Agreement. *Convention on Biological Diversity* https://www.cbd.int/article/cop15-cbd-press-release-final-19dec2022 (2022).
14. Deutz, A. *et al. Financing Nature: Closing the Global Biodiversity Financing Gap*. https://www.paulsoninstitute.org/wp-content/uploads/2020/10/Updated-10.23.20-FINANCING-NATURE_Exec.-Summary_Final-with-endorsements_101420.pdf (2020).
15. Jones, N., Kuehl, J., Gerasimchuk, I., Do, N. & Natalie Jones, Jonas Kuehl, Ivetta Gerasimchuk, Nhat Do. How the G7 Can Advance Action on Fossil Fuel Subsidies in 2025 |. *International Institute for Sustainable Development* https://www.iisd.org/articles/deep-dive/how-g7-can-advance-action-fossil-fuel-subsidies-2025 (2025).
16. UNDP launches new guidance for countries to finance ambitious biodiversity goals, repurposing harmful subsidies. *BIOFIN* https://www.biofin.org/news-and-media/undp-launches-new-guidance-countries-finance-ambitious-biodiversity-goals (2024).
17. Smith, M. *et al. State of Investment in Nature-Based Solutions for Water Security 2025*. https://www.forest-trends.org/wp-content/uploads/2025/06/Doubling-Down-on-Nature.pdf (2025).
18. UNEP-FI. Trends and innovations in nature finance: what to look out for in 2025. *UN Environment Programme Finance Initiative* (2025).
19. Cuming, V. & Bromley, Hugh. *Biodiversity Finance Factbook 1H 2023 Edition*. https://assets.bbhub.io/professional/sites/24/REPORT_Biodiversity_Finance_Factbook_master_230321.pdf (2023).
20. Forest Trends' Ecosystem Marketplace. *State of the Voluntary Carbon Market 2025*. https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202025/Ecosystem%20Marketplace%20State%20of%20the%20Voluntary%20Carbon%20Market%202025.pdf (2025).
21. OECD. *Biodiversity and Development Finance 2015-2022: Contributing to Target 19 of the Kunming-Montreal Global Biodiversity Framework*. (OECD Publishing, Paris, 2024). doi:10.1787/d26526ad-en.
22. Thomson, E. *Companies Profit, Forests Fall: Everyone Pays the Price*. https://forest500.org/wp-content/uploads/2025/04/Forest500_Report_2025.pdf (2025).
23. Forest Trends. Supply Change. *Forest Trends* https://www.forest-trends.org/initiatives/supply-change/ (2021).
24. Tompkins, L. Hundreds of Companies Promised to Help Save Forests. Did They? *The New York Times* (2021).
25. WWF. *Destroying Native Vegetation to Produce Beef and Soy Is the Main Driver of Biodiversity Loss in the Cerrado and Amazon*. https://wwfbr.awsassets.panda.org/downloads/wwf_notatecnica_desmate_e_perda_de_especies_2021_ingles_v2.pdf (2021).
26. Johnson, L. Congressional Dems press US financial institutions on climate alliance exits. *ESG Dive* https://www.esgdive.com/news/congressional-dems-press-us-banks-investment-managers-nzba-nzam-ca-100-exits/748373/ (2025).
27. IPBES. *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. https://zenodo.org/records/6417333 (2019) doi:10.5281/zenodo.6417333.
28. He, T. *et al.* Meta-analysis shows the impacts of ecological restoration on greenhouse gas emissions. *Nat Commun* 15, 2668 (2024).
29. Protecting 30% of the Planet for Nature: Economic Analysis. *Campaign For Nature* https://www.campaignfornature.org/protecting-30-of-the-planet-for-nature-economic-analysis (2020).
30. Gross, S. *Renewables, Land Use, and Local Opposition in the United States*. https://www.brookings.edu/wp-content/uploads/2020/01/FP_20200113_renewables_land_use_local_opposition_gross.pdf (2020).
31. Fleming, P. A. All that glitters – Review of solar facility impacts on fauna. *Renewable and Sustainable Energy Reviews* 224, 115995 (2025).
32. Meng, L., Liu, P., Zhou, Y. & Mei, Y. Blaming the wind? The impact of wind turbine on bird biodiversity. *Journal of Development Economics* 172, 103402 (2025).

33. Gaworecki, M. Is planting trees as good for the Earth as everyone says? *Mongabay Environmental News* (2021).

34. HKBWS. Black-faced Spoonbill Global Population Exceeds 7,000 Deep Bay Decline Demands Urgent Attention. *Hong Kong Bird Watching Society* https://cms.hkbws.org.hk/cms/en/hkbws/work/endangered-species/bfs-en/bfs-census-2025-en.

35. Lai, Y. et al. Endangered Black faced Spoonbills alter migration across the Yellow Sea due to offshore wind farms. Ecology 106, e4485 (2025).

36. Brown, D. & Harris, J. *From Forest to Electric Vehicles*. https://mightyearth.org/wp-content/uploads/2024/05/FromForests-toEVs.pdf (2024).

37. Mowbray, S. Endangered Andean cat is imperiled by climate change and its solutions. *Mongabay Environmental News* (2025).

38. COP30 announces ambitious Thematic Days, invites the world to Belém. *COP30 Brasil - Amazônia - Belém, 2025* https://cop30.br/en/news-about-cop30/cop30-announces-ambitious-thematic-days-invites-the-world-to-belem (2025).

39. Vicarelli, M. *et al.* On the cost-effectiveness of Nature-based Solutions for reducing disaster risk. *Science of The Total Environment* 947, 174524 (2024).

40. Silan, J. G., Xu, S. & Apanada, M. J. Dual Harvest: Agrivoltaics Boost Food and Energy Production in Asia. (2024).

41. Nature Based Solutions Initiative. Nature and climate: welcome ambition, but policy contradictions threaten delivery. *Nature Based Solutions Initiative at University of Oxford* (2025).

42. Nature and climate: welcome ambition, but policy contradictions threaten delivery. *Nature-based Solutions Initiative* https://www.naturebasedsolutionsinitiative.org/news/nature-and-climate-welcome-ambition-but-policy-contradictions-threaten-delivery/.

43. EIB. Completed project – Tafila wind farm. *European Investment Bank* https://www.eib.org/en/publications/interactive/the-eib-outside-the-eu-2017/completed-project-tafila-wind-farm/ (2017).

44. International Finance Corporation. Tafila Region Wind Power Projects: Cumulative Effects Assessment. (2017) doi:10.1596/26322.

45. Namrouqa, H. New guide seeks to protect migratory birds from risks of wind farms. *Jordan Times* (2018).

46. Environmental. *Jordan Wind Project Company* https://jordanwind.com/environmental/.

47. Twidale, S. Global carbon markets value hit record $949 bln last year. *Reuters* (2024).

48. California Air Resources Board. ARB Offset Credit Issuance Table. (2025).

49. California Air Resources Board. Direct Environmental Benefits in the State (DEBS). *Compliance Offset Program* https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program/direct-environmental-benefits?

50. California Air Resources Board. California Climate Investments Funded Programs. *California Climate Investments* https://ww2.arb.ca.gov/our-work/programs/california-climate-investments/california-climate-investments-funded-programs.

51. Wu, Y. China Certified Emission Reduction (CCER) Program: Investor Prospects. *China Briefing* (2024).

52. ICAP. New Zealand Emissions Trading Scheme.

53. Yoo, J. I. Introduction to Korea Emission Trading Scheme; Korean Offsetting program. (2018).

54. Ghosh, A. & Yeong, A. zulaika. Japan's GX-ETS to accept international removal voluntary credits for compliance obligations. *S&P Global Commodity Insights* (2024).

55. Rubicon Carbon. Rubicon Carbon Enters into Agreement with Microsoft for Nature-based Carbon Removal Credits. https://blog.rubiconcarbon.com/rubicon-carbon-microsoft-carbon-removal/ (2025).

56. Bernal, A. Reforestation in the Voluntary Carbon Market: What are we planting and why? *Hummingbirds* https://hummingbirds.eu/reforestation-in-the-voluntary-carbon-market-what-are-we-planting-and-why/ (2024).

57. Mooney, A. Global warming reaches 1.58C over 12 months. *Financial Times* (2025).

58. Tanguy, A. The French National Adaptation Plan (PNACC-3) as an adaptive instrument for regions and sectors. *IDDRI* https://www.iddri.org/en/publications-and-events/blog-post/french-national-adaptation-plan-pnacc-3-adaptive-instrument (2019).

59. Oehling, D. *et al. The Private Equity Opportunity in Climate Adaptation and Resilience*. https://web-assets.bcg.com/b0/07/11ba848b4ae8a55e19ce9955aa92/the-private-equity-opportunity-in-climate-adaptation-and-resilience-may-2025.pdf (2025).

60. *Adapt Now: A Global Call for Leadership on Climate Resilience*. https://gca.org/wp-content/uploads/2019/09/GlobalCommission_Report_FINAL.pdf (2019).

61. *Nature-Based Solutions and Water Security: An Action Agenda for the 21st Century*. (Elsevier, San Diego, 2021).

62. Forest Trends. Restore to Win: How an Agreement Between the Countryside and the City will Make It Possible to Rehabilitate a Vital Wetland in the Heights of Lima, Peru. *Forest Trends Blog* https://www.forest-trends.org/blog/restore-to-win-how-an-agreement-between-the-countryside-and-the-city-will-make-it-possible-to-rehabilitate-a-vital-wetland-in-the-heights-of-lima-peru/ (2021).

63. Jakobs, E. Aligning Business Strategy with Nature: The Role of Taskforce on Nature-Related Financial Disclosures (TNFD). *California Management Review* (2025).

64. Roadmap towards Nature Credits. (2025).

65. Nature Repair Market. *Department of Climate Change, Energy, the Enviornment and Water* https://www.dcceew.gov.au/environment/environmental-markets/nature-repair-market (2025).

66. US EPA, O. Green Banks. https://www.epa.gov/statelocalenergy/green-banks (2022).

67. Barbier, E. B. & Troëng, S. Carbon Taxes Are Key To Stop Deforestation. *Green Fiscal Policy Network* https://greenfiscalpolicy.org/blog/carbon-taxes-are-key-to-stop-deforestation/ (2020).

68. Costa Rica's Future Flows Securitization Bill for Protected Areas provides a replicable model for unlocking public-private finance. *BIOFIN* https://www.biofin.org/news-and-media/costa-ricas-future-flows-securitization-bill-protected-areas-provides-replicable (2025).

69. Green Finance Institute. Revenues for Nature Guidebook Series: Biodiversity Net Gain, England. (2024).

70. Green Finance Institute. Revenues for Nature Guidebook Series: Habitat Banks, Colombia. (2024).

71. International Advisory Panel on Biodiversity Credits (IAPB). Framework for High Integrity Biodiversity Credit Markets. (2024).

72. Gradeckas, S. Deep Dive: Biodiversity Credit Sales. *Bloom Labs* https://sgradeckas.substack.com/p/deep-dive-biodiversity-credit-sales (2025).

73. Gradeckas, S. Bloom Labs: Biodiversity Credit Schemes. (2025).

74. OECD. Policy Instruments for the Environment | PINE | Database. vol. 232 https://doi.org/10.1787/be984b0a-en (2025).

75. Matthews, A. & Karousakis, K. *Identifying and Assessing Subsidies and Other Incentives Harmful to Biodiversity: A Comparative Review of Existing National-Level Assessments and Insights for Good Practice*. vol. 206 https://www.oecd.org/en/publications/identifying-and-assessing-subsidies-and-other-incentives-harmful-to-biodiversity_3e9118d3-en.html (2022).

76. Arlaud, M. *et al. The Nature of Subsidies: A Step-by-Step Guide to Repurpose Subsidies Harmful to Biodiversity and Improve Their Impacts on People and Nature*. https://www.biofin.org/sites/default/files/content/knowledge_products/The%20Nature%20of%20Subsidies%20%28Web%29.pdf (2024).

77. Agreement on Fisheries Subsidies. in vol. WT/MIN(22)/33 9 (World Trade Organization, Geneva, 2022).

78. Barton, D. N. Payments for ecosystem services: Costa Rica's recipe. *International Institute for Environment and Development* https://www.iied.org/payments-for-ecosystem-services-costa-rica-s-recipe (2013).

79. Mbaegbu, R. & Nwanze, C. AD958: Nigerians say country is headed in wrong direction, oppose fuel-subsidy removal. (2025).

80. The World Bank. *Green, Social, Sustainability, and Sustainability-Linked (GSSS) Bonds Market Update*. https://thedocs.worldbank.org/en/doc/dc1d70af2c-45cb377ed3ee12b27399d4-0340012024/original/GSSS-Quarterly-Newsletter-Issue-No-6.pdf (2024).

81. Gardiner, J. & Freke, T. Green bonds reached new heights in 2023. *Bloomberg* (2024).

82. Padin-Dujon, A. & Filewod, B. What are sustainability-linked bonds and how can they help developing countries? *Grantham Research Institute on climate change and the environment* https://www.lse.ac.uk/granthaminstitute/explainers/what-are-sustainability-linked-bonds-and-how-can-they-help-developing-countries/ (2023).

83. PIG. BTG Pactual TIG, Conservation International, and International Finance Corporation Win Environmental Finance's 2025 Sustainability-Linked Loan of the Year. (2025).

84. TFFF. *An Innovative Financing Mechanism to Incentivize Long-Term Forest Conservation at Scale - Concept Note 3.0*. https://tfff.earth/wp-content/uploads/2025/08/TFFF-Concept-Note-3.0-202508-FINAL.pdf (2025).

85. HSBC. Walmart Spurs Suppliers to Cut Carbon With Special Finance Terms. https://www.business.us.hsbc.com/en/insights/sustainability/walmart-and-hsbc-establish-a-sustainable-supply-chain-finance-program (2023).

86. Starbucks. Starbucks Issues the First U.S. Corporate Sustainability Bond. *Starbucks* (2016).

87. Johnson, L. Goldman Sachs launches biodiversity bond fund to support SDGs. *ESGDive* (2025).

88. Our Approach. *Ecosystem Investment Partners* https://ecosystempartners.com/.

89. Superorganism. *Superorganism* https://www.superorganism.com/.

90. Segal, M. Mirova Raises $233 Million for Environmental Solutions Impact Private Equity Fund. *ESG Today* https://www.esgtoday.com/mirova-raises-233-million-for-environmental-solutions-impact-private-equity-fund/ (2024).

91. GEF. Wildlife Conservation Bond boosts South Africa's efforts to protect black rhinos and support local communities. *Global Environment Facility* https://www.thegef.org/newsroom/press-releases/wildlife-conservation-bond-boosts-south-africas-efforts-protect-black (2022).

92. TNFD. Recommendations-of-the-Task-force-on-Nature-related-Financial-Disclosures. (2023).

93. Global Reporting Initiative. *GRI 101: Biodiversity 2024*. (Global Sustainability Standards Board (GSSB), 2024).

94. EFRAG. Exposure Draft ESRS E4 Biodiversity and Ecosystems. (2025).

95. PBAF. The PBAF Standard enables financial institutions to assess and disclose impact and dependencies on biodiversity of loans and investments. *Partnership for Biodiversity Accounting Financials* https://pbafglobal.com/.

96. TNFD, E. Over 500 organisations and $17.7 trillion AUM now committed to TNFD-aligned risk management and corporate reporting. https://tnfd.global/over-500-organisations-and-17-7-trillion-aum-now-committed-to-tnfd-aligned-risk-management-and-corporate-reporting/ (2024).

97. UNEP-FI. Principles for Responsible Banking. https://www.unepfi.org/banking/bankingprinciples/.

98. PBAF. Financial institutions. https://pbafglobal.com/financial-institutions-taking-action.

99. FfB. Home. *Finance for Biodiversity Foundation* https://www.financeforbiodiversity.org/.

100. GARP. *Global Survey of Nature Risk Management at Financial Firms*. https://www.garp.org/white-paper/global-survey-nature-risk-2024 (2024).

101. Legal framework for forest management and timber trade of Indonesia. *Timber Trade Portal* https://www.timbertradeportal.com/en/indonesia/74/legal-framework.

102. Lopes, C. L., Nardi, J. & Chiavari, J. *Regulating Forest Compensation For Legal Deforestation in Brazil*. https://www.climatepolicyinitiative.org/wp-content/uploads/2021/08/Summary-Forest-Compensation.pdf (2021).

103. Nandalall, A. Turning the Tables: How Canada can shake off the U.S. softwood lumber dispute and grow the sector. *Cole Heideman* https://ca.rbcwealthmanagement.com/cole-heideman/blog/4498201-Turning-the-Tables-How-Canada-can-shake-off-the-US-softwood-lumber-dispute-and-grow-the-sector?lang=en_US (2025).

104. Liquid assets: Where to look for sensible water policies. *The Economist* (2018).

105. Kaplan, L. $755 billion: The energy sector's revenue contribution to Canadian governments, 2000–2021. *Canadian Energy Centre* https://www.canadianenergycentre.ca/755-billion-the-energy-sectors-revenue-contribution-to-canadian-governments-2000-2021/ (2023).

106. The Australian Oil & Gas Industry's Tax and Royalties Contribution. *Australian Energy Producers* https://energyproducers.au/fact_sheets/the-australian-gas-industrys-tax-and-royalties-contribution/.

107. Constable, T. Australian Minerals Sector Achieves Record Tax and Royalty Payments. *Minerals Council of Australia* https://minerals.org.au/resources/australian-minerals-sector-achieves-record-tax-and-royalty-payments/ (2024).

108. Hein, J. F. & Cecot, C. Mineral Royalties: Historical Uses and Justifications. *SSRN Journal* (2017) doi:10.2139/ssrn.2918357.

109. Stanway, D. China's Xi launches $232 mln biodiversity protection fund for developing countries. *Reuters* (2021).

110. Global Biodiversity Framework Fund. *Global Environment Facility* https://www.thegef.org/what-we-do/topics/global-biodiversity-framework-fund (2025).

111. CBD. The Cali Fund launches in the margins of the resumed session of COP16. (2025).

112. Spring, J. & Griffin, O. UN nature summit agrees on payments for use of genetic information. *Reuters* (2024).

113. Heal, G. *Endangered Economies: How the Neglect of Nature Threatens Our Prosperity*. 240 Pages (Columbia University Press, 2016).

114. Calel, R., Colmer, J., Dechezleprêtre, A. & Glachant, M. Do Carbon Offsets Offset Carbon? *American Economic Journal: Applied Economics* 17, 1–40 (2025).

115. Heal, G. *Greens Are Right to Be Suspicious of Carbon Offsets*. w33170 http://www.nber.org/papers/w33170.pdf (2024) doi:10.3386/w33170.

116. Scott, J. M., Goble, D. D. & Davis, F. W. Conservation Banking. in *Endangered Species Act at Thirty, Volume 2: Conserving Biodiversity in Human-Dominated Landscapes* 228–243 (Island Press, Washington, 2006).

117. Scott, J. M., Goble, D. D. & Davis, F. W. Arbitrage and Options. in *Endangered Species Act at Thirty, Volume 2: Conserving Biodiversity in Human-Dominated Landscapes* 218–227 (Island Press, Washington, 2006).

118. BCA. *Definition of a Biodiversity Credit*. https://www.biodiversitycreditalliance.org/wp-content/uploads/2024/05/Definition-of-a-Biodiversity-Credit-Rev-220524.pdf (2024).

119. Heal, G. *Nature and the Marketplace: Capturing The Value Of Ecosystem Services*. (Island Press, Chicago, 2012).

120. Mundy, S. The wasted potential of 'blended finance'. *Financial Times* (2025).

121. OECD. Increasing development finance efforts to scale private finance mobilised and its impact. (2025).

122. Apampa, A. Blended finance leverage ratio. *Convergence News* https://www.convergence.finance/news/4cC8kVJXvOFZDVxGQ6HLNH/view (2023).

123. Flammer, C., Giroux, T. & Heal, G. M. The Economics of Blended Finance. *AEA Papers and Proceedings* 115, 397–402 (2025).

124. Flammer, C., Giroux, T. & Heal, G. M. Biodiversity finance. *Journal of Financial Economics* 164, 103987 (2025).

125. Flammer, C., Giroux, T. & Heal, G. M. Blended Finance. SSRN Scholarly Paper at https://papers.ssrn.com/abstract=4779861 (2024).

Authors

Eric Swanson, Geoffrey Heal, Li Zhu, Rose Niu, Terry Townshend, Jinsui Song

Contributors

Simon Zadek, Johanna Costigan

Acknowledgments

The authors wish to express their sincere appreciation to Henry M. Paulson Jr., Chairman of the Paulson Institute, for his visionary insight and inspiration, and to Deborah Lehr, Vice Chairman and Executive Director, for her leadership and strategic guidance.

About The Paulson Institute

The Paulson Institute is a non-partisan, independent "think and do tank" dedicated to fostering global relationships that advance economic prosperity, promote sustainable growth, and maintain global order in a rapidly evolving world. We operate at the intersection of economics, financial markets, and environmental protection by promoting market-based solutions to ensure green economic growth. Founded in 2011 by former U.S. Treasury Secretary Henry M. Paulson, Jr., the non-partisan Paulson Institute is based in Chicago with offices in Washington and Beijing.

Photo Credits

Cover	Photo by Robert John Photography / Getty Images
Page 2	Photo by Robert John Photography / Getty Images
Page 4	Photo by drdonut / Adobe Stock
Page 5	Photo by Giordano Cipriani / Getty Images
Page 7	Photo by George Karbus Photography / Getty Images
Page 8	Photo by EJ_Rodriquez / Getty Images
Page 9	Photo by Sakorn Sukkasemasakorn / Getty Images
Page 10	Photo by Chayanan Narksompong/ Getty Images
Page 11	Photo by Marc Rauw / Getty Images
Page 13	Photo by Rapeepong Puttakumwong / Getty Images
Page 15	Photo by Patchareeporn Sakoolchai / Getty Images
Page 16	Photo by Buena Vista Images / Getty Images
Page 17	Photo by Ashley Cooper / Getty Images
Page 21	Photo by zhihao / Getty Images
Page 22	Photo by Antonio Busiello / Getty Images (top photo) Photo by Erni / Adobe Stock (bottom photo)
Page 29	Photo by Juan Carlos Vindas / Getty Images
Page 30	Photo by Hans Wismeijer / Getty Images
Page 31	Photo by LeoMercon / Getty Images
Page 32	Photo by Marcio Sa / Getty Images
Page 34	Photo by AlexGo / Adobe Stock
Page 35	Photo by Earnest Tse / Adobe Stock
Page 36	Photo by Ayzenstayn / Getty Images
Page 37	Photo by Sumith Nunkham / Getty Images

PAULSON INSTITUTE