GLOBAL LAND OUTLOOK

Working Papers

United Nations
Convention to Combat Desertification

FINANCING LAND

Transformative Pathways to Resilient Futures

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ECONOMICS OF LAND DEGRADATION INITIATIVE

UFZ HELMHOLTZ Zentrum für Umweltforschung

FINANCING LAND

Transformative Pathways to Resilient Futures

Financing Land: Transformative Pathways to Resilient Futures

Global Land Outlook Working Paper

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Purpose

This paper is a working paper by the ELD initiative under the Global Land Outlook 3 currently developed by the UNCCD Science-Policy Interface scheduled for publication ahead of UNCCD COP 17 in Ulaanbaatar, Mongolia, in 2026. The working paper will also serve as the basis for a GLO3 chapter on “Financing Land: Transformative Pathways to Resilient Futures”.

This working paper synthesizes scientific and other knowledge on the topic of “Financing Land: Transformative Pathways to Resilient Futures”, including through selected case study examples from around the world. It applies a systems transformation perspective to the role and impact of finance and financial mechanisms in preventing land degradation (phasing out) and accelerating land restoration and resilience (phasing in).

Objectives

1. Demonstrate the urgency for transformative change through increased investment for resilient land and water systems to support human security.
2. Discuss the need for transformation as intentional change and necessary enabling conditions so that financial flows lead to substantial transformation and, in turn, make investment in this transformation attractive.
3. Identify the investment opportunities for resilient land and water systems, discuss promising financing instruments and investments pathways and illustrate the interplay between finance and transformative change (how to enhance phasing-in and phasing-out processes).
4. Give decision makers guidance on creating investment opportunities for different financial mechanisms and investments pathways with a specific view on attracting private capital.

List of acronyms

AUM	assets under management
BCR	benefit-cost ratio
BER	Biodiversity Expenditure Review
BIOFIN	Biodiversity Finance Initiative
CBD	Convention on Biodiversity
COFOG	Classification of the Functions of Government
CSO	civil society organization
CSR	corporate social responsibility
D-SLM	Drought-smart land management
ESG	environment, social, and governance
GEF	Global Environmental Facility
GHG	greenhouse gas
ha	hectare
IFPRI	International Food Policy Research Institute
IGWDP	Indo-German Watershed Development Programme
ILK	Indigenous and local knowledge
LDN	land degradation neutrality
MDB	multi-lateral development bank
NABARD	National Bank for Agriculture and Rural Development
NbS	nature-based solutions
NGO	non-governmental organization
ODA	official development assistance
PES	payment for ecosystem services
SeyCCAT	Seychelles Conservation and Climate Adaptation Trust
SLM	sustainable land management
SSA	sub-Saharan Africa
TNC	The Nature Conservancy
TNFD	Taskforce on Nature-related Financial Disclosures
USD	United States Dollar

Glossary

Adaptation: The process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, it is the process of adjustment to actual climate, whereas in human systems, it includes adjustments to moderate harm or take advantage of beneficial opportunities.

Carbon market: A trading system where carbon credits—representing one ton of reduced, avoided, or sequestered—are bought and sold to meet climate targets. These markets, which can be mandatory (compliance) or voluntary, aim to reduce emissions efficiently by putting a financial price on pollution and incentivizing cleaner practices.

Cropland: Any geographic area with a predominant cultivated surface cover of either herbaceous crops or woody crops, including areas planted with trees for afforestation purposes and forest plantations.

Desertification: Land degradation in arid, semi-arid, and dry subhumid areas resulting from many factors, including climatic variations and human activities.

Enabling conditions: Conditions that enhance the feasibility of adaptation and mitigation options. Enabling conditions include finance, technological innovation, strong policy instruments, institutional capacity, multilevel governance and changes in human behaviour and lifestyles.

Financial instrument: Grants, debt instruments (concessional or non-concessional loans, reimbursable grants, bonds and asset-backed securities), equities and shares in collective investment vehicles, insurances. The financial instrument classification also includes instruments that do not necessarily generate a flow (i.e. contingent liabilities) such as guarantees.

Guarantees: Legally binding agreements under which the guarantor agrees to pay part or the entire amount due on a loan, equity or other instrument in the event of nonpayment by the obligor or loss of value in case of investment. The term guarantee refers to both guarantee and insurance scheme.

Impacts: The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather/climate events), exposure and vulnerability. Impacts generally refer to effects on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services) and infrastructure. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial.

Impact investment: Investments made into companies, organizations, and funds with the intention to generate social and environmental impact alongside a financial return. Impact investments can be made in both emerging and developed markets, and target a range of returns from below market to market rate, depending upon the circumstances.

Incentive(s): A tangible or intangible reward, financial or non-financial, meant to encourage a person or group to behave in a certain way, to do certain things, or to achieve certain goals, including policy or regulatory, financial, and fiscal incentives.

Insetting: Investments by a company or group of value-chain actors in emissions reduction, carbon sequestration, or ecosystem restoration activities within their own value chain, aimed at improving environmental performance, reducing risk, and generating measurable sustainability outcomes.

Insurance: Provides individual institutional units exposed to certain risks with financial protection against the consequences of the occurrence of specified events; it is also a form of financial intermediation in which funds are collected from policyholders and invested in financial or other assets which are held as technical reserves to meet future claims arising from the occurrence of the events specified in the insurance policies.

Investment: Putting money into an activity with the expectation of gaining revenue, which upon thorough analysis, has a high degree of security of principle, as well as security of return, within an expected period of time, and the use of non-grant instruments allocating financial resources, public or private, for projects, programmes and other relevant activities related to implementation.

Land degradation: A deterioration of land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity, or value to humans.

Natural capital: The stock of natural resources that provides flows of valuable goods and services.

Nature-based solutions: Actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.

Resilience: The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning. It includes the capacity for self-organization and the capacity to adapt to stress and change.

Restoration: The process of assisting the recovery of an ecosystem that has been degraded. Restoration seeks to re-establish the pre-existing ecological structure and function, including biotic integrity

Risk: The potential for adverse consequences for human or ecological systems, recognizing the diversity of values and objectives associated with such systems.

Sustainable land management: The use of land resources – including soils, water, vegetation, and animals – to produce goods and provide services to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions.

Vulnerability: Conditions determined by physical, social, economic and environmental factors or processes that increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards, such as drought. Hence, vulnerability is an inherent property of a system that exists independently of the external hazard (i.e., the same level of hazard may impose different consequences for different individuals, communities, countries, regions and other systems due to the distinct underlying vulnerabilities of these systems). In turn, vulnerability to a hazard and its impacts can be altered by the actions of society, such as land and water management practices, among others.

Executive Summary

Turning commitments into action: A financial pathway to land resilience

Humanity stands at a critical juncture, as finite land and water systems are being pushed beyond their ecological thresholds of resilience. These systems are the foundation of global food security, climate regulation, biodiversity integrity, and economic prosperity. Yet, up to 40% of the Earth's terrestrial surface is already degraded, with degradation processes intensified by the rising frequency and severity of droughts, floods, and aridity, and further compounded by accelerating climate change and biodiversity loss. At the same time, growing demand for food, fibre, water, and raw materials continues to exert unsustainable pressure on these systems, amplifying the risk of irreversible ecosystem decline.

There is an urgent need to translate existing commitments into implementation at scale and to mobilize substantial investment in sustainable land management and ecosystem restoration. This window of opportunity is reinforced by the rapid expansion of proven practices, pilot initiatives, and technological and institutional innovations, alongside a growing recognition among investors, businesses, and financial institutions of both the dependencies on natural capital and the associated physical, transition, and systemic risks. The evolving global policy landscape further signals an increasing - albeit still insufficient - political commitment to address these challenges, as reflected in restoration pledges covering up to 1.2 billion hectares of land.

This report responds to this urgency by offering decision makers a structured pathway for transformation toward a land- and nature-positive financial architecture. It demonstrates how financial systems can be repositioned as key enablers of sustainability and introduces a transformative change framework that helps policymakers and investors understand not only why we need systemic change and what must change, but also how change can happen and be enabled.

The economic case for action: Realizing the multitrillion value of land restoration

Land degradation imposes substantial and growing costs on global economies and societies, with annual losses in ecosystem services estimated at no less than USD 92 billion. These losses reflect the progressive erosion of natural capital, which underpins the ecological systems upon which more than half of global Gross Domestic Product (GDP) directly depends. Consequently, the private sector, including financial institutions, is increasingly exposed to a spectrum of risks: physical risks arising from the degradation of ecosystems, transition risks associated with evolving regulatory and market conditions, and systemic risks linked to the destabilization of interconnected economic and ecological systems. These risks are further exacerbated by the declining availability and reliability of critical production inputs, such as pollination services, fertile soils, and water resources, as well as by the tightening of environmental regulations and policy frameworks (--> Chapter 2.1).

The financing gap for achieving global land and drought objectives and commitments is at least USD 355 billion annually. Closing this gap requires public finance to lead and private capital to scale up significantly. To achieve this, financing for land and drought needs to more than triple by 2030, with public finance continuing to contribute the largest share, and private finance significantly scaling up to 20-40% of the total. Otherwise, with nature-negative finance standing at USD 7.3 trillion per year, the global economy is ultimately financing its way into collapse. Redirecting existing financial flows is therefore as important as mobilizing new ones (--> Chapter 2.2).

Restoring degraded land represents a substantial economic opportunity, with the potential to unlock ecosystem service gains valued at up to USD 24.6 trillion. However, realizing this potential requires coordinated action that simultaneously prioritizes the avoidance and reduction of further land degradation. Restoring up to 4.3 billion ha of degraded land would significantly improve the annual flow of ecosystem services leading to substantial increases in their economic values. Focusing on the 1.07 billion hectares of forest, grassland and cropland area committed and pledged by countries for restoration, the increase in the annual values of ecosystem services resulting from meeting these commitments is estimated at USD 4.4 trillion, representing both private and public benefits, providing a clearly high social return from land restoration investments. Unlocking these gains requires a financial architecture that positions restoration as a mainstream and scalable investment class, while systematically phasing out environmentally harmful financial flows. Such an approach must adhere to the Land Degradation Neutrality (LDN) mitigation hierarchy, whereby measures to avoid and reduce degradation are prioritized, as they are typically more cost-effective than restoration after degradation (--> Chapter 2.3).

Transforming land systems: Phasing out degradation, scaling resilience

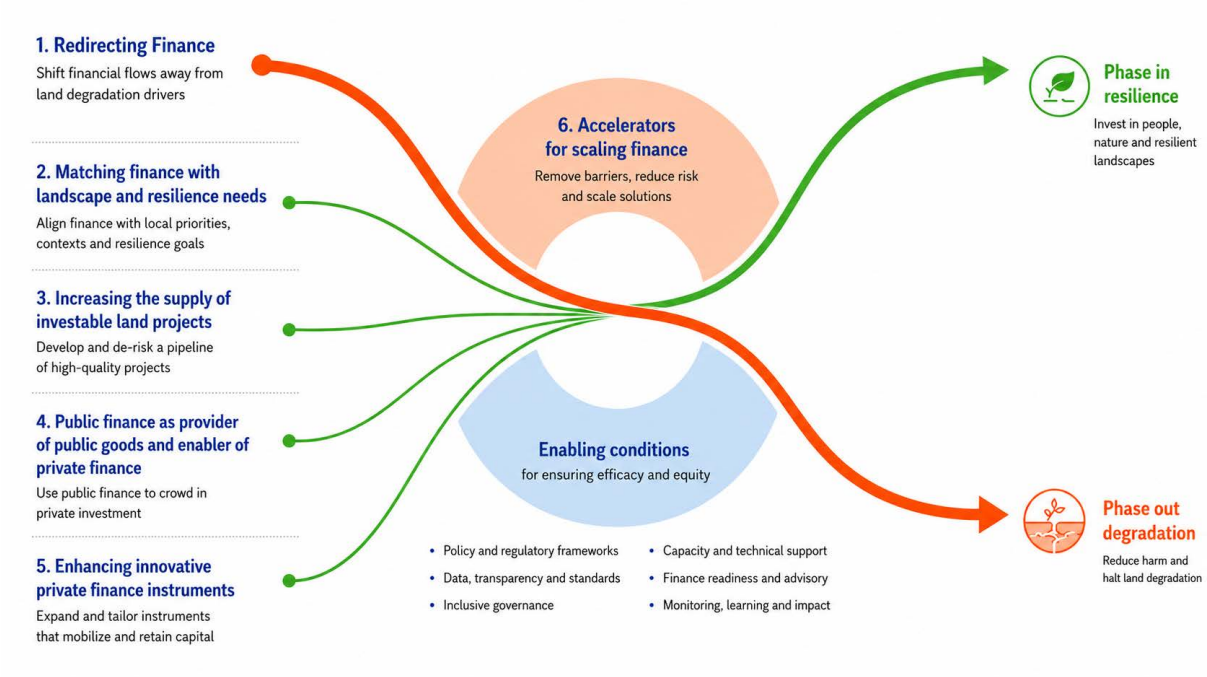
Current structures and institutions are unfit for the challenges we face – a transformative shift in the way societies and businesses govern, finance, manage, and value land and water systems is urgently needed. The scale of action required to "bend the curve" of degradation far exceeds what current investment patterns and governance structures can support. The transition X-curve highlights the need for two simultaneous shifts (Figure A): phasing out harmful flows and phasing in beneficial ones, and have to be propelled by conducive enabling conditions (--> Chapter 3.1).

This systemic change requires layered and sequenced intervention pathways, guided by a five-part transformation framework. Together, these provide a conceptual foundation for identifying concrete financing pathways and instrument combinations. The five building blocks forming this integrated logic are:

1. Shared vision for direction and purpose,
2. Knowledge for understanding how to change the system,
3. Dynamics for navigating phase-in and phase-out processes,
4. Agency for broadening who can shape transformations, and
5. Governance for enabling coordinated action, alignment and incentives (see Chapter 3.2).

A transformative vision for financing resilient land and water systems must direct "the right finance to the right intervention in the right place at the right time". Financial flows should close investment gaps and follow private interests, and also enable more just, inclusive, and resilient landscapes enabling those who depend on and steward land and water systems to participate meaningfully in the distribution of ecological and economic returns. This is both about justice and enhancing the durability of investments (--> Chapter 3). Such a transformative vision does not only require changes in the financial system in order to close the financial gap (--> Chapter 4), but also in the wider framework conditions that enable and accelerate transformations towards sustainable finance (--> Chapter 5).

FIGURE A Land stewardship bolsters landscape resilience



Financing pathways for resilient futures

A critical, yet often underemphasized, component of this transition is the deliberate phasing out of financial flows that drive land degradation and ecosystem loss (Solution pathway 1). Environmentally harmful subsidies, distorted price signals, and investment patterns that incentivize unsustainable land use continue to outweigh investments in restoration and resilience. Reforming these flows through subsidy repurposing, regulatory tightening, and disclosure requirements that internalize environmental risks can generate substantial fiscal space while reducing systemic risks to economies and financial systems. (--> Chapter 4.1)

A new financial architecture for resilient landscapes must match the right type of capital to the appropriate category of investment (Solution pathway 2). This requires concessional public finance for public goods and equity-enhancing projects, and blended finance to address systemic failures while leveraging private investment. Domestic public finance anchors national priorities and supports institutional coherence, while private commercial finance drives scalable, market-led solutions where business incentives align with resilience outcomes (--> Chapter 4.2)

Investment opportunities exist but are limited by a lack of investable land and water projects (Solution pathway 3). Promising areas for private finance investment such as regenerative agriculture, agroforestry, sustainable rangelands and integrated watershed restoration can deliver financial, ecological and societal returns. However, despite promising pilots, few projects have historically scaled into investable pipelines. This is due to factors such as limited cash flows, unfavourable private risk-return ratios, insecure tenure, small ticket sizes, high upfront and transaction costs, long payback periods, a lack of standardized and decision-ready data, as well as integrity and equity risks. Overcoming these bottlenecks is essential for developing the nascent land restoration investment market (--> Chapter 4.3).

Public finance is an essential lever for resilient landscapes, both by directly funding public goods and also by crowding in private investment (Solution pathway 4). Governments can deploy a wide range of tested and proven mechanisms, including results- or performance-based payments such as payment for ecosystem service (PES) schemes, carbon credits, conservation trust funds, conservation easements and insurance and risk mitigation mechanisms. More novel and/or underemployed innovations with potential to scale are biodiversity (or nature) credits and habitat banking, debt-for-nature swaps, green or nature-performance bonds, and catalytic capital (--> Chapter 4.4).

Public and blended finance remain pivotal for early and mid-stage land and water investment projects (Solution pathway 4). Because early-stage projects yield high public value but uncertain private returns, public finance must provide the backbone, providing financial support through grants, concessional loans, and structural support through capacity-building and data systems. As projects move toward demonstration and scaling, blended finance becomes crucial, lowering risk through first-loss capital, partial guarantees, public procurement commitments, and aggregation vehicles. These interventions help shift projects from small, fragmented pilots into coherent investment opportunities (--> Chapter 4.4).

Private finance is rapidly emerging with instruments that have significant potential for upscaling (Solution pathway 5). Innovative instruments, from impact investments and green bonds to sustainability-linked loans, already today channel private capital into land restoration, climate resilience, and conservation. Insurance and resilience bonds mitigate climate risks, while supply chain finance, insetting, and conservation trust funds create long-term, locally anchored incentives. Philanthropy, crowdfunding, and private equity are increasingly mobilized to scale solutions, demonstrating that aligning financial returns with sustainability can unlock transformative capital flows (--> Chapter 4.5).

Accelerating the transition toward resilient land and water systems requires a coordinated shift in policy frameworks that enables the scaling of positive investments and the systematic phase-out of degradation-driving activities (Solution pathway 6). Coherent and predictable policy environments, including secure land and water tenure, alignment of national targets with resilience and restoration objectives, and the integration of these targets into fiscal and regulatory systems, are essential to attract long-term capital. At the same time, targeted economic instruments such as results-based payments, blended finance mechanisms, and the repurposing of environmentally harmful subsidies can correct risk–return imbalances and redirect financial flows toward sustainable land use. Complementing this, strengthened cross-sector coordination and institutional alignment are critical to ensure efficient resource allocation and avoid fragmented interventions. (--> Chapter 4.6)

Equally important is a structural transformation in data and information systems (Solution pathway 6). Robust monitoring, reporting, and verification (MRV), natural capital accounting, and standardized, transparent metrics reduce uncertainty, enable performance-based financing, and enhance investor confidence. Together, these policy and data shifts create the enabling conditions for scaling investments in ecosystem restoration and climate resilience, while improving accountability and effectiveness across financial flows (--> Chapter 4.6).

Enabling conditions for making transformation equitable

Financing resilient land and water systems requires an enabling environment that can direct capital to where it is most needed, when it is most effective, in a socially equitable and ecologically sound matter. Without these foundations, even well-intentioned finance risks reinforcing existing inequalities or failing to halt degradation. There are four critical conditions to this:

(1) Transformative knowledge: Effective transformative finance depends on integrating diverse sources of knowledge to guide context-appropriate interventions. Scientific data about land use changes, economic evidence, and Indigenous and local knowledge ensure culturally aligned and ecologically grounded decisions. A holistic understanding of landscapes — including climate, soils, biodiversity, and community values — is essential for robust planning, and trade-offs among stakeholder interests must be assessed transparently and mitigated where necessary (--> Chapter 5.1).

(2) Capacity building for empowering communities: Empowered communities are essential for sustaining landscape restoration and maximizing the impact of financial resources. Capacity building includes developing skills, strengthening institutions, fostering a common understanding across communities, and promoting interdisciplinary learning and participatory approaches to enhance resilience and adaptive management. Long-term programmes, such as the Indo-German Watershed Development Programme (IGWDP, 1992–2014), demonstrate lasting ecological and social benefits. Funding must cover research, monitoring, assessment, adjustments, and institutional strengthening, not just training (--> Chapter 5.2)

(3) Good governance: This ensures fair, transparent, and effective use of financial mechanisms in transformation processes. Clear property rights and anti-corruption measures are needed at all governance levels, and inclusive decision-making must recognize marginalized groups and manage winners and losers equitably. Policy coherence across sectors and conventions increases efficiency and reduces costs, and strengthens both environmental and social outcomes (--> Chapter 5.3).

(4) Better and standardized data for trust building: This is crucial for building trust and reducing uncertainty. Transparent indicators and strong monitoring systems lower risks and improve accountability, while technologies like satellites, drones, and digital platforms enable real-time progress tracking, and agricultural digitalization offers new opportunities as it enhances traceability and cooperation across value chains. Ultimately, standardized metrics and interoperable data systems underpin long-term, trust-based investment (--> Chapter 5.4).

Call for action

As we head towards 2030, there is a noticeable lack of achievements in meeting global commitments and targets of the SDGs, climate change, biodiversity, land degradation neutrality (LDN), the Bonn challenge, AFR, Great Green Wall and others. This requires urgent and concerted action from four main actor groups: governments and public finance institutions, the private sector (including finance, and philanthropists), international organizations, and local communities. (--> Chapter 6)

Key priorities include:

- Scaling investments through targeted public finance, catalytic blended finance, and strong policy frameworks.
- Realigning incentives and policy environments by phasing out harmful subsidies and strengthening regulatory signals that reward resilience and prevent degradation.
- Building investable pipelines through robust project preparation, community involvement, and transparent monitoring, reporting, and verification (MRV).
- Ensuring equity and legitimacy by embedding participation, rights, and fair benefit-sharing in all financial mechanisms.

Mobilizing and aligning finance for resilient land and water systems is both a funding challenge and a transformation challenge. With the right conditions, instruments, and governance, this necessary transition is feasible, economically advantageous, and able to catalyse a sustainable, resilient, and secure future.

Chapter 1 Introduction

Land is at the crossroads of the global challenges. All around the world, the demands on land are rising while its capacity to sustain people, biodiversity, and economies is shrinking (Nkonya et al., 2016; King et al., 2023). By 2050, a global population of 9.7 billion may need up to 56% more food relative to the demand in 2010. This would require an additional 593 million ha of land for cultivation (two times the size of India) and would create an 11 gigatons of greenhouse gas (GHG) mitigation gap (Ranganathan, Waite, Searchinger et al., 2018). Food production is currently the dominant land use, covering 34% of the ice-free terrestrial surface of Earth, and has the largest overall environmental impact.

Up to 40% of land globally is currently degraded (see Figure 1) (UNCCD, 2022), with more than three-quarters of all land on Earth having become drier in the last three decades (UNCCD, 2024a). Land's natural capital, such as healthy soils, water, and biodiversity, is aggravated by increasing droughts and floods, intensifying climate change and biodiversity loss, and is less resilient and less capable of meeting the growing demands for food and other ecosystem services as a result. 1.7 billion people experience crop yield losses due to land degradation today (FAO, 2025). By 2030, water supply may fall 40% short of global water needs (McKinsey, 2020). Until 2050, up to five billion people may be affected by insufficient crop pollination and higher water pollution due to land use and climate change, particularly in Africa and South Asia (Chaplin-Kramer, Sharp, Weil et al., 2019).

The impacts are already affecting societies and economies. Land degradation and drought cause economic losses of at least USD 878 billion per year (UNCCD, 2024a), amplify migration (Escribano & Pons Ganddini, 2024) and negatively affect human health (UNCCD, 2025).

This signals a critical alarm about the need for sustainable land management and restoration, and it is urgent to reach scale quickly. The time for such change is urgent given the many best practices, pilots, innovations and rapid developments in this space. There is also an increasing understanding of why investors, business, and finance should care about desertification, land degradation and drought both in terms of impacts and dependencies, as well as risks and opportunities. To move towards sustainable and resilient land and water systems globally, investments in the restoration of 300 million ha of degraded farmlands (50% of degraded farmland) and almost 1 billion ha of non-farmland (50% of degraded non-farmland) are needed (Maestre et al., 2025).

The global policy landscape does reflect a current willingness to tackle the issue with numerous initiatives, including the following:

- SDG 15 (Life on Land) and 13 (Climate Action)
- UNCCD's country level Land Degradation Neutrality voluntary targets
- UNFCCC's restoration approach is included in nationally determined contributions (NDCs) and nature-based solutions (NbS) for climate mitigation and adaptation
- The Kunming-Montreal Global Biodiversity Framework under the CBD aims to restore at least 30% of degraded ecosystems by 2030 and to designate 30% of national area to biodiversity conservation (30 x 30), ecosystem services and resilience
- UN Decade on Ecosystem Restoration advocates to restore 350 million ha of degraded land by 2030 to support climate mitigation, conservation and poverty alleviation
- Regional restoration commitments like the Bonn Challenge (350 million ha by 2030), AFR100 (Africa 100 million ha by 2030), Great Green Wall, or the 20x20 Initiative in Latin America and the Caribbean (originally 20 million ha by 2020 and now extended to 50 million ha by 2030).

Global commitments and pledges to restore degraded land by 2030 amount to 1.2 billion ha (G20 Land Initiative, 2024). The costs to implement these commitments are little compared to global GDP or the size of the global bond market. Nonetheless, they amount to several hundred billion USD, constituting a very significant gap where investments need to almost triple from current levels (UNEP, 2026). The opportunities are large, every USD invested in restoration yields USD 7-30 in societal returns (Verdone & Seidl, 2017; Ding et al., 2017). Restoring degraded land is part of the LDN mitigation hierarchy in which measures to avoid and reduce degradation are always preferable and usually more cost-efficient than land restoration (Orr et al., 2017; Cowie et al., 2018; IPBES, 2018).

Turning commitments into action, and ultimately avoiding, reducing, and reversing land degradation for the prosperity, food security and well-being of current and future generations will not come to fruition without rapid and large-scale financing of the transition towards resilient land and water systems.

This report applies a transformation perspective to the role and impact of finance and financial mechanisms in avoiding land degradation (phasing-out) and enhancing land restoration and resilience (phasing-in). It identifies investment opportunities for resilient land and water systems, discusses promising financing instruments and investment pathways and illustrates the interplay between finance and transformative change in terms of how to enhance these phasing-in and phasing-out processes. It looks at enabling conditions, including governance settings, such that financial flows support successful transformation and in turn make investment in this transformation reliable and attractive. And lastly, it provides decision makers with guidance on turning proposed measures into action with a specific focus on attracting additional private capital.

This report looks at land and water systems primarily through the lens of land and land use, with water considered as a linking element within and among landscapes, given its critical role in droughts. Categories for actions sit alongside established approaches of sustainable land management (SLM), restoration and conservation, which are also denoted in this report as land use practices or land investments and include drought resilient land management (Reichhuber et al., 2019).

Chapter 2 presents the economic rationale for action and discusses the state of finance for land. Chapter 3 introduces the concept of transformative change in a finance context including a transformative vision for financing land. Chapter 4 discusses actionable pathways to increase the pool of investable land projects and scaling public and private finance. Chapter 5 embeds financial mechanisms into critical enabling conditions for ensuring equitable benefit sharing and ecological effectiveness of resilient landscape management, and Chapter 6 concludes with recommendations.

Chapter 2 Economic rationale for action – Where are we in land finance in 2026?

2.1 The costs of land degradation

Land degradation puts a heavy toll on the prosperity and well-being of present and future generations. The decline in ecosystem services resulting from land degradation costs societies, economies and businesses USD 92 billion every year (authors' own calculation).[1] Of that, global cropland degradation has the highest economic costs with USD 36 billion per year, forest degradation is at USD 33 billion and grassland degradation at USD 23 billion globally. Figure 2.1.a indicates that all regions show increases in the extent of degraded forests, grassland, and cropland, with the exception of Central America and the Caribbean. The lost value of ecosystem services is highest for forests in Northern America and South America (USD 12.8 billion per year and USD 11.6 billion per year respectively) and grassland in Sub-Saharan Africa (over USD 17 billion per year).

For the private sector, including small businesses, increasing land degradation and drought are physical risks that increase operational costs, jeopardize revenues and decrease the value of assets, threatening business performance and financial stability. This results in increasing scarcity and the risk of supply shortages of critical goods and services that ecosystems provide such as clean water, healthy soils, pollination, and carbon storage. For example, decreasing natural pollination already has companies hiring pollination services or even resorting to mechanical pollination at significant costs. In the United States, farmers paid more than USD 400 million for such services in 2024 (Ceres, 2025).

The cost of drought

Drought is one of the costliest threats to societies and economies affecting every continent around the globe and impacting over 1.8 billion people. The cost of drought damages is estimated at USD 307 billion per year (Thomas et al., 2024; UNCCD, 2024a). Costs can escalate due to knock-on effects of drought on other sectors and the global economy, for example through supply chain disruptions. For example, severe drought conditions in 2023 around the Gatun Lake, which feeds the Panama Canal, resulted in a 33% reduction in the number of daily ship transits. This reduced revenues to Panama from canal operations, normally equal to 6% of its GDP or USD 2.5 billion per year, raised transport costs for goods globally and disrupted shipping and logistics increasing costs to consumers everywhere. It also led to trade-offs between using water for Panama City, for hydro-power energy generation, and canal operations (IMF, 2024; McKinsey & Company, 2024).

1 This novel cost estimate is based on a global analysis of changes in the degradation of forests, cropland and grassland from UNCCD LDN data and estimates the economic value of the associated changes in ecosystem services. The analysis is conducted at the country level, the results are aggregated and presented at the level of FAO regions in order to show broad regional trends (author's own calculation, see Annex for methodology).

FIGURE 2.1.A Annual change in extent of degraded forest, grassland and cropland (km2/year) by FAO region (Source: Authors' calculations)

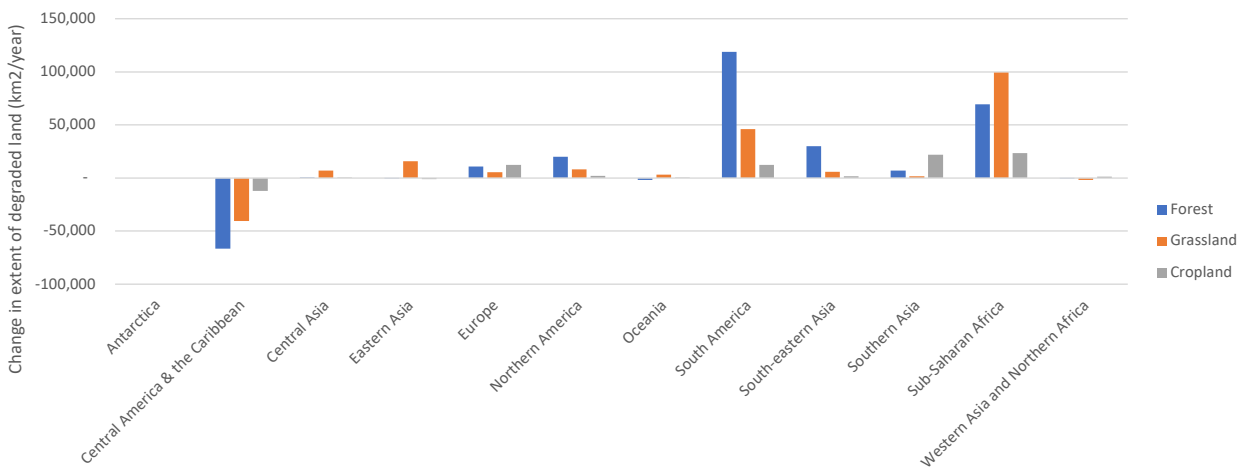
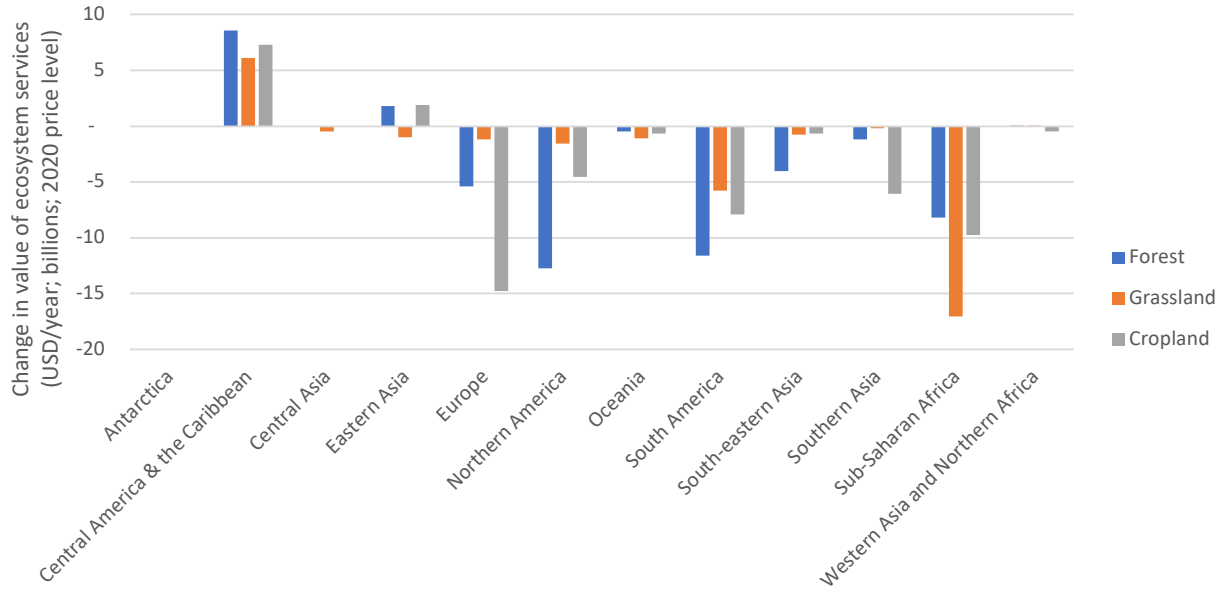


FIGURE 2.1.B Annual change in the value of ecosystem services (USD billions/year) resulting from the change in extent of degraded forest, grassland and cropland by FAO region (Source: Authors' calculations)



More than half of global GDP depends strongly or moderately on the ecosystem services provided by healthy land and intact nature in general (WEF, 2020). However, the ecological foundation of the economy is eroding at an alarming pace in an accelerating environmental multi-crisis where up to 40% of global land area is degraded, droughts prevail around the world, and biodiversity losses and climate change are worsening. This crisis is tightly linked and its severity a result of the persistent failure to account for the true values of land-based natural capital, leading to misallocation of capital and systemic underinvestment into land (IPBES, 2022).

Recent evidence confirms that the environmental multi-crisis impacts every aspect of the economy:

- A partial collapse of critical ecosystems could lead to a decrease of 2.3% in global GDP by 2030, with low and lower-middle income countries being hit with GDP losses of up to 10% (World Bank, 2021a).
- Nature degradation may cause major sovereign downgrades as early as 2030, with China and Indonesia on course to drop two notches (i.e. rating levels) under a business-as-usual scenario (F4B, 2022) leading to changes in refinancing conditions through higher costs, which can reduce the willingness to lend and further weaken the financial positions of economies (see also Wollenweber, Wang and Ranger, 2026).
- The seven largest banks in the UK could face valuation adjustments of 4-5% in domestic holdings (excluding finance) over the next decade due to physical nature-related risks (Green Finance Institute, 2024a).
- The European economy could face a major hit under an extreme but plausible drought with a 25-year return period, which would put nearly 15% of their economic output at risk (ECB, 2025).
- At the level of individual commodities, loss in yields and higher prices or volatilities are already taking place or can be expected as evidenced, for example, for olives in Tunisia (ELD 2024, Tunisia), agave hearts & Mezcal in Mexico (ELD 2022, Mexico), and crops in general (Nature, 2021).

For business, finance, and economies, this erosion of natural capital translates into a broad set of risk types, including physical risks (see above), transition risks such as revenue loss from shifts in market demand, and systemic risks (TNFD, 2023; WRI, 2025). These challenges include:

- Supply chain disruptions: land and water dependent industries are particularly vulnerable to further degradation
- Resource scarcity: e.g., water, raw materials, ecosystem services
- Risk of increasing costs for land intensive industries: e.g., costs associated with restoration, compliance costs, or risk mitigation costs
- Reputation and regulatory risks: increased risk for reputational damage, regulatory penalties, and loss of investments associated with environmental, social, and governance (ESG) investment portfolios
- Climate and disaster risk amplification: land degradation increases vulnerability to hazards
- Social and geopolitical risks: increased migration, food insecurity, and conflict exacerbated inequalities, leading to destabilized markets and operational costs for multinationals

The good news is that the private sector, including finance, is increasingly waking up to the challenge and taking steps towards resilient land and water systems. This trend persists but is also facing current backlash against environmental regulations and ambitions. As of 2025, every 6th USD of global assets under management (AUM) is or will be under scrutiny of nature-related risk assessment aligned with the Taskforce on Nature-related Financial Disclosures (TNFD) (TNFD, 2025a and 2025b). These are over 700 organizations with more than USD 22 trillion AUM and this is only four years after the TNFD was set up. The Network for Greening the Financial System is the international coalition of central banks and financial supervisors and now explicitly includes nature and biodiversity loss as systemic financial risks (NGFS, 2024). Other companies including multinationals such as Kering, Ørsted, Danone, L'Oréal, Nestlé, and Unilever, increasingly have set targets for the sustainable use of natural resources.

2.2 State of finance for land

The UNCCD Financial Needs Assessment estimates that implementing global commitments that countries have made through their land and drought related plans requires USD 2.6 trillion for the period 2016-2030 (UNCCD, 2024b). SDG 15.3 calls for nations to combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land degradation-neutral (LDN) world. Related to this target, in 2021 more than 115 countries had made quantitative, area-based commitments to restore 1 billion ha of farms, forests, and pastures – an area greater than the size of the United States or China. Almost half of these are pledged as voluntary national LDN targets under the UNCCD, including 250 million ha of farmland.

Even though land and nature are the ecological foundation of economies, they remain chronically underfunded. UNCCD estimates that for achieving land and drought objectives, investments need to grow by a factor of 3.5 from 2022-levels of USD 66 billion to USD 355 billion per year between 2025 and 2030. With a slight increase in projected investments, this leaves an annual financing gap of USD 278 billion. UNEP, ELD and Global Canopy's State of Finance for Nature 2026 report even estimates a financing need for NbS of USD 571 billion annually by 2030 (UNEP, 2026). This would require finance flows to increase by >2.5 times from current levels of USD 220 billion annually indicating a funding gap of USD 351 billion annually. Currently, governments provide 90% of NbS finance (USD 197 billion per year), with only 10% (USD 23 billion) contributed from the private sector.

Closing the funding gap will require the mobilization of new finances from both public and private sources (financing green) and the realignment of existing public and private financial flows (greening finance) (World Bank, 2020). Public finance including government, multilateral development banks (MDB), and donors will need to continue to lead, but private finance must significantly scale to deliver at least 20% of total finance needed (USD 69 billion per year; UNEP, 2023; other estimates even suggest 40% - IHLEG & Systemiq, 2025). The UNEP Finance Initiative estimates private finance for nature at USD 102 billion in 2024, with growth rates up elevenfold relative to 2020 (USD 9.4 billion) (UNEP FI, 2024a). Particularly for private finance, these flows should not be looked at as additional costs but as investments into the future (see Chapter 4.2).

Even with slightly positive investment trends, governments and businesses still finance destruction of land-based natural capital at massive scales: USD 200 billion in NbS funding is far less than the USD 7.3 trillion of annual finance flows from public and private sources that have a direct negative impact on nature. These are mainly harmful subsidies for fossil fuels, agriculture and water from the public sector, and negative private flows from utilities, industrials, and energy (UNEP, 2026). This calls for the need to broaden the scope beyond closing the financing gap to transforming the financial and economic system as a whole (see Chapter 3).

Towards standardized tracking of nature and land finance

More standardized nature finance measurement and tracking approaches are only beginning to emerge. This currently leads to, in parts, strong variations in nature, land, or drought finance estimates since different methodologies, categories, and scopes are applied. Recent advances are being made by tracking methodologies of the World Bank (2024), principles for tracking methodologies by a group of MDBs (2023), the MDB common nature finance taxonomy published in late 2025 (MDBs, 2025) and a working model for nature positive finance proposed by the UNEP FI (2024b).

2.3 From degradation to opportunity: Unlocking a trillion-dollar ecosystem investment opportunity

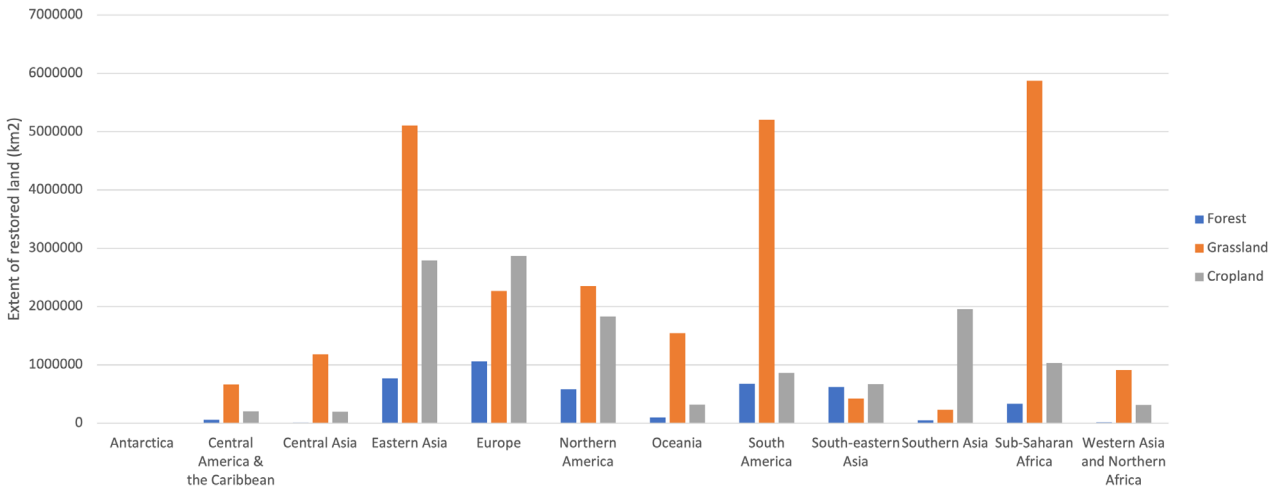
The global need and potential for restoring already degraded land is large. Van der Esch et al. (2021) provide a PBL Global Land Outlook restoration scenario estimating the extent of potentially restorable land at around 5 billion ha.[2] Particularly promising are grasslands in Eastern Asia, South America, and Sub-Saharan Africa, as well as large areas of potentially restorable cropland in Europe, Eastern Asia, Southern Asia and North America.

Banking on this restoration potential would unlock a USD 24.6 trillion ecosystem investment opportunity for businesses and societies (authors' own calculation).[3] This is the estimated increase in the annual value of ecosystem services with both public and private benefits resulting from the restoration of forests, grasslands, and cropland. For comparison, the global GDP currently stands at USD 110 trillion - the restoration investment opportunity hence amounts to 40% of global GDP (World Bank, 2026).

Unlocking this potential is only feasible with a transformation towards a nature and land positive global financial architecture (see next chapters). Restoration also needs to be viewed as part of the LDN mitigation hierarchy in which avoiding land degradation in first place should have the highest priority followed by reducing degradation where it cannot be fully avoided (Orr et al., 2017; Cowie et al., 2018). Decades of research of the ELD Initiative and others have shown that the costs of inaction in the face of land degradation are four to five times higher than the costs of action (Mirzabaev et al., 2016, Kirui et al., 2016; see also ELD Initiative, 2015a). Research also suggests that avoiding degradation before it happens costs less compared to restoration and is more cost-efficient (IPBES, 2018; UNEP, 2023).

There is notable variation in the potential return on restoration across regions and biomes, with particularly high returns from restoration of cropland in Europe, North America, and Eastern Asia. This requires careful consideration as it presents risks for deepening inequalities of uneven resource allocation between countries and regions. Figures 2.3.a and 2.3.b represent the total change in extent of restored forest, grassland and cropland and the resulting change in the annual value of ecosystem services from full implementation of the PBL Global Land Outlook restoration scenario.

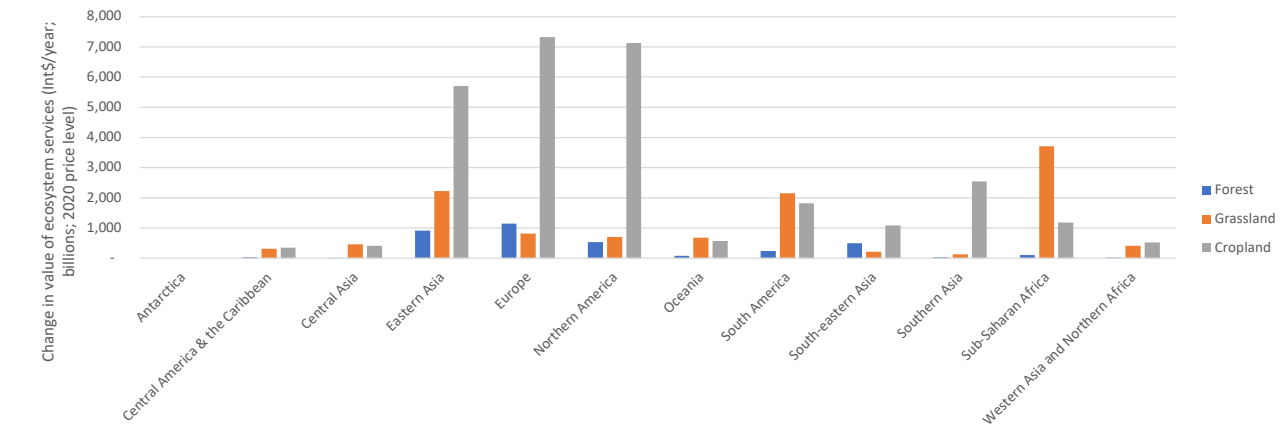
FIGURE 2.3.A **Total change in extent of restored forest, grassland and cropland (km2) by FAO region (Source: Authors' calculations)**



1 This novel cost estimate is based on a global analysis of changes in the degradation of forests, cropland and grassland from UNCCD LDN data and estimates the economic value of the associated changes in ecosystem services. The analysis is conducted at the country level, the results are aggregated and presented at the level of FAO regions in order to show broad regional trends (author's own calculation, see Annex for methodology).

2 This novel benefit estimate is based on a global analysis of changes in the extent of restored forests, cropland and grassland from the PBL Global Land Outlook restoration scenario and estimates the economic value of the associated changes in ecosystem services. The analysis is conducted at the country level, the results are aggregated and presented at the level of FAO regions in order to show broad regional trends (author's own calculation, see Annex for methodology).

FIGURE 2.3.B Change in the annual value of ecosystem services (USD billions/year) resulting from restoring forest, grassland and cropland under the PBL Global Land Outlook restoration scenario by FAO region (Source: Authors' calculations)



Focusing on the areas of forest, grassland and cropland reported in the Global Restoration Commitments Database 2024 (https://grih.info/commitments/), the total area of land restoration pledges covers 1.07 billion ha. **Meeting the global restoration commitments of 1.07 billion ha would unlock a USD 4.4 trillion ecosystem investment opportunity** resulting from an increase in annual ecosystem services values. This represents both private and public benefits and a potentially high return on investments in restoration.

FIGURE 2.3.C Total extent of restored forest, grassland and cropland (km2) under current commitments by FAO region (Source: Authors' calculations)

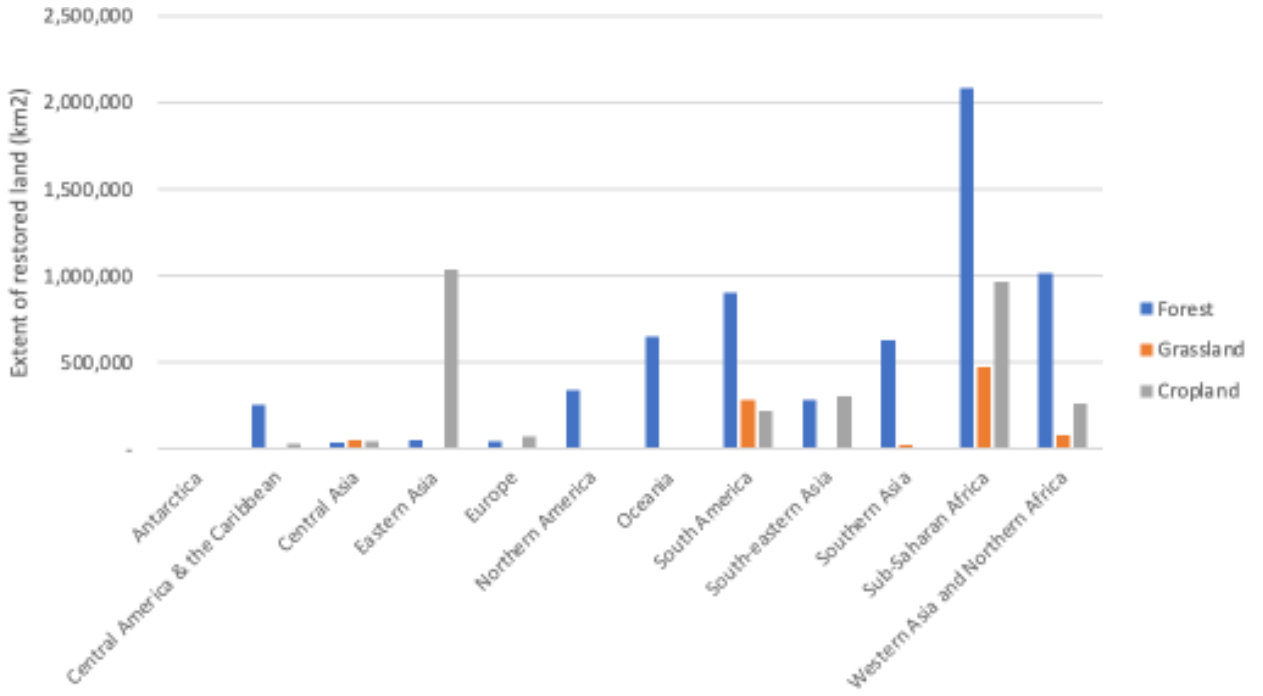
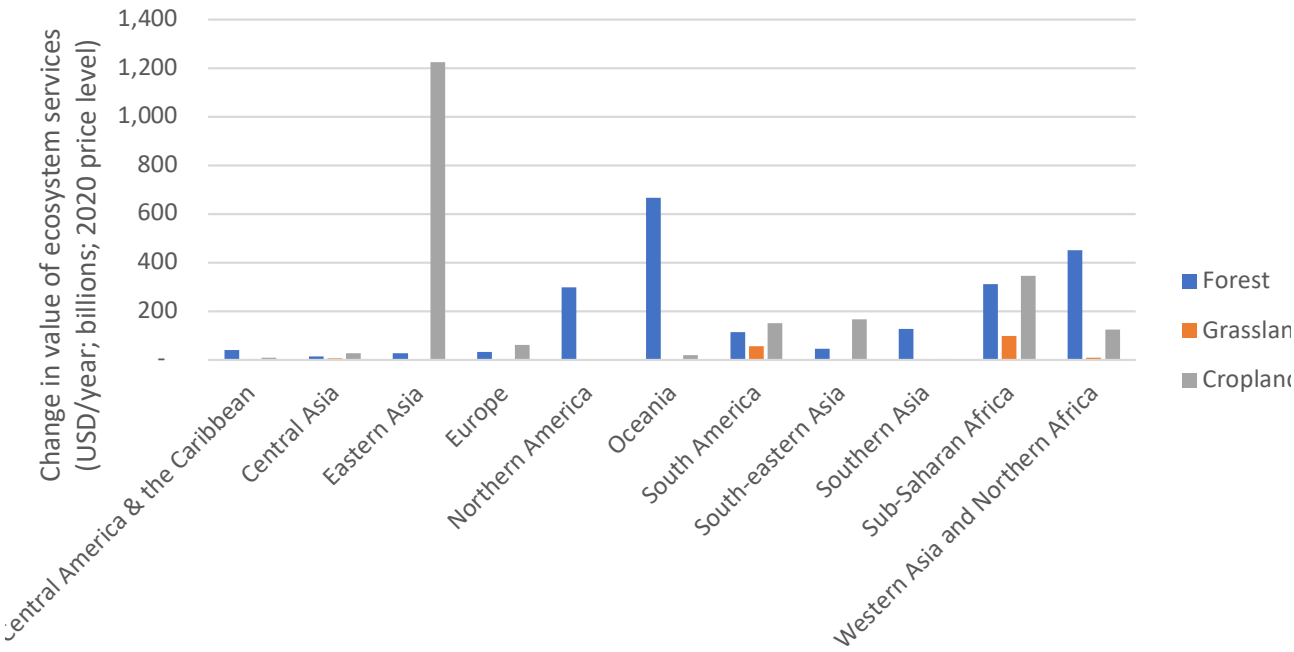


FIGURE 2.3.D Change in the annual value of ecosystem services (USD billions/year) resulting from the restoration of forest, grassland and cropland under current commitments by FAO region (Source: Authors' calculations)



Chapter 3 Transformative change and sustainable investments – A conceptual framework

With respect to changing financial flows towards sustainability, our paradox is clear: **we know what is needed and understand that the returns to society and business are high, yet finance is not being mobilized or aligned at the scale and speed required.** This misalignment shows that finance is not merely a missing input—it is itself part of the system that must transform.

To close the financing gap, accelerate investment, and ensure that financial flows lead to the desired social-ecological outcomes, incremental improvements will not suffice. A transformative shift is required in how land and water systems are governed, financed, managed, and valued. Phasing out degradation while phasing in restoration and resilience must happen simultaneously, supported by financial mechanisms that are adaptive, context-specific, and aligned with long-term landscape health.

This chapter introduces a Transformative Change Framework that provides a structured way to understand, identify, and describe the conditions under which such systemic change becomes possible. It builds on the evidence presented in Chapters 1 and 2 by:

- Explaining why transformation – not incrementalism – is essential to avoid further degradation and secure long-term resilience;
- Identifying further elements or enabling conditions under which finance can catalyse rather than hinder transformative outcomes; and
- Outlining how phasing-out harmful flows and phasing-in supportive investments can be understood as part of a broader transformation pathway.

Situating the role of finance within a transformation perspective provides the conceptual bridge between the biophysical and economic imperatives (Chapter 2), and the practical financing pathways (Chapter 4) and enabling conditions (Chapter 5) that follow. The Transformative Change Framework serves as the analytical backbone for the remainder of this report, guiding how we think about investment decisions, policy reforms, governance structures, and the mobilization of public and private capital to shift land and water systems from degradation to resilience.

3.1 Why a comprehensive transformation is necessary

Incremental improvements to existing land-use practices alone cannot overcome this structural mismatch. Alongside avoiding and reducing degradation, large-scale restoration — across both farmland and non-farmland — is necessary to "bend the curve" of degradation in the coming decades. The scale of action required far exceeds what current investment patterns and governance structures can support. Achieving this requires a deep, systemic transformation in how societies value, finance, govern, and manage land and water resources.

Finance as a driver of degradation—or a catalyst for sustainability

Finance and land degradation are deeply interconnected. Their relationship is dynamic, bidirectional, and capable of generating both destructive and regenerative feedback loops.

Negative feedback loops: How finance can reinforce degradation

Current financial flows often amplify business-as-usual land use and management practices, creating incentives that drive degradation. These include:

- subsidies for activities supporting environmentally harmful practices in agriculture, water use, or energy use that externalize environmental costs;
- preference for short-term investments and return expectations that favour high-intensity, extractive land use over long-term resilience;
- underpricing of natural capital, which makes over-extraction of natural resources economically rational;
- insufficient investment safeguards, allowing investments to generate unintended social and ecological harm.

When financial flows reinforce unsustainable land use and management practices, they increase exposure to material physical, transition, and systemic risks. In effect, investments that contribute to degradation become high-risk investments themselves and reinforce a vicious cycle:

Land degradation reduces ecological resilience → reduced output → lower financial returns and higher volatility → investors demand higher short-term returns as compensation for higher risk → pressure for more extractive practices → further land degradation.

Breaking this cycle is central to the transformation challenge.

Positive feedback loops: How finance can enable resilience and long-term sustainability

Finance also has the potential to reverse degradation trajectories and generate long-term, regenerative economic value. Investments that enable land managers to protect, restore, and sustainably manage landscapes can:

- improve soil moisture, fertility, and productivity;
- enhance water regulation and drought resilience;
- secure carbon storage and climate change mitigation;
- strengthen biodiversity and ecosystem services;
- support livelihoods and social stability.

These outcomes reduce risk and improve long-term performance, making landscapes more resilient and investments less risky over time. Well-designed financial instruments aligned with ecological realities and local governance conditions can create a virtuous cycle:

Investment in resilience projects and programmes → healthier landscapes → stable output → achieving anticipated yields and lower risk → better financial performance → more investment in resilient land and water systems.

However, such positive cycles materialize only when financial incentives and institutions are aligned with long-term ecological and social objectives.

The case for transformation: From isolated projects to systemic change

Because financial flows can both undermine and support sustainability, the goal cannot be limited to simply mobilizing more capital. What is needed is the redirection, redesign, and realignment of financial systems so that:

1. Capital flows which subsidize or incentivize degradation are reduced and ultimately eliminated (phasing-out).

2. Capital flows that support resilience, restoration, and SLM – are massively scaled (phasing-in). For this to occur, some elements conducive for such change can be identified ex ante and are subsumed under enabling conditions.

3. Enabling conditions such as (local) ecological knowledge and transformative knowledge, secure land rights, strong governance, participation, monitoring, and equitable benefit-sharing ensure that investments generate intended outcomes and that these are appropriately monitored.

This requires transformative change, not incremental improvement. A transformative change lens is essential for three essential reasons:

1. The scale and speed of the challenge exceed what incremental approaches can deliver. Land degradation, climate change, biodiversity loss, drought, and water scarcity form a tightly interlinked crisis that cannot be addressed through isolated interventions.
2. Current inferior outcomes reflect systemic flaws, not individual failures. Existing financial, economic, and governance systems normalize short-term extraction and underinvestment in natural capital.
3. Finance must become a lever for system change, not just a source of funding. Without shifts in incentives, risk models, safeguards, and governance, new financial flows will continue to reinforce old patterns.

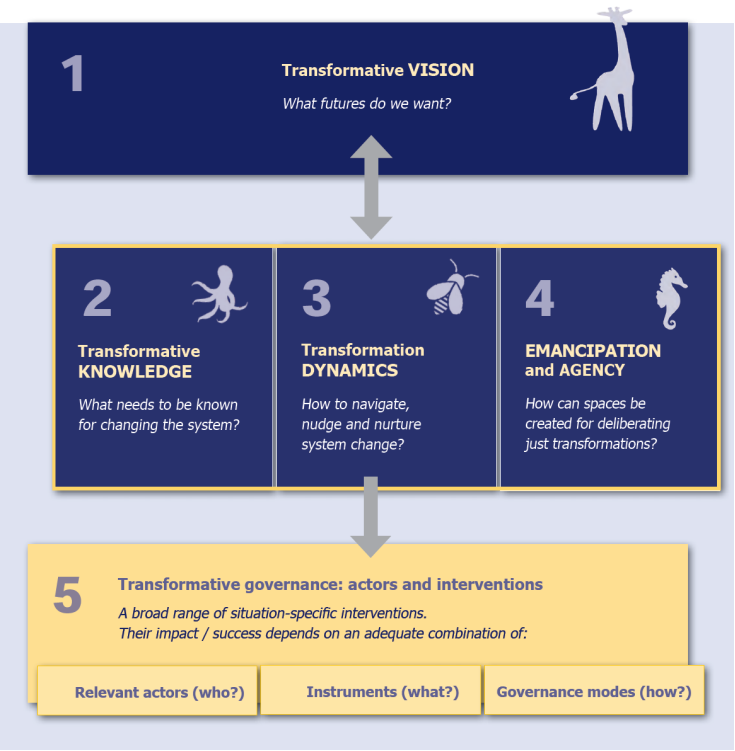
3.2 A Transformative Change Framework

The preceding section highlighted that transformation towards sustainability cannot be understood without linking the normative direction of change—the futures that societies want to achieve—with the dynamic dimension of how real-world systems evolve. These two perspectives converge on a central question: under which conditions can interventions, including financial mechanisms, actually trigger or sustain such systemic change?

To answer this, Wittmer et al. (2021) propose a framework that brings together key insights from socio-ecological transformation research, transition studies, governance scholarship and assessment reports. The framework identifies five building blocks that jointly shape whether transformative change can take root: Vision, Knowledge, Dynamics, Agency, and Governance. Each element represents a necessary condition and together they provide a coherent lens through which to design, assess, and steer interventions—in our case financial interventions—towards long-term resilience and sustainability.

What follows is an integrated presentation of these five building blocks, tailored to the context of financing the transformation towards resilient land and water systems and to investment challenges discussed earlier. Each block is accompanied by practical implications for financing pathways, illustrating how the conceptual foundations translate into actionable levers for change.

FIGURE 3.2 A Building blocks for the framework on transformative change (Source: Wittmer et al., 2021)



Block 1: Transformative vision – setting direction and purpose

At the foundation of transformative change lies a shared vision of the future: a clear sense of where change should lead and how a resilient land-water system differs from the current trajectory. Wittmer et al. (2021) emphasize that such visions must not only describe ecological goals; they must also articulate social, economic, and governance values that can mobilize broad constituencies. Visions help translate abstract sustainability aspirations such as the SDGs into tangible images of landscapes where the landscape services like food production, biodiversity, water security, and livelihoods reinforce one another rather than compete against each other.

The relevance for finance is immediate. Without an overarching vision, continued investment flows towards sources of negative impact reproduce risky, short-term optimization instead of fostering systemic resilience. Vision provides the yardstick for investment alignment: whether financing supports regenerative agriculture, climate-resilient water landscapes, restoration at scale, or the phase-out of harmful practices. It also strengthens investor confidence by signalling long-term policy direction, which is essential for blended and private finance, insurance reform, and risk-sharing arrangements.

Block 2: Transformative knowledge – understanding how to change the system

Transformation requires more than technical information; it demands knowledge about how to shift systems, manage uncertainty, and design strategic interventions. According to Wittmer et al. (2021) transformative knowledge has three dimensions: understanding systemic feedback and interactions; dealing constructively with uncertainty; and combining diverse knowledge systems – from scientific to local and Indigenous knowledge – through co-production.

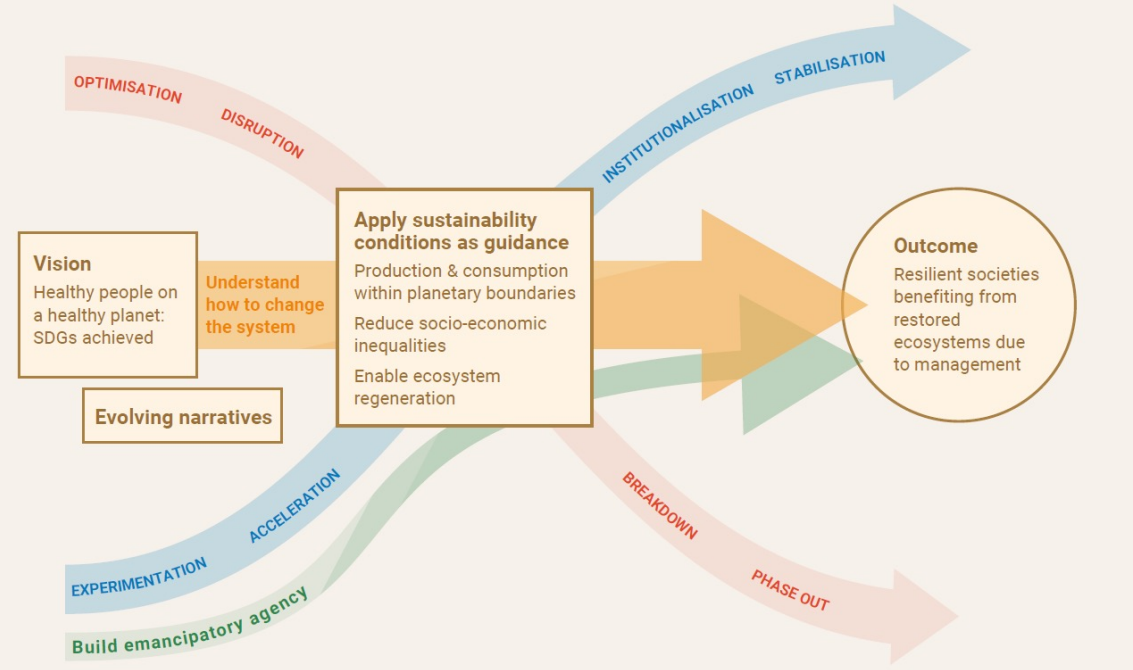
For financing, this translates into the ability to identify leverage points and to design appropriate instruments for each phase of change. For example, knowledge about hydrological cycles, soil carbon processes or drought–yield interactions contribute to shaping risk models and creditworthiness assessments. Meanwhile, participatory knowledge processes can inform the selection of nature-based solutions (NbS), the design of PES schemes, or the creation of restoration pipelines suitable for blended finance. Crucially, transformative knowledge enables the shift from simply understanding landscape dynamics to orchestrating interventions in ways that support the transition towards long-term resilience.

Block 3: Transformation dynamics – navigating build-up and breakdown

While vision and knowledge provide orientation, systemic change unfolds through a dynamic interplay of build-up and breakdown, a dual movement captured in the transition literature in the discussion of phase-in and phase-out processes. Transformations do not progress linearly; they involve disruption, contestation, experimentation and at times, rapid acceleration.

BOX 1 The X-curve of socio-technical transitions

FIGURE 3.2.B Phasing in and phasing out processes of transformation towards resilient land and water systems (Source: Thomas et al., 2024; based on Wittmer et al., 2021)



The X-curve (Figure 3.2.b) visualizes two simultaneous trajectories:

- A gradual deconstruction of the old system occurs as unsustainable structures and practices lose legitimacy, become economically inefficient, are converted into more sustainable ones, or phased out through regulation; and
- The emergence of a new system occurs as innovative practices are piloted, gain traction, become institutionalized, and ultimately stabilize as new norms.

In early stages, innovations remain fragile. Later, windows of opportunity created by crises or policy shifts can accelerate their uptake. Meanwhile, the old system typically resists change, supported by sunk costs, vested interests, and institutional lock-ins.

Regarding financing pathways, different stages of the transformation process place different demands on capital. In the early phase, when new ideas are still being tested and uncertainty is high, funding often needs to come from public grants, concessional loans, or philanthropic sources that can absorb risk. As promising approaches begin to spread and gain traction, they typically require blended finance arrangements, guarantees, or supportive regulation that help lower risk and attract additional private investment. Once new practices and institutions become more established, longer-term and more stable financial instruments such as green bonds, resilience-linked loans or insurance products that reward good land and water management, become crucial to maintain momentum.

The decline of unsustainable practices also has specific financing implications. Phasing out harmful activities to avoid and reduce degradation may involve reforming subsidies, adjusting taxes or pricing systems for energy, carbon, and water, or providing transition support to affected groups and sectors. In some cases, it also means recognizing and pricing environmental risks that were previously ignored. Together, these shifts in financial flows help create the economic conditions needed for a more sustainable system to take hold.

Understanding transformation dynamics thus helps investors and policymakers sequence interventions in ways that intentionally nurture emergence while managing the decline of unsustainable practices.

Block 4: Emancipation and agency – broadening who can shape transformation

Transformative change cannot be imposed top-down; it depends on the capacity of actors including communities, local organizations, innovators, civil society groups, private actors, and public institutions to participate meaningfully in shaping the transition. Agency is often unevenly distributed and constrained by power relations, unequal access to knowledge, land tenure insecurity, or socioeconomic vulnerability.

Strengthening agency involves opening deliberative spaces, supporting local champions, recognizing diverse knowledge systems and anticipating resistance from actors benefiting from the status quo. It also requires attention to equity: transformation can impose short-term costs or risks, making protection of vulnerable groups essential.

For financing, strengthening agency means designing instruments that are not merely technically effective but also socially legitimate and inclusive. This may include benefit-sharing mechanisms, co-financed community projects, support to land rights formalization, or participatory governance structures for ecosystem crediting schemes. Agency also matters for risk mitigation as projects with strong local agency tend to face lower implementation risks.

Block 5: Transformative governance – aligning actors, instruments and incentives

Finally, governance determines whether the previous building blocks can be translated into coordinated action. In this sense governance is not a separate dimension but a cross-cutting function that shapes how actors, institutions, policies, and incentives interact. Effective transformative governance is inclusive in terms of societal groups, informed to the extent it can be, adaptive and adjust measures without long time lags and react to any changes that occur, integrated across sectors and policy areas and able to hold specific actors accountable in case of non-compliance or lack of action.

This includes horizontal coordination across sectors (e.g., agriculture, water, climate, finance), vertical alignment across administrative levels, and the ability to adjust policies as knowledge and conditions evolve. Governance also needs to recognize and anticipate resistance, ensuring that interventions can withstand political and economic pressures.

Strong governance frameworks enable financial systems to channel capital away from harmful impacts towards regenerative pathways. Instruments such as mandatory supply-chain due diligence, sustainability taxonomies, carbon and water market regulation, land-use planning reforms, or removal of environmentally harmful subsidies can decisively shift incentives. Without governance that rewards resilience and penalizes degradation, transformative investments remain the exception rather than the norm.

Integrating the five building blocks

Taken together, the five building blocks form an integrated logic: vision provides direction, knowledge provides capability, dynamics provides orientation in the process, agency enables participation and legitimacy, and governance orchestrates alignment and incentives. For sustainable investments in land and water systems, this clarifies why isolated projects cannot produce systemic change; financial flows need to be embedded in broader pathway thinking that actively phases out harmful pressures while scaling up resilient alternatives.

A transformative vision for financing resilient land and water systems

The transformation of land and water systems requires a reorientation of prevailing development paradigms and resource-use logics. Rather than treating financial mechanisms as isolated instruments for closing funding gaps, a transformative perspective is required that conceptualizes finance as an integral component of socioecological transitions. Such transitions require both the phasing-in of resilient practices and the phasing-out of unsustainable ones. At their core, they demand structural shifts in how benefits, responsibilities, and risks associated with land- and water-based investments are allocated across actors and scales.

Unsustainable land and water use is often rooted in economic and institutional arrangements that externalize environmental costs while concentrating benefits among a small number of actors. A transformative vision towards more sustainable systems will have to **challenge the prevailing dynamics and share the benefits of resilient land and water systems more equitably**. It seeks to redistribute value generation and decision-making power by placing equitable benefit sharing at the centre of financing and governance models. Financial flows should not merely close investment gaps and follow private interests; they must enable more just, inclusive, and resilient landscapes enabling those who depend on, steward, and invest labour into land and water systems to participate meaningfully in the distribution of ecological and economic returns.

Sharing benefits more equally matters from two perspectives in financing the transformation to resilient land and water systems. From a justice perspective, it ensures that those who steward land and water resources—often rural communities, smallholders, women, and youth—share fairly in the economic and ecological gains; they participate in the financial returns. From a sustainability perspective, it enhances the durability of investments: projects grounded in participation, transparency, and shared benefits are more widely accepted, better maintained, and ultimately more impactful (Thomas et al., 2024).

This is also a decisive prerequisite for scaling and mainstreaming financial flows from public finance, unlocking development processes and international collaboration, via instruments from blended finance to private financial flows, which heavily rely on the fruitful collaborations between partners and trust building. Mobilizing additional (mainly private) capital flows can thus be achieved much more easily if such a perspective of equitable benefit sharing serves as a basis for all involved parties.

Achieving this vision requires financial mechanisms to be embedded in enabling environments that include robust knowledge systems, inclusive institutional arrangements, coherent governance, and transparent, standardized data infrastructures. These elements form the structural conditions under which finance can contribute to systemic change. Transformation is not a linear outcome of financial input; instead, it is co-produced through iterative interactions between institutions, knowledge, social agency, and governance that establishes evolving financial modalities (Wittmer et al., 2021).

This integrative logic is reflected in the principle of directing

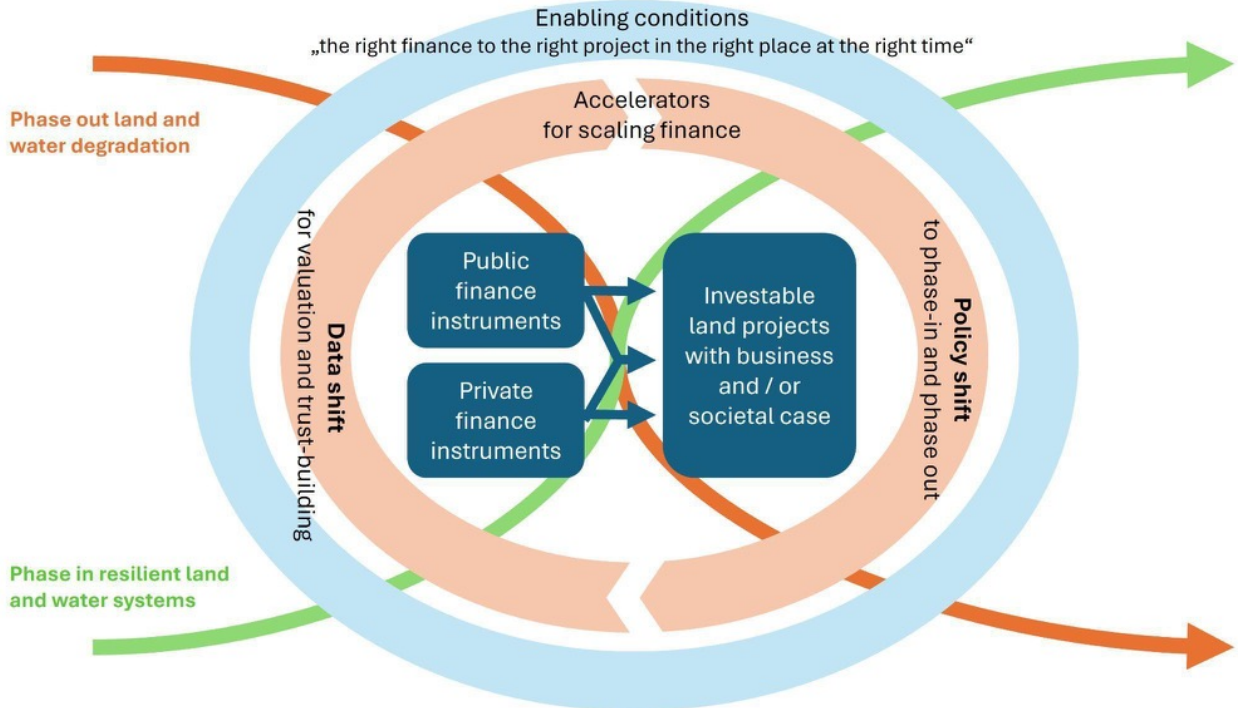
“the right finance to the right intervention in the right place at the right time”.

It underscores that financing instruments, whether public, blended, or private, must be strategically aligned with contextual biophysical dynamics, existing institutional capacities, and social heterogeneity within landscapes. Such alignment enhances the probability that financial flows catalyse rather than constrain transformation pathways.

Chapter 4 Financial pathways: Phasing out degradation and scaling resilience

This chapter examines six financial pathways through which the transition to resilient landscapes can be advanced. These financial pathways are based on two propositions. First, resilient land and water systems are investable, but they are not automatically investment ready. Many promising interventions such as regenerative agriculture, agroforestry, sustainable rangeland management, and watershed restoration can generate strong ecological, social, and in some cases financial returns. Yet these opportunities often remain financially inaccessible because of small intervention sizes, long payback periods, weak project preparation, insecure tenure, fragmented delivery structures, limited standardization, and inadequate data - and above all, because of being focused on the fragmented-projects level, rather than being scaling-ready at the system level. Second, finance for scaling is not simply a question of volume. It requires a dual transformation: phasing out financial flows that perpetuate degradation, while phasing in the instruments, institutions, and incentives that make restoration and resilience viable and scalable. Finance must therefore be understood not only as a source of capital, but as a lever for changing the underlying logic of land and water management. Throughout, the chapter is guided by the report's broader transformation perspective and by the principle of directing the right finance to the right intervention in the right place at the right time (Figure 4.a).

FIGURE 4.A Pathways for scaling finance for resilient landscapes (Source: Authors' elaboration)



4.1 Solution Pathway 1. Redirecting finance for resilient landscapes: From misallocation to transformation (phase-out)

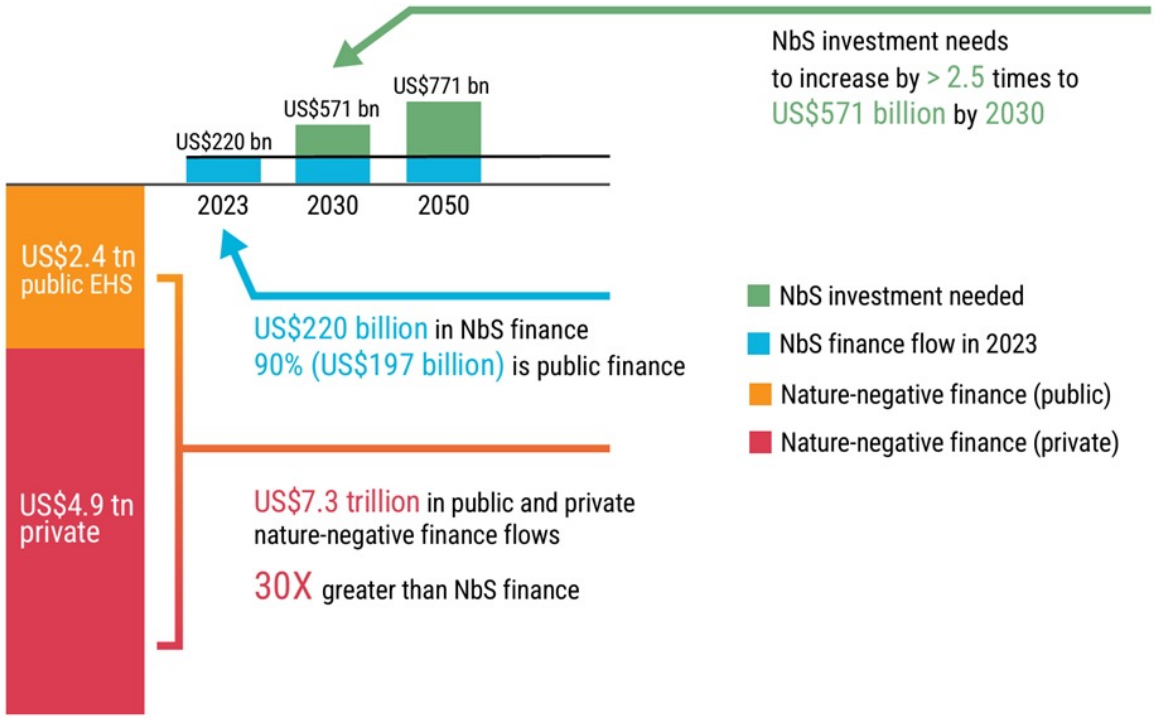
Finance is not external to land degradation. It is one of the main mechanisms through which current land-use patterns are maintained, accelerated, or transformed. Financial systems shape which land uses are rewarded, which risks are insured, which actors can invest, and which practices are scaled. In this sense, land degradation is not only a biophysical or governance failure; it is also a failure of financial allocation.

This misalignment is now stark. Current global finance continues to favour activities that degrade land and ecosystems, while finance for nature-positive solutions remains far below what is required. According to the evidence reviewed in this report, financing for nature-based solutions amounts to around USD 220 billion annually, against estimated needs of USD 571 billion per year by 2030, leaving a financing gap of USD 351 billion (UNEP, 2026). At the same time, global estimates of direct nature-negative finance flows from the public and private sectors amount to approximately USD 7 trillion per year, of which USD 5 trillion come from private sector sources or 140 times reported private investments in nature positive solutions (Deutz et al., 2020; UNEP, 2023). A recent study estimates that global subsidies for environmentally harmful projects amount to USD 1.8 trillion per year (USD 640 billion in fossil fuels; USD 520 billion in agriculture; USD 350 billion in water; USD 155 billion in forestry; USD 90 billion in construction; USD 85 billion in transport; and USD 50 billion in marine capture fishing) (Koplow and Steenbeck, 2022). Most agricultural subsidies and, probably research dollars, support the intensification of agriculture, resulting in greater fossil fuel use, soil loss, and water insecurity (Reichhuber, et al., 2019; UN-Water, 2018). Target 18 of the 2030 Global Biodiversity Framework addresses future cost avoidance by at least USD 500 billion per year by 2030 through the reform of subsidies harmful to and scaling solutions beneficial to nature (CBD, 2022).

Closing the gap therefore requires more than mobilizing additional resources. It requires a structural redirection of existing financial flows away from degradation and toward restoration, resilience, and sustainable land use (Figure 4.1.a).

Reducing, reforming, removing, and redirecting such policies is attractive from an efficiency, terms-of-trade, fiscal responsibility, and inter-generational equity perspective in addition to avoiding the need to clean up today's costly misguided policies in the future (Matthews and Karousakis, 2022). It does not make sense to encourage both resilience-enhancing transformation, while at the same time providing support to environmentally degrading practices through various subsidies (OECD, 2020; Jayne and Rashid, 2013). Subsidies, taxes, and land-use regulations need to be reviewed to ensure they do not favour unsustainable practices. For instance, subsidies for irrigation can worsen drought vulnerability (Wheeler et al., 2020) and so phasing out or repurposing such harmful incentives is a critical step. Several countries are beginning to redirect public funds towards climate-smart agriculture and conservation, such as Malawi, Zambia and Ghana (Jayne et al., 2018). Subsidies are not all harmful; when well targeted, they can also play a positive role towards transformation. They can help catalyse private investment through tax reductions for farmers adopting water-saving irrigation, grants for community-based ecosystem restoration projects, or public procurement policies that favour sustainably produced agricultural products (e.g., sustainable low-emission rice for public procurement and international humanitarian assistance).

FIGURE 4.1.A From misallocation to nature-positive finance (Source: UNEP, 2026)



BIOFIN has published guidance for countries interested in harmful subsidy reform (UNDP BIOFIN, 2024). This can help countries to screen existing subsidies, assess the need to redesign them, analyse repurposing options, identify opportunities to incorporate social and environmental safeguards in existing policies, and facilitate communication and advocacy strategies.

Case study 1: Agricultural subsidy reform: Colombia, Georgia and Thailand

Case study authors: Andrew Seidl, UNDP BIOFIN, Istanbul, Türkiye, and Colorado State University, Fort Collins, Colorado, USA; An Feng, UNDP BIOFIN, Istanbul, Türkiye

Dozens of countries have followed UNDP-BIOFIN's guidance to identify and repurpose subsidies harmful to nature as part of their biodiversity policy and institutional review (PIR). Policy reforms to address ecologically harmful unintended consequences of subsidies are fiscally responsible, reducing the current costs and avoiding future costs of policy driven market distortions, improving efficiency, and reducing the tax burden to provide an opportunity to redirect public budgets to biodiversity positive policies and programmes (UNDP, 2024). A review of UNDP's biodiversity finance initiative (BIOFIN) country reports provides three examples of harmful subsidy reform as a finance solution: Colombia, Georgia and Thailand (UNDP, 2026).

In Colombia, subsidies inadvertently created perverse incentives that funnelled millions of dollars into extensive cattle ranching and high-input rice farming, which encroached upon forest reserves and dried out essential watersheds. In response, the government sought to "green" these financial flows by integrating mandatory environmental determinants into the credit approval process. The initiative utilizes administrative land demarcation to clearly define the boundaries of forest reserves, riverbanks, and floodplains. By legally separating productive agricultural land from sensitive ecological zones, a protected physical space where natural regeneration and active restoration can occur is created. The La Mojana region provides an example where redirected credit lines support local communities in rehabilitating degraded wetland landscapes using native species while maintaining sustainable livelihoods. This integrated approach reduces the state's future restoration costs by preventing further degradation and establishes a self-sustaining financial cycle where green credits fuel long-term ecological recovery.

Georgia screened 21 agricultural subsidy programmes managed by the Rural Development Agency (RDA), identifying five programmes with significant potential adverse impacts on biodiversity. The reformed programme established clear targets for 2030: a 20% reduction in the total use of pesticides and fertilizers and transitioning 10% of Georgia's agriculture to organic production. An Action Plan was developed for repurposing subsidies, providing a formal framework to redirect financial flows from harmful practices toward production models that support landscape restoration and conservation. The RDA initiated a Bioproduction Promotion Program that provides financial support to farmers for certification, consulting services, and the purchase of organic fertilizers. Transitioning to high-value organic production could increase the annual net income of farmers by approximately USD2.8 million while enhancing soil fertility and the climate resilience of the landscape.

Thailand's 2019 Land Tax Act forced landowners to plant only 53 state-approved crops, resulting in the destruction of natural vegetation on their land, which turned healthy and diverse areas into monocultures that support very little wildlife. Land Tax policy reform encourages people to maintain natural trees and plants, recover the landscape and preserve biodiversity. Similarly, carbon credit policies are being updated to prioritize landscape restoration over mono-crop plantations. The new approach encourages the use of a variety of native plants that belong to the local environment to not only capture carbon but also bring back rich biodiversity to Thailand.

References:

UNDP (2024). 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

UNDP (2026). BIOFIN Knowledge Hub. https://www.biofin.org/search/node?keys=harmful+subsidy (accessed April 18, 2026)

4.2 Solution Pathway 2: Integrating and targeting finance to match with landscape and resilience needs (phase-in)

Different types of finance need to be targeted to match with landscape and resilience needs through an integrated financial architecture (Figure 4.2.a). Public finance has a distinctive role in funding public goods, correcting market failures, building enabling conditions, and absorbing early-stage risk. Blended finance becomes critical where projects generate high public value but require de-risking, aggregation, or concessional support before private investors can participate. Private finance is indispensable for scale, but it can only expand where business models are credible, cash flows are visible, risk-return profiles are acceptable, and policy environments are stable and supportive. The central task is therefore to match the right type of capital to the right type of intervention. This is particularly important in land systems, where the most socially desirable investments are not always those that immediately generate private returns, and where avoiding and reducing degradation is often more cost-effective than restoring ecosystems after damage has already occurred.

The amount of financing for agrifood systems related to climate change adaptation is currently around USD 100 billion or only 7% of total climate finance needed (Galbiati et al., 2025). These amounts are not only insufficient, but the targeting of funds toward agrifood systems and land transitions requires a more nuanced and location specific approach. Aligning public and private sources of finance is crucial to achieve such transition. Public budgets and international funds provide the foundation for resilience investments, but they cannot meet the need alone. Governments play a leading role by creating an enabling and supportive environment, which lowers perceived risks and improves returns for investors, both public and private. For instance, transparent data and stable yet adaptive, predictable policies give financiers confidence that land restoration projects will generate long-term real value, helping investors price in full range of private and social benefits and more accurately track performance over time, which is essential for attracting private capital.

FIGURE 4.2.A Integrated financing architecture (Source: Authors' elaboration)

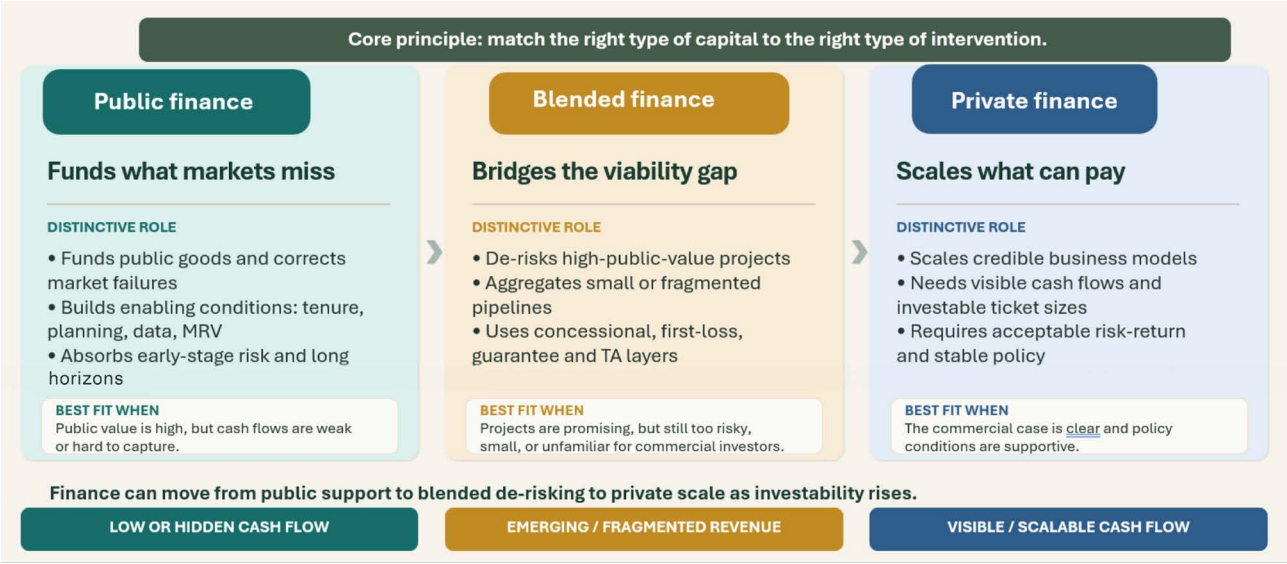
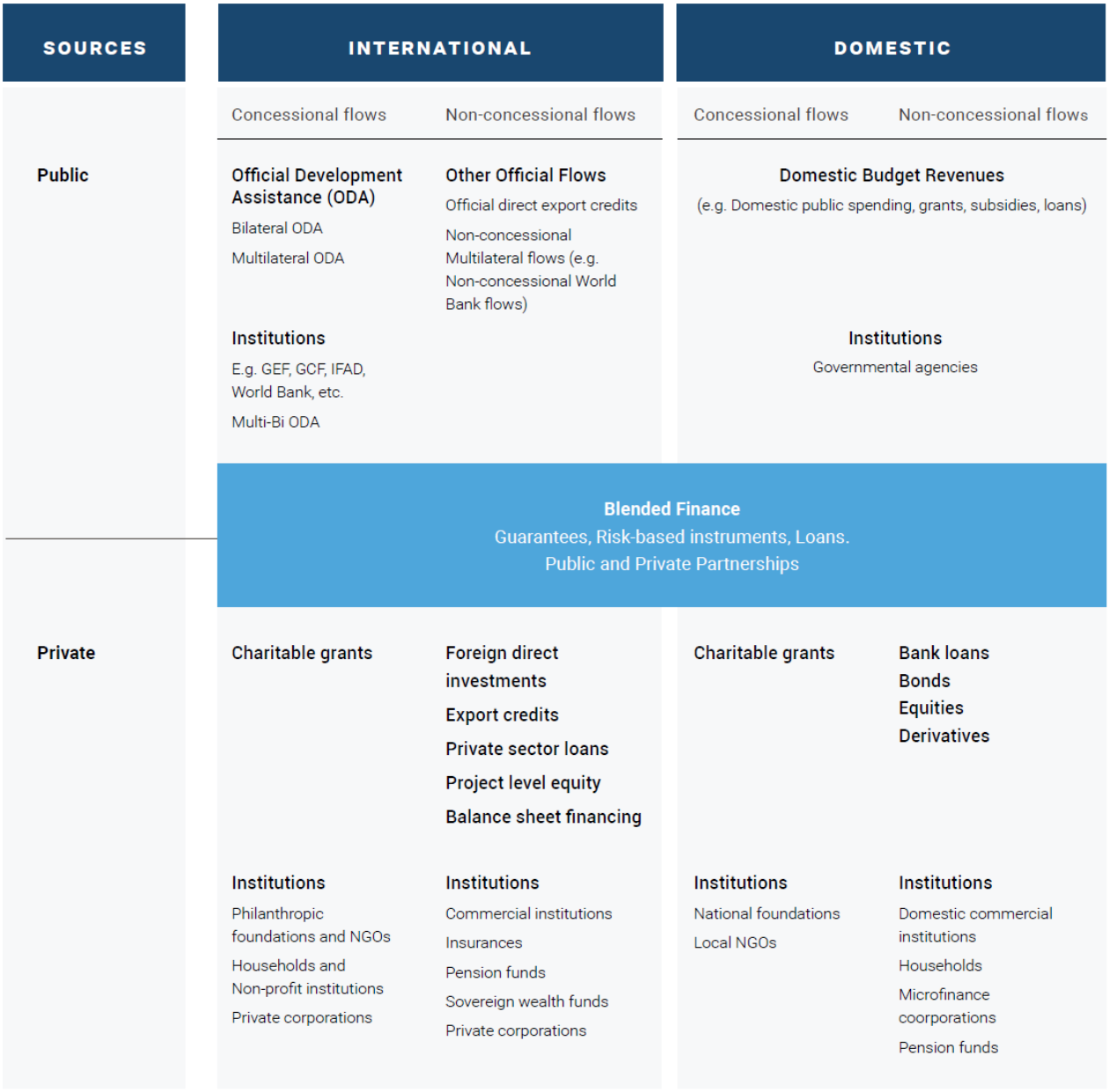


FIGURE 4.2.B Financial flows by source and category (Source: UNCCD Global Mechanism, 2024)



Public, blended, and private finance each play indispensable and mutually complementary functions (Table 4.2.b). Financing strategies for land restoration must therefore combine them and not treat them in isolation:

- Match public finance to public goods and high-impact social interventions,
- Use blended finance to correct market failures and crowd in private capital,
- Facilitate private investment where commercial returns are feasible,
- Strengthen enabling conditions including regulation, risk-sharing, information systems, and MRV, reduce uncertainty and improve bankability of resilience projects.

This integrated financing logic is essential for mobilizing the scale of finance required to drive transformative adaptation and NbS, ensuring that investments generate both financial and socio-economic returns while supporting long-term sustainability.

4.3 Solution Pathway 3: Increasing the supply of investable land projects (phase-in)

The societal and business case for land

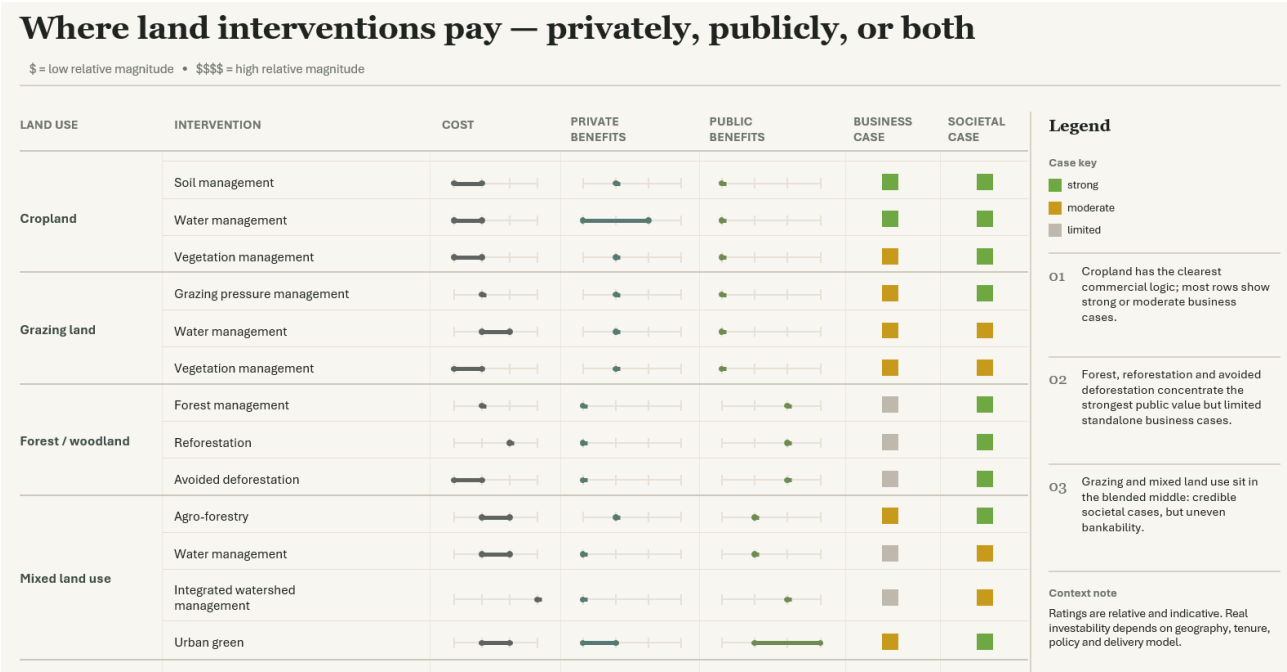
Making the case for investments in resilient land and water systems involves comparing the costs and benefits of implementation, which accrue to investors and other private and public beneficiaries. The benefits of ecosystem restoration and conservation are diverse and can include the enhanced flow of ecosystem services (e.g., provisioning of food, raw materials and water; regulation of the global climate, soil erosion and water quality; and cultural use for recreation, tourism, and spiritual connection to nature), protection of biodiversity, sustainable livelihoods, and improved social and gender equity. Quantifying these diverse benefits is challenging and the estimates described below should generally be considered as only partial.

The returns on investment in SLM have been estimated by numerous studies, both from the societal and private investor perspectives. The evidence consistently shows that land restoration and SLM investments yield strong economic returns, though these vary by context (Table 4.3.a). Ecosystem restoration delivers high societal benefits, with benefit–cost ratios (BCRs) ranging from about 7 for wetlands to 20 for grasslands (de Groot et al., 2013). Soil erosion control shows similarly strong returns, with average BCRs of 6.58 in Africa and 3.47 in Asia (ELD Initiative & UNEP, 2015; Tilahun et al., 2018). Case study evidence confirms wide but generally positive returns, with BCRs between 1 and 27 depending on intervention and location (Thomas et al., 2024; Dallimer et al., 2018). However, outcomes are highly context-specific, and conservation often yields higher returns than restoration due to lower costs and faster benefits (van Zanten et al., 2025). At scale, restoration remains economically viable: forest restoration under the Bonn Challenge shows a societal BCR of 7.54 and a positive private BCR of 1.88 (Verdone & Seidl, 2017).

Private finance is particularly effective where strong business cases are evident with reliable revenue streams, favourable risk-return ratios, low costs and stable business environments. Public finance will likely continue to play a critical role where societal benefits prevail and only limited cash flow opportunities exist (IHLEG & Systemiq, 2025). Blended finance solutions that make strategic use of public, philanthropic, and private capital are particularly suitable for the middle ground between these idealized poles. The risk is that important land projects that do not meet these profiles but have high biodiversity, climate or other values particularly in developing contexts remain underfunded and deepen a chronic divide.

It is increasingly recognized in the private sector that **investments in land restoration and conservation including regenerative agricultural practices are expected to increase and achieve scale rapidly** (McKinsey & Company, 2023a). The evolving policy environment is likely to strengthen the societal and particularly the business case with an increase of cash flow opportunities, for example from PES schemes, biodiversity credit schemes, or offsetting requirements.

FIGURE 4.3.A Summary of the relative costs and benefits of land interventions (Source: Own elaboration; building on Reichhuber et al., 2019)



Case study 2: Transformational agroecology in Burkina Faso – How agroecology changed a farmer's life

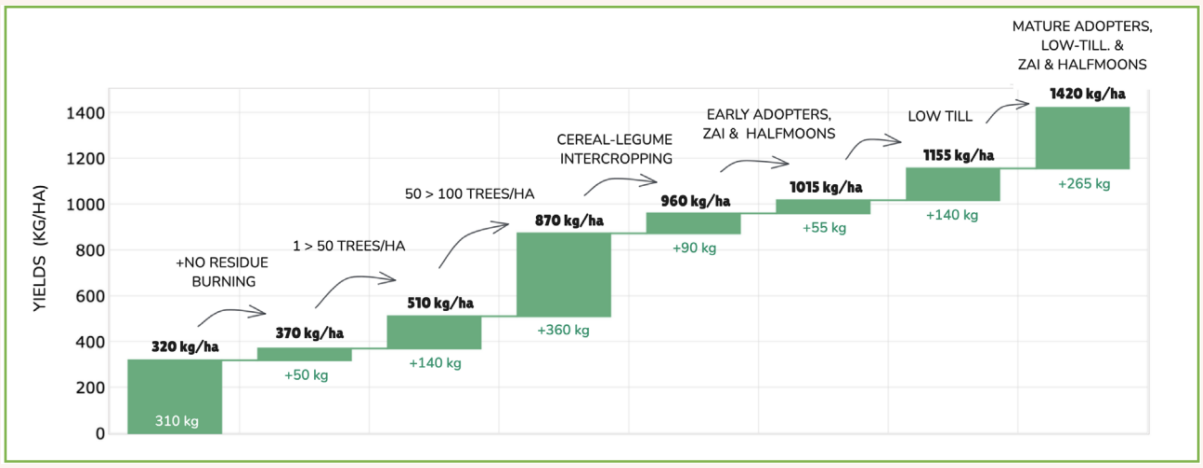
Case study author: Vanja Westerberg, Altus Impact

A recent study from Groundswell International, Altus Impact, and the Burkinabè NGO Association Nourrir Sans Détruire (ANSD) provides compelling evidence that agroecology improves resilience and delivers high-impact, bankable development returns (Westerberg & Dianou, 2025a).

Since 2011, ANSD has promoted agroecology in Burkina Faso's Eastern region through a farmer-to-farmer model. What were once rare practices have now spread across an estimated 100,000 hectares. Drawing on data from more than 400 farming households surveyed in 2024, the study shows a clear progression: as farmers adopt and combine agroecological practices, livestock numbers, manure availability, and land productivity all increase in tandem.

Around 25% of farmers have reached an advanced stage of agroecological adoption, employing at least three high-impact techniques — including zaï, half-moons, stone contour barriers, low tillage, no burning, and farmer-managed natural regeneration of trees (FMNR) — alongside legume-cereal intercropping and at least two tons of manure per hectare. Even during one of the driest agricultural seasons in recent history (Westerberg & Dianou, 2025b), these farmers achieved 77% higher yields (1,230 kg/ha) and 67% higher net income (USD 489/ha) compared to those just beginning the transition (695 kg/ha; USD 293/ha). At the furthest end of the spectrum, the most advanced systems yield 4.4 times more than farms using no agroecological practices at all — a 340% increase from 320 to 1,420 kg/ha (Figure 4.3.a).

FIGURE 4.3.B Returns from agroecological practices



The investment case is equally strong. A popular combination of zaï pits, stone barriers, and FMNR generates an annualized effective return of 43% (the IRR), USD 4.8 in revenues per USD 1 invested, and an net present value of USD 2,308 over 15 years. The main barrier to adoption is a 5.4-year payback period, which far exceeds typical loan durations of six months to two years. Patient capital or targeted NGO and policy support can close this gap. For example, under an earlier government programme (PNTG2), stone barriers were subsidized, reducing the pay-off period to 4.5 years and the IRR rises to 64% (Table 4.3.b).

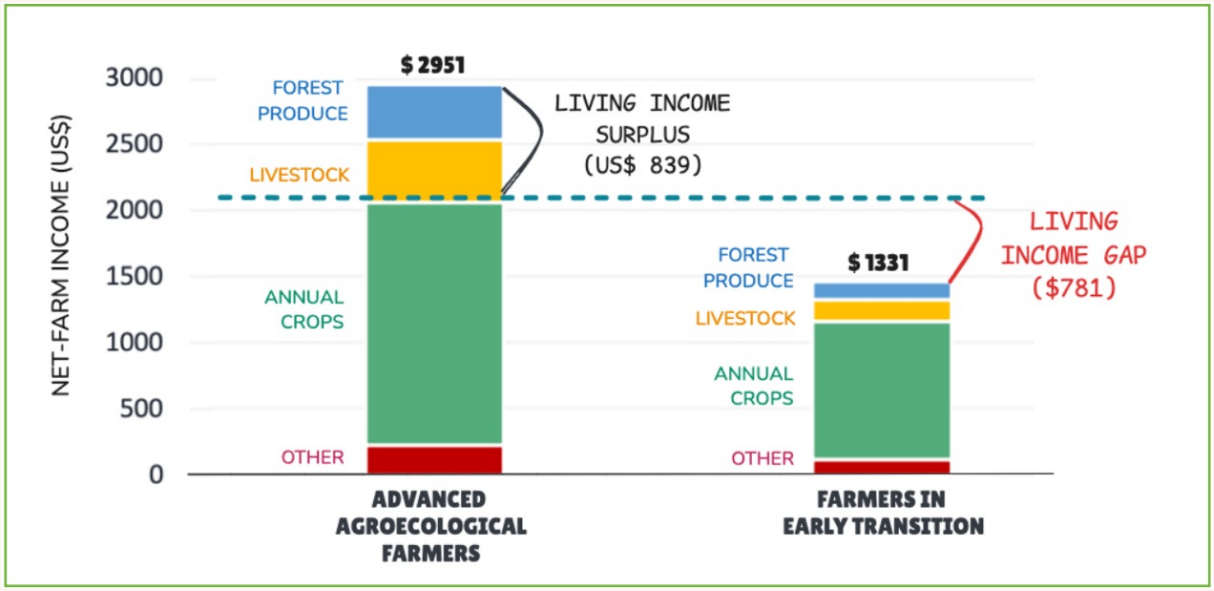
Finally, when non-farm income is included, advanced agroecological households earn USD 2,951 per year — well above Burkina Faso's Living Income Benchmark of USD 2,112 (Medinaceli et al., 2024) — compared to just USD 1,331 for farmers in early transition. This means that advanced agroecological farmers are able to afford a decent standard of living for all members of their household.

The evidence is unambiguous: farmer-led agroecology belongs at the heart of national strategies for land restoration, food security, and peacebuilding – and squarely within the ambition of Burkina Faso's Nationally Determined Contributions for climate and the Sustainable Development Goals.

TABLE 4.3.B Payoff periods with and without public subsidies

	Without subsidies	With subsidies for stone contour barriers
Evaluation criteria (T=15)	**r=4.5 %**	**r=4.5 %**
Net Present Value (US$/ha)	$2,308	$2,464
Average annual net-benefit (US$/ha)	$154	$164
Benefit-Cost Ratio (BCR)	4.8	6.4
Implementation costs (USD/ha), first 3 years	$621	$451
Payback period in years	5.4	4.5
Internal Rate of Return (IRR)	43%	61%
Return on Investment (ROI)	540%	746%

FIGURE 4.3.C Returns from agroecological practices



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Westerberg, V. and Dianou, A. (2025a). Transformational agroecology in Burkina Faso: An assessment of the impact of agroecology on farmer livelihoods in eastern Burkina Faso. Altus Impact; Association Nourrir Sans Détruire (ANSD); Groundswell International. https://www.groundswellinternational.org/wp-content/uploads/2025/10/Transformational-Agroecology-in-Burkina-Faso-Impact-evaluation-study-FINAL.pdf

Westerberg V. and Dianou, A. (2025b) Burkina Faso Agroecology Dashboard with Remote Sensing Insights. https://agroecologicalimpact.framer.website/ (2025).

Challenges to overcome for investable projects

There is not a lack of finance in general or lack of investor interest, but finance currently does not make its way at the scale needed to the right intervention in the right place to the right people at the right time. Surveys among investors and finance stakeholders indicate that land and nature finance is not hindered by a lack of interest but by a set of barriers and bottlenecks that can be overcome (PwC, 2023; Van Raalte & Ranger, 2023).

Different types of land investment projects can encounter very different challenges and bottlenecks (Van Raalte & Ranger, 2023; Thomas et al., 2024). A commercially attractive project, for example scaling regenerative agriculture, with a compelling business case and thus large potential to attract private finance is very different from a project with a societal case with important co-benefits but limited cash flow potential, for example restoring tropical forests without carbon schemes in place (Africa Regenerative Agriculture Study Group, 2021; UNEP, 2025). For each project stage different barriers become more prevalent (Sheikh et al., 2025). Lastly, location matters, for example, reforestation in the Ethiopian highlands is a very different endeavour compared to grassland and savanna restoration in the Brazilian Cerrado.

Developing the land and nature asset class and investment market in a meaningful and equitable way is relatively nascent. Many challenges can be attributed to this, for example the lack of a track record of successful investment projects, limited standardization of data and measurement approaches, lack of capacities and limited experiences at all levels (project manager, finance institutions, governments, donors) and insufficiently developed market infrastructure (Knight et al., 2022; Ding & McLaren, 2025).

The question is how we can make the transition towards resilient land and water systems work, and get more finance mobilized correctly. Some of the major challenges and bottlenecks that need to be addressed for increasing the supply of investable land restoration projects are:

Limited project attractiveness: Many projects with strong societal benefits generate low or no market returns, making them unattractive for private capital. Public goods such as regulating and cultural ecosystem services are rarely monetized, limiting cash flows. Investments are therefore concentrated in sectors with clear revenue streams, such as agriculture and forestry. Even where a business case exists, high risks — e.g., insecure land tenure — can deter investment or require very high returns (EIB, 2023; UNEP, 2025; zu Ermgassen et al., 2025).

Limited project pipelines: A key constraint is the shortage of investment-ready projects. Typical project sizes are below USD 10 million, far below institutional investor thresholds (USD 50–100 million), and returns often materialize over long horizons (10–30 years), conflicting with investor expectations. High upfront costs, lack of standardization, complex partnerships, and weak business model development further limit bankability (EIB, 2023; PwC, 2023; Ding & McLaren, 2025).

Data, integrity, and equity risks: Land investments lack standardized metrics, robust MRV systems, and high-quality data, increasing uncertainty around impacts and returns. Poorly designed projects can also generate social risks, including inequitable benefit-sharing or displacement. Moreover, private finance tends to favour low-risk contexts, leaving high-need regions underfunded (Knight et al., 2022; WEF & McKinsey, 2025; Chausson et al., 2025; UNEP, 2025).

Weak enabling environments: In many countries, unclear policies, weak market signals, and insecure land rights undermine investment. As a result, less than half of globally restorable areas meet favourable investment conditions, and only about 1% remain viable when all criteria are considered (WEF & McKinsey, 2025; Vincent et al., 2025).

Case study 3: Building investable restoration landscapes through blended finance, tenure security, and project pipeline development across TRI child projects

Case study authors: Paula R. Prist, IUCN; Benjamin De Ridder, FAO; Theresa Fuhrmann, IUCN; Jonathan Gheyssens, United Nations Environmental Programme; Anique Hillbrand, IUCN; Chetan Kumar, IUCN

Across multiple countries under The Restoration Initiative (TRI), implemented by the Global Environment Facility (GEF) in partnership with the International Union for Conservation of Nature (IUCN), Food and Agriculture Organization of the United Nations (FAO), and United Nations Environment Programme (UNEP), a common financial approach emerged focused on making landscape restoration investable through a combination of tenure security, public de-risking finance, and emerging private and community revenue streams. Rather than relying on a single funding source, TRI child projects consistently applied a sequencing logic that supported restoration from early planning to long-term management.

A critical first step was strengthening land and resource tenure as a prerequisite for investment. In many TRI landscapes, forests, rangelands, or mangroves were often open access or governed by weak rights, reducing incentives for long-term restoration investment. TRI projects supported the formalization of community forestry agreements and co-management arrangements, clarifying management and benefit-sharing rights. In Kenya, for example, four community lands were registered under the Community Land Act, strengthening land rights and creating an “asset base” for restoration, enabling communities to anticipate future benefits and engage with external finance.

Once governance structures were strengthened, TRI used grant financing, primarily from the Global Environment Facility, to reduce early-stage investment risk. These public funds financed baseline ecological assessments, landscape mapping, restoration planning, and the establishment of monitoring, reporting, and verification systems necessary for performance-based finance mechanisms such as carbon markets. Pilot restoration interventions were also supported to demonstrate feasibility and reduce perceived risk among potential co-financiers.

As projects matured, TRI child projects aligned different finance types with specific restoration stages. Public grants and national co-financing typically covered establishment costs, while emerging private finance opportunities, such as carbon finance and impact investment, were introduced where conditions allowed. Community-level enterprises were supported to generate short-term livelihood benefits through non-timber forest products or agroforestry production, helping maintain local incentives while longer-term ecosystem revenue streams were developed.

A recurring element was improving the “bankability” of restoration interventions by addressing scale and data standardization. Initial restoration activities were often too small to attract external investment. TRI supported bundling interventions into landscape-scale portfolios, harmonizing project documentation, and strengthening ecological and financial data systems, creating structured pipelines of restoration opportunities that could be matched with appropriate financing instruments. In DRC, 65 local cooperatives/community associations benefited from small grants to establish or strengthen restorative value chains linked to soil fertility and forest restoration, sustainable NTFP commercialization.

Overall, evidence from TRI child projects shows that restoration finance becomes more effective when structured as a progression rather than a single intervention. By securing tenure first, using public finance to de-risk implementation, and linking restoration to aggregated investment pipelines and local enterprise income, TRI moved restoration toward more coherent and potentially investable landscape systems.

4.4 Solution Pathway 4: Enhancing the role of public finance as provider of public goods and enabler of private finance (phase-in)

Public finance mechanisms that primarily or secondarily support a transition to land and water stewardship are abundant; however, selecting the appropriate mechanism depends on capital requirements, the ecosystem services involved, and the nature of the intervention (Plantinga, et al., 2024). The BIOFIN Catalogue of Finance Solutions (UNDP, 2024a) contains about 150 financial mechanisms that can be sorted by type of finance result, mechanism, and/or sector. In addition to new or additional sources of revenue (e.g., Plantinga et al., 2024), public finance can come from three primary interventions: cost avoidance, including reforming and removing harmful subsidies; improved efficiency of delivery, including results and performance-based approaches; and improved prioritization of the deployment of scarce funds, including incorporation of natural capital values in policy and decision-making (UNDP, 2024a).

Case study 4: Bat Conservation International's Agave Restoration Initiative: Public grants as a catalyst for bi-national restoration and rural enterprise

Case study authors: Dr. Kristen Lear and Dr. Ana Ibarra, Bat Conservation International

The Agave Restoration Initiative, led by Bat Conservation International (BCI), illustrates how public grant investment can prepare the ground for private investment in landscape restoration and sustainable development. Operating across Mexico and the Southwest United States, the Initiative restores a bi-national corridor of native agave ecosystems that sustains threatened migratory pollinating bats while supporting rural livelihoods. This includes building regional agave restoration supply chains, from native seed collection and nursery propagation to large-scale planting, while supporting sustainable agave-based and other green enterprises that benefit from healthy agave ecosystems. The Initiative also serves as an umbrella mechanism connecting communities, private landowners, and small producers and helping them navigate and access funding streams, technical capacity, and markets that would otherwise be difficult to reach or leverage effectively.

Public funding, primarily in the form of government grants and cooperative agreements from agencies such as the U.S. Forest Service International Programs, Bureau of Land Management, and state agencies, has played a foundational role in de-risking early-stage restoration, financing activities such as seed collection, nursery development, native habitat and rangeland restoration, and improved monitoring of bat populations and habitat conditions. This upfront investment has enabled the initiative to scale into a large landscape-scale restoration effort by establishing supply chains, strengthening local institutions and governance, and generating verifiable environmental outcomes that reduce risk for future private investment.

Public funding is also supporting the development of blended finance mechanisms, including a pilot nursery loan guarantee facility to expand native agave production and attract private capital. Alongside these financing innovations, alignment with national and subnational policy frameworks in both the United States and Mexico (including state and national action plans, protected area priorities, and species recovery planning) reinforces the policy commitments needed to sustain and scale large-scale restoration.

Through this approach, the Agave Restoration Initiative is building on early public investments to expand restoration across a bi-national landscape and create real opportunities for private investment, while delivering long-term benefits for biodiversity, climate resilience, and rural livelihoods.

Further information: https://www.batcon.org/our-work/endangered-species-interventions/agave-restoration/

Carbon credits are at the core of carbon retirement and trading programmes. Drought-smart land management (D-SLM) practices can be incentivized through public-private partnerships using carbon credits resulting in improved efficiencies as well as avoided future costs of landscape restoration (Reichhuber, et al., 2019). Carbon markets create a cost minimization mechanism under the umbrella of a traditional cap-and-trade pollution mitigation system, based on a polluter pays principle. Carbon prices reflect the private cost of emission reduction, not the social cost, and thus underincentivize reductions in carbon emissions. Negative experiences stemming from narrowly defined objectives of carbon capture/sequestration projects have raised the need for biodiversity safeguards, or perhaps 'stacked' ecosystem service exchanges (e.g., Robertson, et al., 2014), in such programmes.

In 2023, the voluntary carbon market value of traded credits was about USD 725 million, consistent with an overall upward trend in value and volume. Average 2023 prices were relatively low at USD 6.50 per tCO_2e. Current voluntary and compliance-based carbon credit and trading institutions operate at international level (e.g., Clean Development Mechanism), national level (e.g., Australian Carbon Credit Unit Scheme) and local level (e.g., California Compliance Offset Program). Credits with measurable and verifiable biodiversity or SDG co-benefits comprise about one third of the overall voluntary credit market, with observed price premiums of about 30%.

Offsets of unavoidable environmental damage and surety bonds to restore damaged landscapes and watersheds date to the 1970s in the global north. Polluting industries from mining and oil and gas to livestock often have surety bond requirements. Since the 2000s, biodiversity offsets (e.g., in South Africa and Mozambique) have been suggested to ensure 'no-net-loss' of biodiversity results from biodiversity losses due to development through the protection of an appropriate ecosystem in exchange for the lost or damaged ecosystem, for example the Rimba Collective and Responsible Commodities Facility (Green Finance Institute, 2025). Questions about how to account for such payments persist and surround societal rights to a healthy planet, versus the right of a company to pollute so long as they financially compensate for the damage done. For example, it is unclear whether an increase in offset payments over time implies an environmental improvement or whether it would have been better not to impose the damage in the first place.

The Tropical Forest Forever Facility is a proposed USD 125 billion public-private partnership using concessionary capital intended to reward forest stewardship (performance) rather than more costly and imperfect restoration activities. The programme beneficiaries are currently to receive grants for performance, but some have argued concessional loans would result in more forest stewardship at lower cost (e.g., Harstad, 2025). Closely related, a means to incentivize 'net positive' biodiversity investments was derived from the concept of carbon credits in the form of biodiversity credits (Biodiversity Credit Alliance, 2025). The closely related concept of habitat banking has a much longer history (e.g., in the USA and Colombia). Although biodiversity credits and potentially an associated market for their trade have gained a lot of interest over the past few years (e.g., in the UK, EU, and Australia), they still require proof of concept due to concerns over measurement, enforcement, comparability, and additionality, materiality in making the business investment case, and ensuring benefits flow to local people (e.g., Green Finance Institute, 2024bc; IAPB, 2024; Swanson, et al., 2025).

When demand in ecosystem services credit market is limited despite a demonstrable societal benefit of conservation, we essentially have a case for a PES scheme, of which there are well over 500 studied cases globally (Salzman, et al. 2018) (e.g., Costa Rica, Ecuador, Sri Lanka). Classically, a single downstream (physically or also in supply chain language) public or private buyer of valuable ecosystem function or condition contracts with upstream providers of the ecosystem service to improve profitability or lower the cost of the former providing goods and services to its stakeholders or consumers. The buyer can purchase best management practices verified by farm gate output measurements in an arrangement that is often managed at the watershed level, but could be scaled to an international level, for example the Land Enterprise Network. Some certification programmes (IUCN Green List of protected areas; FSC certified wood products; Fair Trade coffee) could similarly be viewed through this conceptual lens of credit for (returns to) verified and drought-smart sustainable land and water management practices (e.g., Reichhuber, et al., 2019; UN-Water, 2018; Green Finance Institute, 2025).

Case study 5: Ecological fiscal transfer: Indonesia, Malaysia and Uganda

Case study authors: Andrew Seidl, UNDP BIOFIN, Istanbul, Türkiye, and Colorado State University, Fort Collins, Colorado, USA; An Feng, UNDP BIOFIN, Istanbul, Türkiye

Ecological fiscal transfer (EFT) redistributes operational budgets from central government to more local levels of government, which may result in more responsive and effective policy implementation and often facilitates site-level land conservation and restoration projects with explicit ecological indicators and objectives (e.g., Busch et al., 2021). A review of UNDP's biodiversity finance initiative (BIOFIN) country reports provides three examples of EFT as a finance solution: Indonesia, Malaysia, and Uganda (UNDP, 2026).

In Indonesia, EFT has been institutionalized to provide financial rewards to provinces, regencies, and villages for performance against environmental quality indices and protecting vital ecosystems, often to scale up local restoration of degraded forests and protection of high-conservation-value areas. EFT complements landscape-level initiatives like the SPARE project to support the restoration of more than 4,000 hectares of degraded land and the active management of 1.6 million hectares of critical habitats. In Baluran and Way Kambas National Parks these fiscal incentives support removal of invasive species from savannas and rehabilitation of wetland ecosystems through community-led "rewetting" and replanting programmes.

Malaysia's EFT mechanism incentivizes states to protect and manage forest reserves by compensating for potential revenue losses from forgone commercial logging. This mechanism has directly facilitated the gazettement and protection of 350,000 hectares of new terrestrial and marine protected areas. For the 2026 budget, the federal allocation is approx. USD 59 million, with the weight of ecological criteria in the distribution formula increasing from 30% to 50%. This performance-based model expands forest cover and supports the restoration of ecological corridors, aiming to reconnect fragmented habitats into integrated natural landscapes for systemic ecological recovery.

In Uganda, the National Biodiversity and Ecosystem Index has been used to reward local governments for measurable conservation and restoration efforts outside protected areas effectively monetizing ecological stewardship. Indicators such as forest cover and wetland condition have been used to identify 22 priority districts requiring investments of USD 56-138 million toward forest and wetland services.

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Public-private partnership for land stewardship

Conservation Trust Funds (especially in Latin America) and other national funds (e.g., in Indonesia, Gabon, and Rwanda) have a long history as effective vehicles for conservation, maintenance, and restoration of public lands, and less so in application to private land stewardship. However, in some cases (e.g., Great Outdoors Colorado, USA) they can be directed toward private lands conservation efforts to preserve private goods rights and benefits while incentivizing public goods provision and stewardship.

Conservation easements are a primary land use planning tool employed in the United States to facilitate voluntary but strategic private lands conservation. They are a type of public-private partnership made between private landowners and either nonprofit land trusts or government bodies. Easements safeguard conservation values of a property including protecting habitat for fish and wildlife, maintaining working farms and ranches, preserving scenic views, and ensuring spaces for outdoor education and recreational activities.

In the United States, 32 states have enabled the purchase of (agricultural) conservation easement programmes and facilitated 28 active state level programmes. State and federal conservation easement programmes have invested billions of dollars to protect millions of acres of working farms and ranches. Conservation easement programme financing mechanisms include lottery funds, state tax credits, secondary market trading of state tax credits, bonds, private contributions, mitigation fees, real estate transfer taxes, license plate fees, tobacco taxes, and fuel taxes, among others.

Risk mitigation: Compensatory and insurance-based conservation tools

Finance tools can contribute to climate mitigation and adaptation strategies, reduce disaster risk, and speed recovery from damaging events or outbreaks. The UNDP's Insurance and Risk Finance Facility workstreams on insuring natural capital and green infrastructure investments have been touted as climate risk mitigation strategies, particularly in coastal zones and flood plains, but also relevant for D-SLM (Reichhuber, et al., 2019). Parametric (or index-based) insurance is an example of an emerging tool that could facilitate more rapid recovery from storm, flood, fire, or pest invasions as payments are predetermined based upon probability of an event and magnitude of the likely damage as opposed to requiring an actual damage assessment, a relatively more attractive idea for poor and/or marginalized communities (see, for example, Mozambique mangrove insurance under development).

As is often the case for making the business case for private sector investment in sustainable land stewardship, insurance premiums and loan rates are often subsidized, 'concessionary,' or 'de-risked,' to better align private incentives with public objectives and encourage participation (e.g., Land Degradation Neutrality Fund, Green Climate Fund; Fisheries Improvement Fund) (e.g., Swanson, et al., 2025; Green Finance Institute, 2025).

In a dated article, Wagner et al. (1997) identify compensation programmes in 19 states and seven provinces and damage abatement materials in 34 states and seven provinces across the USA and Canada respectively. Such compensation and/or insurance programmes exist for a great variety of species including deer, bear, elk, moose, bison, wolves, antelope, mountain lions, and coyotes. Human-wildlife conflict insurance has been piloted in Argentina for jaguars, and Nepal, Bhutan, and Sri Lanka for tigers to reduce the public budgetary footprint of programmes that compensate or indemnify for livestock and crop losses due to wildlife predation or destruction.

Debt instruments: Green and nature performance bonds

With many countries and an increasing share of local governments facing restricted fiscal space coming out of the global pandemic and the prospect of ODA reductions, debt financing is a common consideration. Green, blue, or land restoration sovereign bonds may be an appropriate solution for ESG investment in this case, such as in Belize, Indonesia, Uzbekistan, Philippines, Peru, and Zambia (e.g., WOTR, 2025). North America comprises 33% of the current USD 525 billion green bond market, which is predicted to grow to USD 1,033 billion by 2031.

Nature performance (also known as 'pay for performance') bonds are recently introduced instruments that incentivize issuers to meet key nature performance metrics to improve the terms (interest rate or principal) of their debt service. The USD 150 million South African 'rhino bond' was the first known pilot of this tool, supported by the GEF and the World Bank, and a 'tiger bond' recently has been launched in SE Asia.

In 2021, Benin issued its first SDG bond (Government of Benin, 2021) for EUR 500 million over a 12.5-year tenure with a coupon rate of 4.95% (Caumes, A. & Merle, C. (2021). Around 91% of the bond was allocated to investors with sustainable investment strategies, such as those investors incorporating ESG criteria in their investments. The bond can be categorized as an International Capital Market Association Sustainability Bond, in alignment with the Sustainability Bond Guidelines (2021 edition). The contribution to sustainability has been assessed as advanced by Moody's Vigeo Eiris.

Debt instruments: Debt-for-nature swaps

The case for debt-for-nature swaps in sub-Saharan Africa: sub-Saharan African (SSA) states are among the most vulnerable to the triple crisis of debt, climate change, and natural resource loss and/or degradation. The total external debt of SSA countries excluding the high-income countries was USD 216 billion in 2000, grew to USD 515 billion in 2015, and reached USD 863 billion by 2023. During the same period, total external debt servicing increased from USD 14 billion in 2000 to USD 81 billion in 2023 (World Bank, 2025). Debt servicing has been growing both in absolute terms and as a percentage of the total export earnings of these countries, particularly over recent years. The recent growth in external debt accompanied by the negative impact of COVID-19 on global economic activities has led to an unprecedented increase in sovereign debt by several developing countries. In addition, the external debt shock of these countries is exacerbated by the recent growth of inflationary pressure on many economies, and the supply chain disruptions and additional impacts of the Russia-Ukraine war. The fifteen most highly indebted countries in Africa account for 82.73% of Africa's total external debt of USD 1.153 trillion in 2023. The debt-to-GDP ratios of these countries range from 0.2034 for Ethiopia (debt = 20.34% of GDP) to 3.19 for Mozambique (debt = 319.02% of GDP).

Given the decline in public finances, African governments' ability to invest in inclusive economic growth and sustainable natural resource management depends on the availability of external financing, such as debt relief and restructuring multilateral and bilateral financial assistance including soft loans/grants and IMF special drawing rights, and access to markets and external private finance (Patel et al., 2021). Safeguarding Africa's climate and biodiversity while debt and debt servicing levels are so high is extremely challenging (Patel et al., 2021). Thus, managing Africa's debt through debt for nature/climate swaps could provide inclusive investment in nature protection and climate change mitigation and adaptation and provide a bridge to greater debt sustainability while addressing the three crises of debt, climate, and nature (Patel et al., 2021).

Debt-for-nature swap: Seychelles

The Republic of Seychelles defaulted on its debt in 2008. But rather than using debt-for-equity or debt-for-resources swaps, debt-for-nature swaps proved to be much more relevant to the country, international community, and global good of biodiversity and ecosystems. Seychelles is an archipelago of 115 islands in the Western Indian Ocean, home to precious coral reefs and endangered species, and an economy dependent on marine tourism and fishing. Despite some successful reforms and recovery from the debt default (World Bank, 2017), they have continued to be vulnerable to external economic shocks while their marine ecosystem continued to deteriorate (Gerretsen, 2020).

In 2016, The Nature Conservancy (TNC) initiated a debt-for-nature swap deal that restructured Seychelles' sovereign debt of USD 21.6 million owed to Paris Club members (mostly the UK, France, Belgium, and Italy) in exchange for its commitments to protecting the ocean. Led by TNC, the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) was established, which bought the debt from the creditor countries at a discount. The government of Seychelles agreed to do three things accordingly: 1) pay back loans to SeyCCAT at a lower interest rate; 2) spend the savings on ocean conservation work; 3) designate 30% of its marine area as protected, free from unregulated economic activities such as fishing and drilling (Rahim, 2020). The results were promising; by March 2020, they had made every debt-related payment on time and completed the protection of 32% of its waters. The successful application of debt-for-nature swaps in Seychelles is based on a concept that was coined and tried in the 1980s. Indeed, since its inception, debt-for-nature swaps have been viewed to free up funds for the environment while reducing the debt burden of the borrowers.

Catalytic capital

To overcome financial barriers to transformation such as risk averse strategies of the private sector and lack of start-up finance from the public sector, the use of catalytic capital is envisaged. Catalytic capital is defined as debt, equity, guarantees, and other investments that accept disproportionate risk and/or concessionary returns relative to a conventional investment, in order to generate positive impact and enable third party investment otherwise not possible (Tideline, 2019; Impact Investment Institute, 2023).

Catalytic funders typically include development financial institutions and multilateral development banks, governments, philanthropists, private investors, and corporations. Catalytic funding may be needed at all stages of the phasing in components of the conceptual framework. It aims to facilitate investments by private investors, build partnerships with local fund managers, support those receiving funds, and empower local communities. One key aspect of this process is the identification of a facilitator who can foster collaboration and provide accountability for fund management. This could be an NGO, community-based organization, local or national banks, development banks, and government agencies.

Mobilizing private finance through de-risking: Blended finance for land and water transitions

One option to fund the land and water transition is blended finance where public and/or philanthropic capital is combined with private sector investments to finance projects that deliver social and environmental impacts as well as financial returns. Often the public/philanthropic funding is concessional and catalytic funding that unlocks private investments by reducing the risks over the term of the investments. Blended finance starts with concessional funding meaning capital that has lower than normal interest rates, longer repayment times, higher risk tolerance by the lender and possibly grants. The main funders of concessional capital are foundations, donors, and development financial institutions along with others who provide smaller amounts. Concessional funding plays roles in anchoring commitments and providing credibility, de-risking capital and enhancing returns. Concessional funding is usually combined with private finance to form different types of blended finance and is used to design, initiate a programme or project, raise additional funding and to support its operation, implementation and impact assessment. A technical assistance programme is included in blended finance for fund managers, investors and recipients of the funding. There is no one size fits all and, for example, over 50 public-private-philanthropic partnership models exist that use a variety of financial mechanisms (McKinsey & Company, 2023b).

An example of a successful blended-finance fund with a proven investment track-record is the Acumen Resilient Agriculture Fund (ARAF). ARAF has been supporting small scale agricultural enterprises and small holder farmers in West and East sub-Saharan Africa to adapt to increasing risks to agri-businesses and agriculture from climate change. Funding is in the order of USD 58 million combining funding from the Green Climate fund (GCF), foundations and family offices, development finance institutions (DFI's) and ACUMEN, a non-profit impact investment fund manager. The GCF provided 40% of the funding and served as the anchor entity. The fund divides the capital into a tranche of USD 25 million that de-risks the overall funds and a second 'senior' tranche of USD 33 million (57%) that is a fixed return instrument funded by DFI's, foundations and family offices. The 'ticket' for each investor is up to USD 3 million. Additional investors included FMO, Proparco, and the Soros Economic Development Fund.

A USD 6 million technical assistance fund was established for fund managers, portfolio companies and programme implementers and for ARAF, especially women farmers on climate smart products and services. The main land user targets are investments for small-to-medium size enterprises for climate adaptation measures such as drought resistance, water management, climate smart value chains. Other activities under technical assistance included surveys with farmers on well-being, yields, income and climate resilience.

Impacts include a 90% reported increase in income impacting 12.6 million people with 38% of the farmers who benefited were women.

Further reading: Investisseurs & Partenaires (I&P), Catalytic Climate Finance Facility (CC Facility). 2026. Transformative capital: The role of blended finance in shaping the trajectories of gender- and climate focused impact funds in Sub-Saharan Africa. https://www.convergence.finance/resource/transformative-capital-the-role-of-blended-finance-in-shaping-the/view

Other examples include the Global Agriculture and Food Security Program (GAFSP) https://www.gafspfund.org/ and International Finance Corporation (IFC) Blended Finance Platform https://www.ifc.org/en/what-we-do/sector-expertise/blended-finance

Case study 6: Designing blended finance for landscape impact from the ground-up: Lessons from Spain

Case study authors: Victoria Gutierrez, Alejandro Diaz and Willem Ferwerda, Commonland

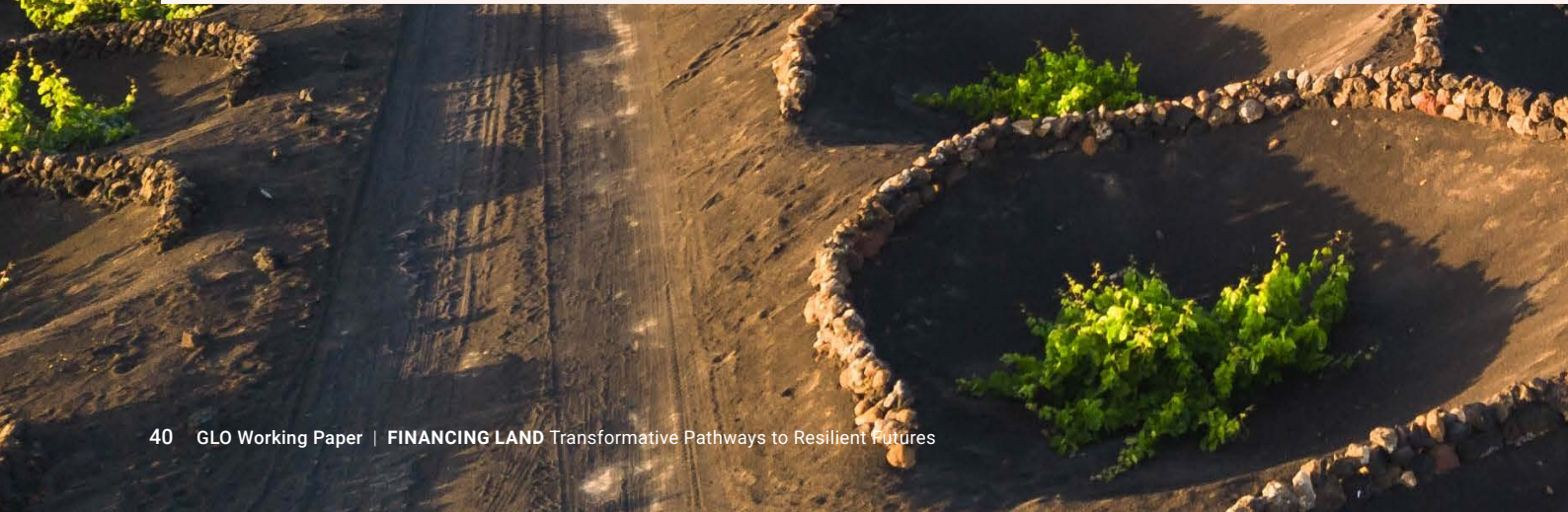
Land degradation and desertification are accelerating across Southern Europe, with the Altiplano Estepario — a 1-million-hectare landscape in south-eastern Spain — among the most affected territories (Martínez-Valderrama et al., 2022; Wilson et al., 2023). Decades of soil erosion, biodiversity loss, and unsustainable land use have undermined both ecosystem function and rural livelihoods. Despite binding and voluntary commitments under the UNCCD Land Degradation Neutrality framework, the EU Nature Restoration Law, and Spain's National Programme to Combat Desertification, public funding alone has proved insufficient to reverse these trends (UNCCD Global Mechanism, 2024). Mobilizing long-term private and blended finance at landscape scale is increasingly recognized as essential, yet practical financial tools and governance models to do so remain scarce (Möller et al., 2025; Dellecker et al., 2024).

Commonland is an international non-profit foundation that supports people and organizations to restore landscapes around the world through the 4 Returns Framework (Dudley et al., 2021) – a practical, holistic approach integrating inspiration, social, natural, and financial returns. Since 2014, it has collaborated with local partners including the AlVelAl Association (650 members, of which 400+ farmers), regenerative agriculture companies such as La Almendrehesa and Habitat, and an educational institute, the Regeneration Academy. With these partners, the first long-term holistic landscape plan was developed, outlining priority actions needed and their spatial implementation. This decade-long engagement built the social trust and institutional relationships necessary for collective financial planning — preconditions often overlooked in policy frameworks.

An Innovative Financial Landscape Assessment Tool

In 2025, Commonland piloted the 4 Returns Finance Assessment tool (4RFA) in the Altiplano Estepario– one of the first applications of this methodology globally. Unlike conventional financial assessments that focus on single projects or enterprises, the 4RFA operates at the landscape scale, mapping all relevant finance flows–public subsidies, private investment, grants, carbon and other revenues from ecosystem services– across a landscape and identifying structural financing gaps. Crucially, it integrates non-financial returns— social, ecological, and inspirational— into the investment logic, enabling a more complete picture of value creation that resonates with impact investors and blended finance providers.

The analysis of finance flows revealed a funding gap of over USD 199 million for the period 2025-2030 across a portfolio of more than 50 distinct interventions. These include working capital and capital expenditures for regenerative agribusinesses, a shared machinery bank managed by AlVelAl, and grant funded measures such as cover crop planting, intercropping with aromatic plants (supporting pollinators while generating essential oil revenues), and water conservation works including swales. EU CAP subsidies emerged as a key leverage point: closer alignment between National Restoration Plans and ongoing CAP reform processes could reduce early-stage risk and support blended finance structures that would otherwise be too uncertain for private investors. One approach under development is to partner with local financial institutions that already have established relationships with farmers in the territory to develop tailored financial products–such as lower interest rates and longer grace periods–that can accelerate the uptake of regenerative practices.



The landscape plan and finance assessment have laid the groundwork for a collective landscape finance strategy with three components: prioritization of interventions; formalization of inclusive governance structures; and development of blended finance mechanisms tailored to the landscape's needs and opportunities (rather than those of financiers). The latter may involve establishing new mechanisms or improving bankability to access existing funds, with landscape partners taking on roles in governance and management as needed.

This process has strengthened the credibility of local landscape partners in engagements with donors and financiers – including the European Commission, the European Investment Bank, local financial institutions, and private investors and philanthropists. By establishing a long-term shared financial strategy and fostering transparent collaboration, Commonland aims to mobilize investment capital alongside additional subsidies and grant funding to help reverse desertification in the landscape.

More broadly, it demonstrates how bottom-up financial planning–grounded in landscape-scale evidence and inclusive governance–can align with top-down policy instruments to unlock investment at scale. As the work progresses, outcomes on capital mobilization and ecological restoration will be tracked against a five-year financing roadmap, building a replicable evidence base for policy and finance actors addressing land degradation across Europe and beyond.

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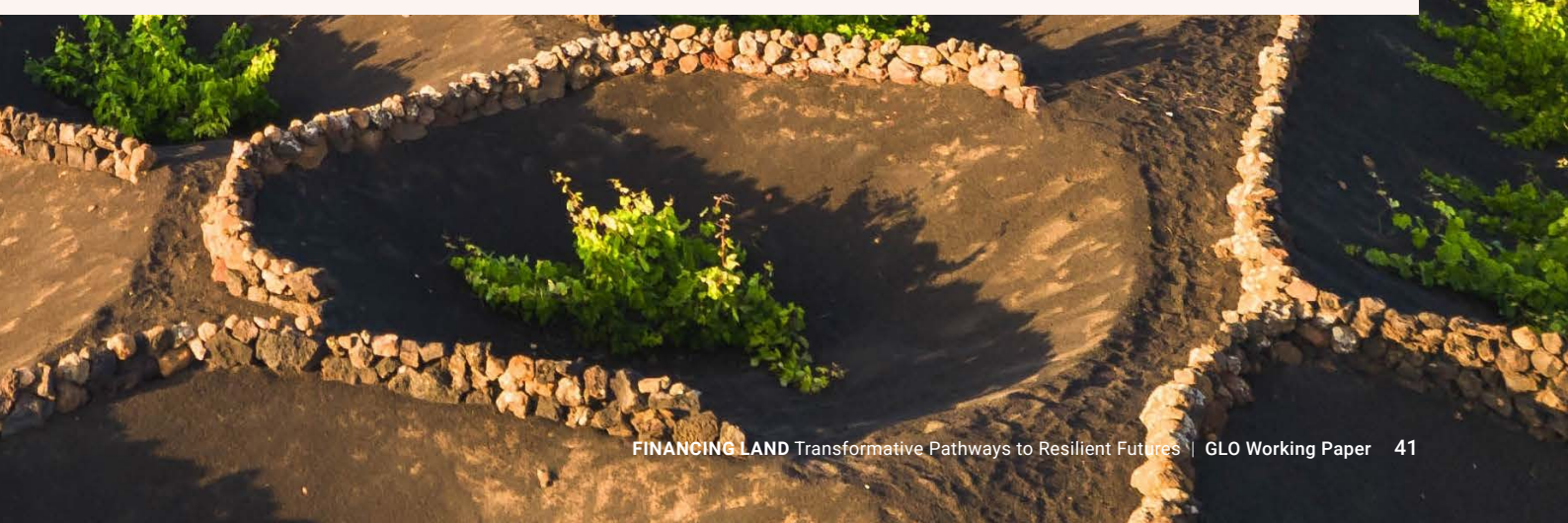

4.5 Solution Pathway 5: Enhancing innovative private finance instruments (phase-in)

SLM and NbS require significant investment, and private finance is increasingly seen as a critical source to fill funding gaps. A range of innovative financial instruments are emerging to mobilize private capital for land restoration, climate resilience, and conservation, ranging from impact investments and green bonds to insurance schemes and biodiversity credits (Table 5.3). This section explores various private instruments and mechanisms to unlock private financing options.

TABLE 5.3 Innovative private finance instruments for SLM and ecosystem restoration

Instrument	Definition and key features	Recent trends/Examples
Impact investments	Investments aiming for positive environmental/social impact plus return. Often structured via funds (private equity, debt) targeting sustainable businesses or projects.	Surpassed USD 1.16 trillion globally. e.g., Land Degradation Neutrality Fund (USD 208 million fund blending public/private capital for land restoration) financing agroforestry in Africa, sustainable forestry in Asia, etc.
Green bonds	Bonds whose proceeds are dedicated to environmental projects (use-of-proceeds). Issued by governments, banks, companies. Investors earn fixed return; principal repaid at maturity.	USD 487 billion in green bonds issued 2022; cumulative sustainable debt USD 3.7 trillion. Sovereign green bonds in e.g. Nigeria, Indonesia fund reforestation and climate-smart infrastructure. Usually there is strong demand from ESG investors.
Sustainability-linked loans/ bonds (SLL and SLB)	Loans or bonds with interest/ coupon tied to borrower's sustainability performance on set targets. No restriction on use of funds; financial incentive to achieve them (rate step-down or step-up).	USD 474 billion in SLLs and USD 86 billion in SLBs issued 2022. Rapid growth across sectors (energy, agriculture, retail). Uruguay's USD 350 million World Bank loan reduces interest if methane emissions are cut 33%. Corporate examples include Olam's loan tied to sustainable rice farming and Chile's sovereign SLB tied to emissions and ocean protection.
Insurance & resilience bonds	Climate risk insurance (index insurance, catastrophe bonds) provides payouts aftershocks (droughts, floods). Resilience bonds raise upfront capital for risk reduction projects, repaid by avoided losses or public savings.	Index insurance: African Risk Capacity payouts (e.g. USD 32 million to Zimbabwe for drought 2024). Resilience bonds: Forest Resilience Bond (USA) raised USD 4.6 million for forest thinning; InvestHER Bond (Uganda) are raising USD 25 million for women farmers' climate resilience; EBRD's USD 700 million climate resilience bond (2019) for adaptation projects. There is a growing interest in linking insurance with nature (e.g., reef insurance in the Caribbean).

Instrument	Definition and key features	Recent trends/Examples
Debt-for-nature swaps	Agreement to restructure or buy national debt at discount in exchange for debtor nation committing funds to conservation or SLM. Often involves issuing a new 'green/blue' bond with lower cost.	Major resurgence: Belize 2021 swap retired USD 533 million debt, freeing ~ USD 4 million/yr for reef conservation. Ecuador 2023 swap cut USD 1 billion+ debt, USD 450 million for Galápagos (largest ever). Gabon 2023 (first in Africa) freed USD 163 million for coasts. There was a total of ~USD 3 billion in swaps 2020-24, and Pakistan, Sri Lanka, and Caribbean nations are considering similar deals.
Biodiversity credits	Tradeable units representing specific biodiversity gains (habitat protected, species conserved). Companies buy to support nature positive goals or offsets. Still a voluntary/nascent market.	Pilot projects: Colombia cloud forest credits at USD 35 for 10m²/30yrs; Zambia community issuing credits for 1 ha conservation. Market value is small but interest rising post-COP15. IUCN Global standard for NbS, Red List of Threatened Species, Red List of Ecosystems, Australia and UK developing frameworks could help ensuring credible metrics, a key to potential approx. USD 18–40 billion/yr market long-term.
Carbon credits/ markets	Credits represent 1 ton CO_2 avoided or removed. Land-based credits (reforestation, soil carbon, REDD+ etc.) sold in **voluntary carbon markets** or via compliance schemes. Monetizes climate regulation service of land.	The voluntary market was estimated at USD 2 billion in 2021 (four times higher than 2020), In 2023, value was estimated at a USD 700 million reduction due to quality concerns. Many corporates demonstrated interests in funding afforestation and agroforestry for offsets, for example, Kenya's Kasigau REDD+ project generates credits sold to Disney etc. Article 6 of the Paris Agreement may boost the market, but price volatility and integrity verification remain challenges. The further operationalization of Article 6.4 may strengthen demand for high-integrity land-based mitigation and removals. For restoration and soil organic carbon-related interventions, however, investability will depend on robust MRV, additionality, permanence, leakage management, and social and biodiversity safeguards. Where these conditions are met, Article 6.4 could become an important channel for mobilizing finance into regenerative agriculture, agroforestry, and ecosystem restoration.
Supply chain finance and insetting	Financing sustainable practices through corporate supply chains. Includes certification premiums, payments for ecosystem services by beneficiaries, and insetting (company-funded climate or conservation projects within its supply chain).	Water funds: e.g., Nairobi Water Fund – companies/ utilities pay farmers for watershed conservation (50 thousand farmers, doubling their incomes). Deforestation-free supply chains: Green Fund loans to palm oil firms meeting no-deforest criteria. Insetting: Nestlé and Pepsi have invested in regenerative agriculture with suppliers. EU deforestation regulations forcing more corporate investment in traceable and sustainable sourcing.

Instrument	Definition and key features	Recent trends/Examples
Conservation trust funds	Long-term funding vehicles (endowments, sinking funds) for SLM or protected areas. Capitalized by donors, governments, increasingly impact investors. Professional management disburses grants or loans to projects.	There are 90+ environmental funds worldwide, including the LDN Fund - a USD 200 million blended fund managed by Mirova investing in land restoration (with returns to investors). The Madagascar Foundation finances parks from endowment. New coastal resilience funds (e.g. Seychelles' Blue Bond trust) combine grants and tourism fees, and ensure strong governance and local involvement.
Philanthropy and grants	Grants or donations from foundations, corporations, or individuals for sustainable land use initiatives. No financial return expected; often funds public goods or early-stage pilots, capacity building.	There was an estimated USD 2.5 billion in private philanthropic capital for nature in 2020. Big pledges including the Bezos Earth Fund of USD 10 billion, and Bloomberg and others at USD 5 billion for 30x30, etc. These are often used to leverage other funds (e.g., grant as first-loss in a project to attract investors). However, there is a decline in pure philanthropy offset by more strategic philanthropy (challenge grants, prize funds for restoration, etc.).
Equity (private equity (PE) and venture capital (VC)) in land-focused Business	Private equity and venture capital investment into companies and projects that promote SLM (sustainable farming companies, forestry firms, climate tech for land, ecotourism ventures). Investors take ownership stakes aiming for high growth/returns.	Rise of natural capital PE funds (HSBC Pollination USD 1 billion target fund, etc.). Pension funds acquiring sustainable timberland (e.g., FSC-certified forests). Agricultural technology VC is booming – e.g. soil carbon measurement startups, biofertilizer companies raising millions of dollars. This is still a relatively small niche, and it is key to align profit with restoration (e.g., ecotourism investing in wildlife habitat).
Crowdfunding	Online platforms or community financing campaigns where many individuals contribute small amounts to fund a specific environmental project or social enterprise. Can be donation-based or investment-based.	Successful campaigns include: • Ocean Cleanup raised USD 2 million from 38k people through community tree-planting drives on GoFundMe/Kickstarter. • Solar drip irrigation projects in sub-Saharan Africa were crowdfunded via Kiva/Trine. • New platforms also allow buying shares in forests or lending to organic farms. This engages the public, but project success varies; it mostly works best for awareness and pilot funding.

Case study 7: Financing land restoration through a stacked-income model in coffee landscapes – Colombia

Case study authors: Ciniro Costa Jr., The Alliance of Bioversity International and CIAT; Julia Bosshard, GIZ; Lars Zimmermann, KfW; Mauricio Mendoza, Incofin IM; Nawel Octave, Incofin IM

In Colombia's coffee landscapes, a biochar-based financing model, implemented by Equation Coffee alongside Cirkular and Biodiversal[1], demonstrates how private climate finance can support sustainable land management while strengthening smallholder livelihoods. The project forms part of the CompensACTION initiative financed by the German Federal Ministry for Economic Cooperation and Development (BMZ) through KfW and implemented through the Fairtrade Access Fund (FAF), advised by Incofin IM, in close collaboration with the Alliance of Bioversity International and CIAT. The financing mechanism links global climate finance with smallholder producers through a blended approach combining impact investment, technical assistance, carbon markets and value-chain incentives. Biochar is a carbon-rich material from biomass residues that improves soil health while sequestering carbon and reducing emissions. Long term loan and grants mobilized through the FAF and FAF TAF finances biochar infrastructure, farmer organization, as well as measurement, reporting and verification (MRV) systems required to generate high-integrity carbon removal credits. These credits are sold to private buyers in voluntary carbon markets, creating a revenue stream linked directly to improved land management practices. In addition, premium on price for climate-positive coffee further strengthen farmer's income stream.

Therefore, the model follows a stacked income approach, combining multiple revenue streams from improved land management. Coffee pruning residues from farm renovation are converted into biochar using low-cost Kon-Tiki ovens operated by clusters of 80 - 100 households, without requiring additional land. Each cluster processes around 2,750 tons of biomass and produces about 618 tonnes of biochar, resulting in the removal of roughly 1,361 tons of CO_2. By 2030, under the CompensACTION loan, the model is targeting to apply 12,300 tons of biochar and remove 25,000 tons of CO_2. Farmers receive payments from verified biochar carbon removal credits, which can increase of annual household income by 8-10%, with biochar-based carbon credits typically generating higher prices than other removal techniques. Combined with estimated yield gains of 5–10% from improved soil health and access to climate-positive premiums, this model seeks a viable pathway for smallholders to move above the poverty line and transition toward more profitable, resilient, and investment-ready production systems. Although the model was piloted by the company prior to the KfW–Incofin IM intervention, the financing mechanism is now enabling its scaling to new areas and additional farmers while the Technical Assistance is supporting the strengthening of the MRV system and the testing of soil parameters that may generate further co-benefits for smallholders and the overall model.

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[1] Equation Coffee, Cirkular Origin, and Biodiversal are private companies united by common founders, a shared purpose, and a vision for impact. They work collaboratively within Colombia's coffee value chain as members of the Coffee Hub, complemented by a broader ecosystem of roasters, farms, and coffee shops. Equation coffee receives the CompensACTION loan for Biochar expansion buys, export the coffee and leads grower relations; Cirkular delivers project design and connection with carbon markets, while Biodiversal handles field execution and farmer engagement.

4.6 Solution Pathway 6: Accelerating finance for scaling and restoration

Experience from landscape-scale restoration, climate adaptation programmes, and integrated water resource management demonstrates that financial resources alone are, in most cases, insufficient in the absence of targeted accelerators and enabling conditions for scaling land restoration. Without these complementary factors, even well-designed financial instruments — whether public, private, or blended — often fail to gain traction or remain limited to pilot-scale initiatives:

- First, targeted **accelerators** are needed to drive financial flows and enable the scaling of investments. These accelerators are closely linked to finance-for-nature instruments and investment mechanisms.
- Second, broader **enabling conditions** are essential. These encompass the institutional, policy, and economic frameworks within which financial decisions are made, and serve to reduce risks, coordinate stakeholders, and align incentives with long-term sustainability objectives.

The targeted accelerating factors include data shifts, policy shifts, and reforming subsidies as a particular measure.

Accelerating financial flows to land restoration through budgeting, accounting, and MRV

Nature-relevant budgeting: Public sector entities engage in financial accounting, or budgeting, which informs decision-makers about the cost of maintaining or enhancing natural capital (or wealth). Identifying nature-relevant budget lines is not always straightforward. Some government actions are fully dedicated to improving nature stewardship outcomes while others are secondarily focused on nature and co-benefits are common. Public finance may consider land and water stewardship safeguards in identifying and vetting appropriate investments.

The UNDP **Biodiversity Finance Initiative** (UNDP BIOFIN, 2024c) has developed a methodology called the Biodiversity Expenditure Review (BER) to identify, categorize, attribute, and tag biodiversity, climate, and gender positive investments. The BIOFIN Global Biodiversity Expenditure Taxonomy (GLOBE) is a comprehensive listing of biodiversity expenditures consistent with functionalities associated with the Classification of the Functions of Government (COFOG) developed by the OECD and based on the System of National Accounts (OECD, 2023). By using COFOG, public biodiversity expenditures are more likely comparable over time and across countries and regions. 41 countries so far have completed the BER with an additional 91 in the process of completing the analysis by 2027 under the GEF 8 Biodiversity Finance Plan Programme.

Comparative studies of public biodiversity expenditures across 30 BIOFIN countries from 2010 to 2018 show that biodiversity expenditures comprise 0.19 to 0.25% of GDP. Although the trend is increasing over the same period, average biodiversity investment remains less than the 0.5% recommended by the CBD to address the biodiversity targets (Seidl, et al., 2020). Global expenditure models predict higher absolute expenditures in wealthier countries, but as a lower proportion of GDP compared to less wealthy countries (Seidl et al., 2021).

Economic and financial accounting, taken together, can inform the efficiency of public investments by identifying the difference between financial investment costs and economic returns, or return-on-investment (e.g., Plantinga, et al., 2024). When comprehensive natural capital accounting has not taken place, only cost-effectiveness or effectiveness-cost analysis can be used, creating difficulties in comparing the efficiency of potential investment projects affecting different types of ecosystem services or natural capital values.

Transparency, MRV, accountability measures: Trust-building mechanisms are indispensable for attracting and sustaining investment at scale. Key tools include transparency in financial flows, robust MRV (Monitoring, Reporting, and Verification) of outcomes, and strong institutional accountability measures. Together, these mechanisms reduce perceived risk and information asymmetry, making investors and stakeholders more willing to commit resources over the long term. A well-functioning MRV system provides credible evidence of impact, which serves as a powerful incentive for mobilizing additional funding. Accordingly, many climate finance initiatives now incorporate third-party verification and community oversight committees to help ensure that funds are managed effectively.

Enabling finance for land restoration through regulation and incentives

Stable and supportive regulation is an accelerating factor for unlocking large-scale finance for resilience and NbS. Public and private investors are more willing to commit funding when there are predictable, stable investment and regulatory climates (Baker et al., 2016), which requires mainstreaming resilience into development plans and budgets. Countries are currently integrating drought resilience, land restoration, and climate adaptation targets into their national strategies and sectoral plans. Embedding such targets in regulations signals the government's long-term commitment and gives impetus to implementation efforts. Such regulatory commitment also facilitates inflow of international funding. In aligning with global frameworks such as the Paris Agreement or the LDN targets, countries can become eligible for multilateral funds and technical support tied to those commitments.

Beyond direct public incentives, disclosure frameworks, sustainable finance taxonomies, and corporate target-setting initiatives are becoming important drivers of investment in resilient land and water systems. Reporting requirements and taxonomies can reduce information asymmetries, clarify what qualifies as a credible land-positive investment, and lower perceived risk for investors. In parallel, science-based targets and net zero pledges are increasing corporate demand for credible supply-chain interventions, insetting, and restoration investments, including practices that build soil organic carbon while also supporting adaptation, resilience, and broader ecosystem benefits.

Secure land and property rights is another major enabling condition for securing financial flows (Besley, 1995; Deininger and Jin, 2006). People will not invest in restoring land or forests if they fear losing property rights to those resources. Thus, clarifying and strengthening land tenure (or water-use rights) is a key policy reform to encourage local investment in long-term resilience.

Results-based finance and market incentives: Results-based financing mechanisms reward the achievement of specified outcomes rather than just funding inputs, aligning incentives for performance. Market-based incentives such as certification schemes and sustainability price premiums can make resilient and sustainable practices more profitable, thus, attracting private investment. Both strategies help de-risk and incentivize resilience investments, as investors are more confident in backing activities with clear, measurable payoffs or higher market value for sustainable goods. Creating premium markets for sustainable products can pull investment into sustainable land and water management by improving profitability. Companies like Nestlé, Mars, and Unilever have made zero-deforestation and sustainably sourced commitments that effectively create guaranteed demand (often with a slight premium) for certified palm oil, cocoa, tea, etc.

Overcoming funding volatility: Scaling up resilience financing requires confronting the risks in the financial landscape – notably the volatility of funding flows, the uncertainty in aid (ODA) commitments, and structural limitations of the current finance architecture. Many developing countries rely on a mix of domestic budgets, international aid, and private sector investments for land restoration and adaptation activities, even if the bulk of funding for transformation is likely to come from domestic budgets if they are to be successful. This is particularly the case since international flows can be highly volatile year-to-year, complicating long-term planning. Such boom-bust cycles in international support pose a real risk to sustained implementation of long-term initiatives like ecosystem restoration or drought resilience programmes. To address volatility and gaps, several strategies can be used:

- Countries can establish dedicated trust funds or budget provisions. For example, Australia's multi-billion-dollar Future Drought Fund guarantees annual funding over decades (Australian Government, 2019). In Africa, countries like Ghana, Sierra Leone, and Liberia have proposed national drought resilience funds to ensure stable financing for farmers and climate adaptation, rather than relying solely on ad-hoc aid. For example, Ethiopia's Productive Safety Net Programme includes a contingency fund (a multi-donor trust mechanism) that can be tapped during droughts, providing a consistent buffer for response and recovery.

- Combining different types of sources can make funding more resilient. Public or donor capital can be used in a counter-cyclical role, ramping up support when private flows decrease (such as during a recession). Similarly, climate funds and multilateral banks can use guarantee instruments and insurance products that can stabilize returns for investors in sustainable land use – for instance, offering partial risk guarantees for green bonds ensuring that, even if project revenues dip, investors are secured.

- There is a need to make climate and nature finance more integrated. i.e. systemic. Institutions like the Global Environment Facility (GEF) and Green Climate Fund (GCF) are increasingly coordinating on integrated projects (land, water, climate together) to allow a single proposal which can address multiple sustainability gaps. At the country level, creating integrated land-biodiversity-climate finance strategies can help align different donors and programmes and global commitments (environmental United Nations Rio Conventions) toward common priorities, reducing duplication.

Facilitation plays a critical role throughout these steps. Facilitating agencies, such as the Climate Adaptation Fund (CAF), central banks, specialized project developers and intermediaries (like ESMERALDA), impact hubs, NGOs, development cooperations, and stewardship programmes (e.g., GIZ's NatuReS programme), provide platforms for coordination, financing, and monitoring. Their functions extend beyond funding to include ensuring robust MRV systems for natural capital outcomes, impact assessment, and the integration of scientific knowledge into decision-making. Science thereby contributes not only evidence but also legitimacy and adaptive learning capacity.

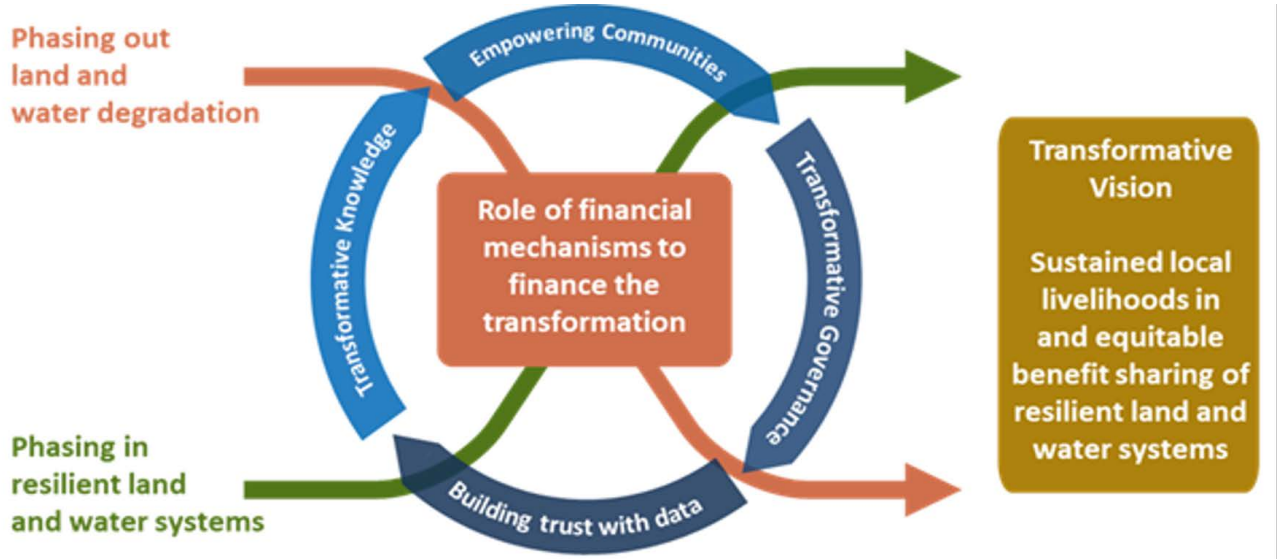
Chapter 5

Enabling conditions – Ensuring that finance benefits people and planet

Chapter 5 examines the conditions needed to create an enabling environment for transformative finance and scaling investments that benefits both people and the planet. The vision outlined in Chapter 3 — "the right finance for the right intervention in the right place at the right time" and the conceptual framing of the phasing-in and phasing-out guide this approach. Key factors include (see Figure 5-1):

- **Transformative knowledge** (5.1): What knowledge is required, and whose perspectives must be included, to design context-appropriate, inclusive, and scientifically informed interventions and financing?
- **Emancipation and agency** (5.2): How can communities, especially marginalized groups, be empowered to co-shape decisions, claim benefits, and steward landscapes?
- **Transformative governance** (5.3): What governance structures and policy environments foster coherence, accountability, and effective benefit sharing?
- **Data provision and standardization** (5.4): How can transparent, interoperable data systems build trust, reduce uncertainty, and enable investment at scale?

FIGURE 5-1 Applying the phasing-in and phasing-out framework to embed financial mechanisms in a transformation to resilient water and land systems (Source: Authors' elaboration; based on Loorbach et al., 2017; Wittmer, 2021)



5.1 Transformative knowledge

If communities, finance providers, other decision-makers, researchers and other stakeholders are to make informed, evidence-based decisions to meet the vision of "the right finance for the right intervention in the right place at the right time", then collating, compiling, and interpreting diverse forms of knowledge into an accessible and understandable form is a pre-requisite. This is particularly so if we wish to facilitate procedural equity throughout the process.

Understanding the background and context of an intervention area is essential if the right interventions are to be implemented in the right places at the right time. In a similar way to the ELD 6+1 Step Approach to assess the economics of land management (ELD Initiative, 2015b), background context materials include geographical and landscape-oriented documents, policies, laws, institutions, socio-economic conditions, cultural and environmental details.

Geographical and ecosystem knowledge: Comprehensive climate, geological, hydrological, topographical and ecological characterization provides an essential baseline for monitoring and assessing if and how interventions to transition to more resilient land systems have progressed. For instance, climate, soil types, water availability, topography and land potential will largely determine which broad types of interventions are likely to deliver beneficial outcomes considering ecosystem function, social cohesion, etc. In addition, biodiversity is a key element of ecosystem service provision, and different individual species/communities are associated with distinct services, and ecological complementarity of diverse species mixtures can enhance service delivery, such as through carbon sequestration, as well as providing a greater range of resources for people. Thus, if we are to properly quantify carbon sequestration in, for example, a grassland or forest, improved knowledge of the structure and diversity of grassland or forest species assemblages is required. To effectively manage treed habitats for climate change mitigation, or for erosion control or in providing diverse habitats for biodiversity, we need an understanding of things like the stocks and flows of organic carbon through biomass and soils, the specific roles of vegetation structure on soil stabilization, and the extent to which vegetation does or does not underpin habitat quality.

Knowledge about communities and stakeholders: An understanding of the communities and stakeholders with influence, or who will be impacted by interventions to address land degradation, plays a key role in fostering transformation processes. Ensuring that stakeholders traditionally marginalized in decision-making are given a stronger voice by gathering knowledge collectively will be essential to enhance legitimacy and reduce the potential for finance impacts to reinforce existing inequalities. If done well, finance for interventions based on equity consideration may even help reduce inequalities, particularly as those who tend to be marginalized in decision-making are also groups (women, elderly, landless, migrants) who are most vulnerable to the impacts of land degradation.

How we avoid, halt, or reverse land degradation also needs to align with livelihood strategies/future opportunities for livelihoods, social structures, youth engagement and norms. Jointly learning about communities, both in terms of quantitative (size, demography, income levels etc.) and qualitative characteristics (e.g. social norms, traditional power structures, knowledge sharing processes, social networks etc.), is an essential component of an evidence-based approach to finance and intervention selection.

Knowledge about attitudes and values: Further, given that interventions may require large-scale landscape change, it will be important to assess whether and in what ways interventions resonate or conflict with diverse, plural community values for the landscapes in which people evolved, live, work, and spend time, and their priorities for how those landscapes should be managed. Interventions may represent substantial acts of place-making, altering cultural identities, more tangible ecosystem services, natural capital assets, and value delivery. Understanding how communities perceive and value current landscapes, their visions for future landscapes, and how these perspectives vary across groups (women in cropping vs. livestock farmers, youth, tenants vs. owners, recent arrivals vs. long term residents) allows the identification of the potential for trade-offs across values, and across stakeholder groups. By making such trade-offs visible, more robust decisions can be taken by communities and other stakeholders for appropriate interventions for specific contexts and needs.

Indigenous and local knowledge (ILK): Knowledge gathering must also incorporate knowledge from non-traditional information derived from ILK, which is seen as vital for achieving transformative change (IPBES 2024). IPBES defines such change as system-wide shifts in thinking, governance, and practices. Indigenous knowledge systems often embody long-term sustainability and resilience, which would be essential for addressing challenges relating to desertification and land degradation. ILK is particularly valuable as it can offer place-based understandings of land, land management systems, ecosystem function, services, and biodiversity. These can complement scientific data to ensure that, to the greatest extent possible, the evidence underpinning decisions are robust, widely supported and are in line with local understandings. In today's context however, ILK is becoming scarcer. Funds are generally allocated to maximize income from every piece of land. Youth, even of indigenous communities, are seeking the same.

ILK, alongside concepts such as relational and plural values (IPBES, 2022), can spotlight the extent to which communities are interconnected with the land systems in which they live. Such nature connections, and their associated values, are often left out of standard evidence gathering processes and valuation approaches. By giving space to ILK, it is more likely that finance and interventions will be selected that are culturally relevant and context specific. By embedding ILK, we will promote the inclusion of Indigenous peoples and local communities in the process of finance/intervention selection. This respects their rights, values, and governance systems, and ensures meaningful participation in finance and intervention selection and is a basis for equitable benefit sharing.

Trade-off-related knowledge: Of course, any vision that focuses on the 'right finance, for the right interventions in the right place at the right time' raises the question of 'right' for whom? Any interventions will involve trade-offs between restoration outcomes (e.g., food production and biodiversity conservation), and therefore there will be winners and losers within communities and across ecosystem service provision, habitat quality, and land cover amongst others. Examining such trade-offs within robust, transparent tools, such as multi-criteria decision analysis, or systematic conservation planning, provides one way to navigate such challenges and ensure that we make visible trade-offs and equity issues associated with the choice of finance mechanism and intervention.

Sharing knowledge, learning, and new technologies: Sharing knowledge, learning from others and building links between stakeholders across levels is an essential aspect of accelerating the uptake of finance to support transformative change. Digital platforms and remote sensing technologies can support transparent data collection and knowledge co-generation (UNCCD G20 Land Initiative, 2025; see also chapter 5.4 below).

Economic impacts knowledge: In any decision about what the right finance might be for the right interventions, a final piece of the jigsaw will be compiling our understanding on the likely impacts on the environment and the social and financial returns. The particular emphasis lies on economic considerations. As illustrated in Chapter 2, economic numbers are a decisive tool to make societal costs of land degradation visible and available to decision-makers.

5.2 Capacity building for empowering communities

Capacity building is a crucial component in supporting transformation pathways. It refers to the processes of developing and enhancing skills, instincts, abilities, methodologies, and resources that organizations and communities need to survive, adapt, and thrive under changing circumstances. It unites different stakeholders to work together for their mutual benefit; to define problems and issues and acquire skills and formulate solutions, and support each other (Maiese, 2005). It also contributes to building trust among stakeholders that financial support will lead to meaningful impact on the ground (see also section 5.4 below).

Decisive role of local actors: Landscape restoration and management depend largely on local communities (Santini and Miquelajauregui, 2022). Transformative knowledge guides all stakeholders and landscape dwellers to realize that land and its resources are a 'shared or common inter-connected property' (Holligan and Howe, 2024). This understanding helps local dwellers and their supportive stakeholders (government, scientific bodies, funding agencies, civil society organizations (CSO)) to adopt appropriate interventions to benefit all, including future generations. In this regard, the roles of local governments, communities, scientific institutions, and CSOs are distinct, but they collectively contribute to landscape sustainability (WOTR, 2025). Each requires specific targeted capacity building approaches. Scientific and economic studies inform policy and funding decisions for large-scale land management, while CSOs translate this science, alongside social science, into transformative knowledge and technical skills that empower communities to take responsibility, build resilience, and ensure equitable benefits (Bourn, 2025; Agyare, Holbech, Arcilla, 2024). It helps groups gain lessons from sustainably managed landscapes, to achieve full potential in landscape management, regenerative agriculture, and economic development. Local institutions also require skills (Kumar et. al., 2025) and the ability to prevent, manage, and resolve conflicts (Shames, Seth Sara, and Scherr, 2019), as well as handle financial resources to realize their development process.

Inter- and transdisciplinary understanding: Land restoration is often treated as a target for achieving UN goals, without recognizing systemic links within ecosystems. An interdisciplinary perspective on ecosystem services and climate impacts enables the scientific community to better inform policy and project design. Financial investment is needed to generate science-based knowledge for proposal development and mid-term assessments that allow adaptive management. Lessons from past and ongoing projects can guide similar interventions, strengthening the capacities of designers, practitioners, CSOs, and communities to reduce loss and build resilience – and increase transdisciplinary understanding. While large international institutions integrate mid-course corrections into project design, private sector funding for CSOs often lacks this flexibility, limiting long-term impact.

Shared learning: Continuous capacity building of CSOs and practitioners providing last-mile connectivity is essential. Transdisciplinary, multi-stakeholder workshops enable shared learning among policymakers, private sector actors, philanthropy, and CSOs. Although funders commonly support workshops and project assessments, investments in multidisciplinary research, knowledge management, and the development of new tools by CSOs remain limited, despite being crucial for resilience building. Addressing this gap is a key task for future public sector financing.

When effectively implemented, empowerment and community ownership can generate lasting impacts over decades. The Indo-German Watershed Development Programme (1992–2014) can be seen as an illustration (see following box).

The Indo-German Watershed Development Programme (IGWDP) in Maharashtra, India

In India, financial investments for land restoration are available through different sources. When SLM through watershed development was a new concept 30 years ago, full funding support from the German Government (BMZ) was provided through bilateral cooperation via the **Indo-German Watershed Development Programme (IGWDP)** (1992-2014). The Indian Government later launched the Watershed Development Programme through NABARD (National Bank for Agriculture and Rural Development).

Since 1999, the implementation of this approach has achieved significant milestones: 3,747 projects were implemented across 30 states and union territories in India, covering approximately 2.7 million hectares in 400+ villages. Approximately USD 323 million (at 2024 exchange rates, nominal, not adjusted for inflation) have been invested in the period 1999–2024.

Capacity building. Financing capacity building was an essential part of these landscape restoration efforts. Managing 1,000 hectares costs around USD 220,000, with about 7% allocated to capacity building, while communities contribute an additional 16% through *shramdaan.* After restoration, a two-year phase focused on sustainable agriculture and water management requires roughly USD 29,000 more for capacity building. As communities begin to collectively market their produce through a Farmer Producer Company, further investments are needed to support both capacity building and operational activities

IGWDP built up ownership and capability, thereby overcoming several challenges:

Challenge 1: Bridging deep-rooted social hierarchies and power dynamics

- Proportional representation of socioeconomic groups in the Village Development Committee.
- Build members' capacities step by step to manage responsibilities.
- Strengthened women's participation through self-help groups and Farmer Producer Companies, enhancing confidence, economic empowerment, and engagement.

Challenge 2: Building community ownership of natural resources

- Implemented participatory planning with all households to design farm-level interventions.
- Covered all land parcels, including commons, for holistic ecosystem recovery.
- Secured local contributions of 16% of restoration costs, excluding vulnerable groups.

Challenge 3: Generating confidence in technical interventions

- Established a 50–80 ha demonstration site visible to most households.
- Implemented soil and water conservation measures with paid local labour.
- Delivered visible results within 6–8 months, strengthening trust.
- Conducted training on quality standards, local norms, record keeping, and conflict resolution.

Present situation. Today, funds for landscape restoration come from blended finance where public funds through NABARD are supported by private sector funds through Corporate Social Responsibility (CSR), which requires eligible companies to provide 2% of their profit for social causes. While this is beneficial, CSR projects are limited to a period of two to three years, which limits the time to provide adequate capacity building for the desired behavioural change.

Key takeaways messages:

- The impact of systematic capacity building remains visible years later, with even younger generations recognizing its benefits (Thomas et al., 2024).
- The IGWDP has ensured sustained outcomes from land restoration, including improved ecosystem health and soil-water conservation, enhanced income and food security, and the empowerment of women and marginalized groups in participatory governance.
- Investments require adequate financial resources and time to enable lasting behavioural change.
- While SLM forms the foundation for healthy ecosystem services, phased investments are also needed to secure food, water, and income, as well as access to credit, markets, and livelihood services.
- Continued support for Farmer Producer Companies has shown strong potential to generate economic returns and strengthen rural resilience (WOTR, 2025).

Source: Murthy et al. (2025)

Financing capacity building: Financing must go beyond training events to include knowledge management, data systems, decision-support tools, and institutional strengthening. These elements provide the skills and systems needed to plan, implement, and sustain interventions. Well-designed capacity building delivers high environmental, social, and economic returns by strengthening local decision-making, reducing dependency, and ensuring long-term impact.

Multiple funding sources can contribute to this agenda:

- **International and multilateral agencies** such as the World Bank, ADB, KfW, and bilateral institutions provide grants, concessional finance, and technical expertise, including assessments and long-term institutional support (World Bank, 2021b; ADB, 2018).
- **National development banks** invest in capacity building through programmes for self-help groups, Farmer Producer Companies, governance strengthening, and climate-resilient agriculture, increasingly leveraging blended finance and CSR partnerships.
- **CSR funds** support community institutions, women's groups, and local governance, as well as pilots and innovation. However, short timeframes and narrow metrics often limit deeper, long-term capacity building.
- **Philanthropies** fund flexible, system-oriented initiatives, strengthen knowledge-sharing networks, and address critical gaps in public and CSR funding while supporting locally grounded solutions.

Capacity building as strategic investment: Ultimately, financing capacity building and mutual learning should be treated as a strategic high-impact investment, not an add-on. Strong local capacities enable communities and institutions to sustain and scale development outcomes, manage natural resources effectively, and build climate resilience. There is a need for unified platforms that bring stakeholders together through workshops, dialogues, and multi-stakeholder engagement to bridge gaps in ambition and implementation. Blended financing—combining public funds, development finance, philanthropy, and CSR—can enable long-term, transformative capacity building beyond project cycles.

5.3 Good governance and political processes

Good governance is a decisive condition for financial mechanisms to effectively support transformative change toward resilient land and water use. It refers to the processes by which governmental institutions manage public affairs, resources, and decision-making in a manner that is transparent, accountable, participatory, and consistent with the rule of law. Core principles include participation, transparency, responsiveness, equity, inclusiveness, and effectiveness (Grindle, 2004; OECD, 2005). Ultimately, good governance aims to promote sustainable land use, prevent corruption in financial mechanisms and projects, and generate positive outcomes for both people and the environment.

Multilevel governance: Good governance must be ensured across all levels — from international and national to regional, landscape, and local/community levels. Clearly defined property rights are fundamental, as they shape access to land and water resources and influence whether these are managed sustainably or subject to overexploitation. Importantly, private ownership does not imply unrestricted use; rather, property rights are embedded within a broader framework that balances private and public interests (Olson, 1965; Hardin, 1968; Ostrom, 1990). Ownership is therefore intrinsically linked to the responsibility to protect and steward resources.

Tackling corruption: Good governance and well-defined property rights can help reduce corruption risks, particularly during the introduction of new policies and financial mechanisms (phasing-in). Intermediary institutions or brokers may otherwise misuse their position, diverting financial flows away from intended beneficiaries or purposes. Effective oversight, transparency, and accountability mechanisms are therefore essential to ensure that funds reach the appropriate actors and achieve intended outcomes.

Inclusivity and equity: Inclusive and equitable governance is essential across all levels to ensure that all stakeholders can benefit from transformation (distributional justice) and to prevent financial exclusion. A whole-of-government approach is required to avoid fragmentation across sectors (Akhtar-Schuster et al., 2024). Identifying stakeholders is a critical first step to ensure recognition (recognition justice) and meaningful participation (participatory justice). Systematic stakeholder analysis helps ensure that relevant actors are involved at the right stages of decision-making.

Compensating trade-offs: Achieving equity is complex, as policy decisions often create both winners and losers, and these dynamics may shift over time. In some cases, compensation mechanisms are necessary to mitigate transition risks or offset new vulnerabilities, including for politically influential groups. For example, policies aimed at reducing deforestation and charcoal use by promoting renewable energy must consider impacts across the entire value chain, particularly where marginalized groups—such as women—play key roles. Managing such trade-offs is essential to balance environmental and development objectives.

Gender and marginalized groups: The UNCCD Gender Action Plan highlights the differentiated impacts of land degradation and the critical role of women in developing and implementing solutions (Okpara et al., 2019; Reichhuber et al., 2019). These impacts are often compounded by intersections with other social factors such as age, ethnicity, and socio-economic status. Programmes such as India's Mahatma Gandhi National Rural Employment Guarantee Act demonstrate how large-scale public initiatives can support marginalized groups while contributing to environmental restoration (Lengefeld et al., 2022; Dhaktode, 2021). Ensuring equity requires systematically addressing trade-offs and unintended consequences, as well as capturing co-benefits through robust monitoring and evaluation systems.

Policy coherence, cross-sectoral integration and system-based approaches: Effective governance requires moving beyond fragmented approaches toward greater policy coherence, cross-sectoral integration, and systems-based solutions. Across the Rio Conventions, there is growing recognition of the need for harmonized frameworks that enable coordinated engagement by governments, businesses, and investors in addressing land degradation, biodiversity loss, and climate change. Such integration can improve ecosystem service monitoring and reduce duplication (Bagstad et al., 2025). Harmonized approaches—including shared standards, interoperable data systems, and aligned financial and regulatory frameworks—can strengthen accountability, reduce reporting burdens, and incentivize broader participation. Initiatives such as the Rio Synergies Platform exemplify increasing political coordination. Evidence from Rwanda and Central Asia shows that integrated approaches can substantially reduce transaction costs and overall investment needs (Mirzabaev et al., 2023, 2024).

Cross-sectoral synergies and policy coherence: Policy integration is closely linked to institutional coordination. Fragmented ("siloed") governance structures can hinder transformative change, whereas resilience inherently spans multiple sectors. Strengthening coordination and institutional capacities is therefore essential to unlock synergies and improve resource efficiency. Integrated, cross-sectoral implementation can optimize financial investments and achieve development and environmental objectives more cost-effectively (Mirzabaev & Akramkhanov, 2025).

5.4 Better and standardized data for trust-building

Building trust between donors and recipients as well as all stakeholders involved in financial mechanisms and related projects is a fundamental prerequisite for successful and sustainable financial cooperation (Ghoorah et al., 2025). Trust arises not only from transparent communication between stakeholders and accountability, but also from verifiable evidence of effectiveness. Demonstrated success stories can serve as powerful instruments for reinforcing such trust. When investments are proven to be equitable and lead to desired outcomes for all involved stakeholders, including less powerful indigenous groups, women, elderly etc., the conditions for attracting further financial flows improve considerably. Therefore, the performance of projects, mid-term results, outcomes, outputs and impacts serve important functions in making visible progress to all involved parties. Providing standardized and transparent data about the performance of invested capital is thus a crucial precondition for maintaining and expanding donor confidence.

Measuring Long-Term Impacts

An example of effective evaluation practices comes from the International Food Policy Research Institute (IFPRI 2018). IFPRI conducted an ex-post impact assessment examining the effects of its decentralization strategy on national development indicators in Africa and Asia. Using panel data from 57 countries spanning 1981 to 2014, the study analysed how the presence and intensity of IFPRI's in-country research activities influenced key policy and outcome variables. By employing econometric models with country and year fixed effects as well as country-specific time trends, the analysis controlled for various factors such as research capacity, production environment, institutional quality, and complementary investments.

The findings revealed that IFPRI's research presence had a positive and statistically significant association with several policy and development outcomes. Estimated BCRs were moderate to high: between 8.4 and 25.4 for land productivity, 9.6 to 17.3 for labour productivity, and 5.5 to 75.3 for GDP per capita (CGIAR 2018). These figures correspond to internal rates of return ranging from 101 to 383%, highlighting the substantial developmental and economic value of well-targeted policy research. Such quantifiable impacts are essential to demonstrate the effectiveness of investment strategies and thus strengthen the confidence of funding partners.

New technologies creating data-driven trust: Recent technological developments provide new possibilities to improve monitoring and evaluation. For example, the increasing resolution of satellite imagery enables real-time observation of restoration outcomes at local scales, allowing stakeholders to verify progress more directly. Satellite imagery and drone data also enable access to otherwise hard to reach locations using ground-based monitoring (Guenat et al., 2022). Digital technologies can create smart data that is traceable throughout value networks, further improving transparency. As data become more precise, reliable, and transparent, they can facilitate shared understanding among all parties involved in financial mechanisms and transformation pathways. Immediate feedback on measures, implementation, and resulting impacts supports adaptive learning, ultimately helping practitioners improve project design and execution.

Digitalization in agriculture: Currently agriculture is less digitized compared to other industries, but by 2030 connectivity infrastructure will reach about 80% of the world's rural areas – except in Africa where only 25% will be covered (McKinsey & Company 2020; 2023a). Asia will benefit the most because it produces more crops. However much of this increase will favour already larger farm and food production enterprises. Nevertheless, digitalization offers huge opportunities for all involved parties to build mutual trust, reliability, and cooperation.

Innovations that will benefit by increased connectivity include crop monitoring, drone farming, smart livestock monitoring, autonomous farm machinery, smart building, and equipment management. The increase in agricultural connectivity may lead to USD 500 billion in additional value, which is a 7-9%

improvement. However, successful transformation will depend on the quantity and quality of engagement and communication of ambitious shared aspirations, requiring a leadership network and reinforcing mechanisms that enable better and faster execution of financial mechanisms. New skills will be required by all actors in this transformation process.

Hence, investments and innovations in monitoring systems and data acquisition strategies are essential not only for accountability but also for continuous learning and improvement. Donors, recipients, and partner countries involved in financial flows should prioritize the establishment of such data infrastructures as a foundation for long-term collaboration and trust.

Standardization as a mechanism for reducing uncertainty: In addition to robust monitoring, new technologies, and ongoing learning, the standardization of indicators plays a crucial role in building trust. Standardized metrics reduce uncertainty for actors engaged in financial and project-based mechanisms, allowing for clearer comparisons and fairer risk assessments. Because uncertainty is a decisive factor influencing the cost of financing—often reflected in interest rates or risk surcharges—its reduction can significantly enhance the attractiveness of public, private, and blended investments.

Scientific research contributes valuable input for identifying appropriate indicators and developing standardized frameworks that can capture impacts and returns over the short-, medium- and long-term. However, the establishment of such standards ultimately depends on political agreements, institutional cooperation, supported by equitable data sharing mechanisms. Coordinated efforts to reduce data fragmentation, and harmonize data collection, indicator definitions, and reporting procedures are therefore essential steps toward greater transparency, efficiency, interoperability, and credibility in global development finance.

Higher quality and standardized data are fundamental instruments for building trust between donors and recipients. By combining advanced monitoring technologies, rigorous evaluation methodologies, and politically anchored standardization processes, financial mechanisms can become more transparent, reliable, and effective. Such trust-based systems not only improve accountability but also foster the long-term flow of resources needed to achieve transformative and sustainable outcomes.

Chapter 6 Recommendations

As we head towards 2030, the lack of achievements to meet the various commitments and targets for climate change, biodiversity, and LDN through the SDGs, Bonn challenge, AFR, Great Green Wall, etc., requires urgency to close the finance gaps and accelerate actions from four main actor groups aspiring to achieve a transition to SLM and who need to work in concerted collaborative efforts.

6.1 Governments and public finance institutions

Changes to policies, incentives, and disincentives for better land management need to be accelerated by governments at local, regional and national levels. This requires encouraging regulatory environments and market structures that catalyse financial flows from the private sector and philanthropists to ESG impacts (Impact investment Institute, 2023). Governments must address major drawbacks for private sector investments such as uncertainty, lack of repurposing of negative subsidies, and incentives and mechanisms to reduce the risks of investments for better land management (Thomas et al., 2024).

With the advancement of internet and artificial intelligence the transition and scaling of innovative SLM technologies and approaches can be expected to proceed rapidly.

To facilitate sweeping changes in connectivity and the use of artificial intelligence, governments will need to collaborate with the private sector on issues such as licensing of communications (low power wide area networks, Wi-Fi low to mid-band 5G, radio, etc.) and infrastructure development to ensure there is not a 'digital divide' between developed and developing countries, and between small and large farms and varying size food production businesses.

6.2 Private sector, including investors and philanthropists

There is sufficient evidence that the leading private sector companies are ready to undertake a switch from traditional investment strategies to impact investments (Impact Investment Institute, 2023; Thomas et al., 2025). These changes involve public-private-philanthropic partnerships that are increasing rapidly (McKinsey & Company, 2023b). Encouragingly, financial returns to the private sector have been shown to be equal to or better than traditional investment processes thus alleviating one concern for shareholders (Thomas et al., 2025).

The private sector recognizes the need to 'build value beyond crops" focusing on land preservation and conservation, regenerative agriculture, and support services to small holders in the agriculture sector (McKinsey & Company, 2023a).

Given positive regulatory and risk management strategies there will usually be a need for catalytic capital to overcome some of the reluctance, barriers and uncertainties for potential investors. Different combinations of actors and funding mechanisms will be required as the transitions move from initiation to expansion and go to scale. These complex arrangements need a facilitator, honest broker, mediator or anchor organization that can be relied upon to act in the interests of all, so that a truly shared value can be obtained (Porter and Kramer, 2011). UNCCD focal points could initiate such mechanisms and processes if given adequate support and training.

6.3 International organizations

All three Rio Conventions aspire to achieve transitions in land and water management with separate foci on addressing climate change (UNFCCC), preventing loss of biodiversity (CBD) and achieving LDN (UNCCD). The potential synergies obtainable by working together have long been recognized and there is evidence of substantial economic savings by working together (Mirzabaev et al., 2023 & 2024). Coordination of efforts on the ground amongst the conventions is now an imperative given limited financial and human resources and overlapping mandates that focus on land. The Rio Conventions Joint Liaison Group recognizes this and now includes integrated land use planning and food systems as thematic areas for collaboration and complementarity amongst other relevant themes (JLG Collaboration Plan 2025). The capacity development aspects appear to be restricted to National Focal Points and training workshops. However, this is likely to be insufficient and other mechanisms such as the ELD ambassador programme and the Icelandic-UNESCO Land Restoration Training Programme and the like should be expanded and replicated elsewhere in order to achieve greater actions on the ground, including more efforts on locally led adaptations.

6.4 Local communities

Successful implementation of SLM practices requires the design, planning and implementation by local communities, incorporating Indigenous and local knowledge, leadership, priorities, and respect of customs such as the 'gift economy' that involve non-financial reciprocal agreements that foster collaboration (IIED, 2025; Middlebury College, 2025). Success will involve building local capacities to, for example, enable adaptation to changing environmental conditions such as the management of captured rainfall and crop selection based on available water supplies in dry environments. As the divide between top down and bottom-up approaches blur into one concerted collaborative effort by increasing focus on locally led adaptations, it is imperative that local communities take ownership of the processes while new institutional arrangements facilitate adequate flows of finance amongst local, regional, and national levels.

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Annex

A.1 Economic value of changes in ecosystem services due to land degradation

Section 2.1 provides a global analysis of changes in the extent and degradation of forests, cropland and grassland and estimates the economic value of the associated changes in ecosystem services.

1. Country level data on the extent of forests, grassland and cropland for the period 2019-2023 are obtained from The Food and Agricultural Organization of the United Nations (FAO) data portal (https://www.fao.org/faostat/en/#home).

2. Country level data on the proportion of total land area that is degraded for the years 2015 and 2019 are obtained from the United National Convention to Combat Desertification (UNCCD) data dashboard (https://data.unccd.int/).

3. Data on the economic values of ecosystem services provided by forests, grassland and cropland are obtained from the Ecosystem Services Valuation Database (ESVD) (https://www.esvd.net). Values are standardized to a common set of units, namely international dollars per hectare per year in 2020 price levels, as described in Brander et al. (2024).

4. Land cover data from FAO were converted from 1,000s of hectares to km2. The annual change in the extent of each land cover class was calculated as the difference between extents in 2023 and 2019, divided by five.

5. At the country level, the annual change in proportion of land that is degraded was calculated as the difference between 2019 and 2015 proportions, divided by five. The annual change in areas of degraded forest, cropland and grassland was subsequently computed by multiplying the annual change in proportion of degraded land by the extents of each land cover class.

6. The values of ecosystem services provided by temperate forests, tropical forests, grassland and cropland were obtained from Brander et al. (2024) Table 1 and converted to values per km2. Values are adjusted to reflect country level income per capita and population density using data from the World Bank World Development Indicators (https://databank.worldbank.org) and elasticities representing the responsiveness of ecosystem service values to variation in income per capita and population density estimated through meta-regression analyses of ESVD data (Brander, 2013). For countries missing information used to adjust ecosystem service values, we assigned median values computed across the remaining set of countries.

7. The values of ecosystem services provided by degraded forests, grassland and cropland were computed using an estimated elasticity representing the responsiveness of ecosystem service values to variation in biodiversity intactness (Scholes and Biggs, 2005). We assume that degradation represents a change in the biodiversity intactness index from the mean (50th percentile) to the 10th percentile as observed across study sites in the ESVD. This assumption is necessary because we only have data on the extent of degraded land and not the degree of degradation. The estimated change in ecosystem service values due to degradation corresponds to approximately a two-thirds reduction.

8. Total annual changes in ecosystem service values due to changes in the extent of forests, grassland and cropland is computed as the change in extent multiplied by the country adjusted unit values for each land cover.

9. Total annual changes in ecosystem service values due to changes in the extent of degraded forests, grassland and cropland are computed as the change in extent of ecosystem degradation multiplied by the change in unit values (per km2) due to degradation.

A.2 Economic value of changes in ecosystem services due to land restoration

The steps in the analysis of land restoration are:

1. Country level data on the extent of potential restoration activities is taken from the PBL GLO global restoration scenario (van Esch et al., 2021).

2. Global MODIS land cover data is obtained from Simoes (2023). MODIS MCD12Q1 Land Cover and Land Use Time Series Global Mosaics 2001-2022 (500 m) (Versie v20230818) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.8367523 --> file https://zenodo.org/records/8367523/files/lc_mcd12q1v061.t1_c_500m_s_20210101_20211231_go_epsg.4326_v20230818.tif?download=1 (i.e. International Geosphere-Biosphere Programme land cover classification)

3. Datasets converted to 500 m resolution Eckert IV projection.

4. Zonal statistics of potential restoration area exported to Excel table (area is given in m2)

5. Land cover classes aggregated from IGBP to three classes: forests, grassland and cropland.

6. Areas converted from m2 to km2 (1 m2 = 0.000001 km2)

7. The values of ecosystem services provided by restored forests, grassland and cropland were computed using an estimated elasticity representing the responsiveness of ecosystem service values to variation in biodiversity intactness (Scholes and Biggs, 2005). We assume that restoration represents a change in the biodiversity intactness index from the 10th percentile to the 80th percentile of the distribution of BII as observed across study sites in the ESVD. This assumption is necessary because we only have data on the extent of restored land and not the degree of restoration. The estimated values of ecosystem services increase by approximately 2.5 times in a restored relative to a degraded state.

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