WORLD RESOURCES INSTITUTE

WORKING PAPER

FINANCING SUSTAINABLE WATERSHED MANAGEMENT IN ETHIOPIA

Exploring Innovative Financing Strategies for Nature-Based Solutions

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EXECUTIVE SUMMARY

Highlights

- Ethiopia has a long history of land restoration and watershed management; however, land and watershed degradation persist, threatening agricultural productivity, water supplies, and livelihoods.
- Inadequate financing and unsustainable conservation interventions are the key challenges to reducing and reversing environmental degradation in Ethiopia. New strategies are needed that can incentivize long-term, sustainable natural resources management and secure conditions for continued investment.
- Innovative financing strategies can help attract domestic and international investments for conservation interventions, or "nature-based solutions" (NBS), which help mitigate risks to economic activities, land productivity, and water security, while delivering livelihood benefits to rural and urban communities.
- In exploring tested or emerging NBS finance strategies applied in other countries, three mechanisms were identified that offer promising avenues for accelerating conservation in Ethiopia and promoting more sustainable and diverse funding sources for NBS: water funds, payments for ecosystem services (PES), and debt-for-nature swaps (DfNSs).
- Recent federal propositions for Ethiopia's financial and environmental sectors could help the country tap into new funding to protect natural resources and vital ecosystems.

CONTENTS

Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.

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Background

Land degradation is a widespread problem in Ethiopia and a major cause of low agricultural productivity, rural poverty, and persistent food and water insecurity. In response, successive governments and development partners have promoted sustainable land and watershed management programs since the 1970s. However, implementation challenges, unsustainable interventions, and lack of adequate financing are major constraints to tackling land degradation and ecosystem loss in Ethiopia.

Combating the rate and scale of natural resources depletion requires funding far beyond that provided by government and donors. There is an urgent need to explore new sources of funding and pilot innovative mechanisms for conservation and NBS. Conservation finance must increasingly look to new strategies that can incentivize long-term, sustainable natural resources management, helping secure conditions for continued investment in ecological protection and complementary livelihood benefits. In this, Ethiopia could learn from the environmental protection experiences of other countries.

Funding for NBS can be increased by redirecting public and private capital allocations to include NBS and by diversifying funder sources. Globally, growing commitments for nature from the financial and economic sectors signal an increasing awareness about the links between natural capital, inclusive growth, and sustainable development. Ethiopia can utilize tested or emerging NBS financing strategies to secure these nature-focused investment commitments and attract new funders, including from the domestic private sector and international climate and impact investors.

About This Paper

The main objective of this paper is to identify NBS financing models that offer promising pathways for larger and more sustainable investments in conservation in Ethiopia, with a focus on water-related benefits. It is primarily intended to provide valuable information to Ethiopian policymakers, project developers, and practitioners. The paper reviews the history of watershed management in Ethiopia and lessons from this experience; illustrates innovations in NBS finance via three international case studies to capture experience and identify enabling factors; provides insights into potentially replicable measures for Ethiopia by featuring possible applications; and presents recommendations on ways forward. The paper is a collaboration between authors from the World Resources Institute and the Ethiopian Institute of Water Resources at Addis Ababa University.

Key Findings

This working paper examines three mechanisms offering promising avenues for water-related NBS in Ethiopia. While there are many financing strategies for NBS, choice is constrained by the institutional and legal context in Ethiopia—for example, limits on foreign investment and private land ownership. We therefore present case studies for each of the following finance mechanisms:

- **Water Funds** are collective action governance and financing frameworks through which resource users of watershed services pay for improved watershed management practices, particularly through the demonstration of a business case (or return on investment [ROI]). The Upper-Tana- Nairobi Water Fund (UTNWF)—Africa's first—illustrates the benefits of coordinating and pooling funding from downstream watershed beneficiaries, including government agencies, bottling companies, and drinking water utilities. Pooled resources are used to help upland communities adopt land management techniques that both enhance landscape productivity and improve downstream water quantity and quality (TNC 2021c).
- **Payments for Ecosystem Services (PES)** provide incentives to natural resources managers, landowners, and resource users to adopt restoration, protection, or conservation practices for the delivery of specified ecosystem services, such as water quality, carbon sequestration, and biodiversity conservation. Costa Rica's long-standing 20-year PES program offers insights into enabling conditions and public and private funding strategies that help maintain more consistent funding streams. The program relies primarily on a fuel tax that is insufficient to meet high demand from landowners and resource users. To meet expansion targets, the program is constantly evaluating new funding sources, creating a culture of innovation (Barton 2013).
- **Debt-for-Nature Swap (DfNS)** allows countries with high debt loads to repurpose repayments toward domestic natural capital investments. The Seychelles government issued a DfNS, with The Nature Conservancy's (TNC) NatureVest serving as broker, which enabled it to meet its 30 percent protection target for marine areas, whose ecosystem services sustain local tourism and fishing communities. The

Seychelles also established a conservation trust fund to oversee annual grant payments to local organizations, utilize debt funds to repay investors, and contribute to an endowment (Gerretsen 2020).

Three locations and/or settings were selected to illustrate the applicability of these strategies to Ethiopia:

1. Water funds to protect vital artificial and natural reservoirs
2. PES involving hydropower dams in catchment conservation
3. DfNS to protect forests of key biodiversity importance

1. **Ethiopia's capital Addis Ababa and the Lake Tana catchment face mounting water insecurity due to rapid land cover change and watershed degradation as a result of growing populations and economic activity and the associated increases in demand for natural resources.** The presence of water utilities, commercial agriculture, bottling companies, tourism facilities, and hydropower services that depend on watershed services offers potential for anchor contributions, pooling, and, thereafter, amplifying resources for upper catchment restoration. The key to success would be strong engagement to secure buy-in by different public, private, and development stakeholders at federal, regional, basin, and city levels.

2. **Many hydropower dams in Ethiopia are under threat from accelerated sedimentation caused by erosion in their upper watersheds.** About 90 percent of the country's installed energy generation capacity is hydropower (Hailu and Kumsa 2021). Sedimentation is impacting storage capacity of reservoirs, reducing hydroelectric generation capacity, increasing operations and maintenance (O&M) costs, and reducing the life span of built structures. In many watersheds across the country, the sediment-hydropower link warrants intervention and financing of upstream restoration by dam operators and hydropower generators through PES schemes. Key institutional actors would include the Ministry of Water and Energy (MoWE), the Ministry of Agriculture (MoA), the Ethiopian Electric Utility, and Ethiopian Electric Power—the latter two being new actors in watershed management financing. Application of PES at a larger scale and broadening types of payers in Ethiopia would likely necessitate a more conducive regulatory framework to manage agreements and transactions.

3. **Ethiopia's remaining Afromontane forests, located primarily in southwest Ethiopia, are a globally important biosphere and center of endemism and crop genetic resources, including the original Arabica coffee plant.** Despite their significance globally, nationally, and to local communities, an estimated 40 percent of these forests were lost between 1988 and 2008, principally due to conversion for agriculture (Mekonen et al. 2017). Given the country's high debt stress and the importance of its biospheres, Ethiopia could consider DfNS agreements. These would allow Ethiopia to convert its international debt into its own currency and to serve as a mechanism to invest in "green" infrastructure and ecosystem protection.

In Ethiopia, the themes of finance and incentives are critical for scaling conservation efforts and achieving sustainability. To meet the required pace and scale, key considerations and needs emerge:

- New and diversified sources of funds from public, philanthropic, and private actors, with a greater role for private and blended finance.
- Long-term funding that can sustain projects from initial capitalization, O&M through to monitoring, evaluation, and learning (MEL).
- Strong governance frameworks that can increase resource allocations, transparency on decision-making, and partner collaboration.
- Community-led engagement and participation to ensure NBS deliver direct benefits to resource-dependent communities and increase adoption and upkeep.
- Landscape-scale interventions that alter the trajectory of watershed and environmental degradation in a meaningful way while advancing equitable livelihood opportunities.

Ethiopia needs a more resilient economy, and investing in ecological health and recovery presents a clear opportunity. Investment must include greater financing of NBS that enhances the health of freshwater sources and landscapes. This paper hopes to inspire new ideas, new initiatives, and, perhaps, even a next generation of watershed management programs in Ethiopia.

1. ENVIRONMENTAL DEGRADATION AND THE NEED FOR FINANCE

1.1 Introduction

Environmental health and natural capital are profoundly linked to key economic sectors and rural development (World Bank 2007). It is estimated that more than half of the world's gross domestic product (GDP), around US$44 trillion, is moderately or highly dependent on nature (WEF 2020). This dependence is particularly acute in countries like Ethiopia with a majority rural population and a primarily rain-fed agriculture forming the basis of the economy. Over 80 percent of Ethiopians rely on natural resources for subsistence and livelihoods (World Bank 2021b), and agriculture accounts for 35 percent of GDP (World Bank 2022) and 80 percent of export earnings (USAID 2021). Moreover, the country's development priorities—reflected also through its Climate Resilient Green Economy (CRGE) strategy and Ten-Year (2021–2030) Development Plan—foresee increasing investments in agriculture, manufacturing, and hydropower, all of which rely on natural assets.

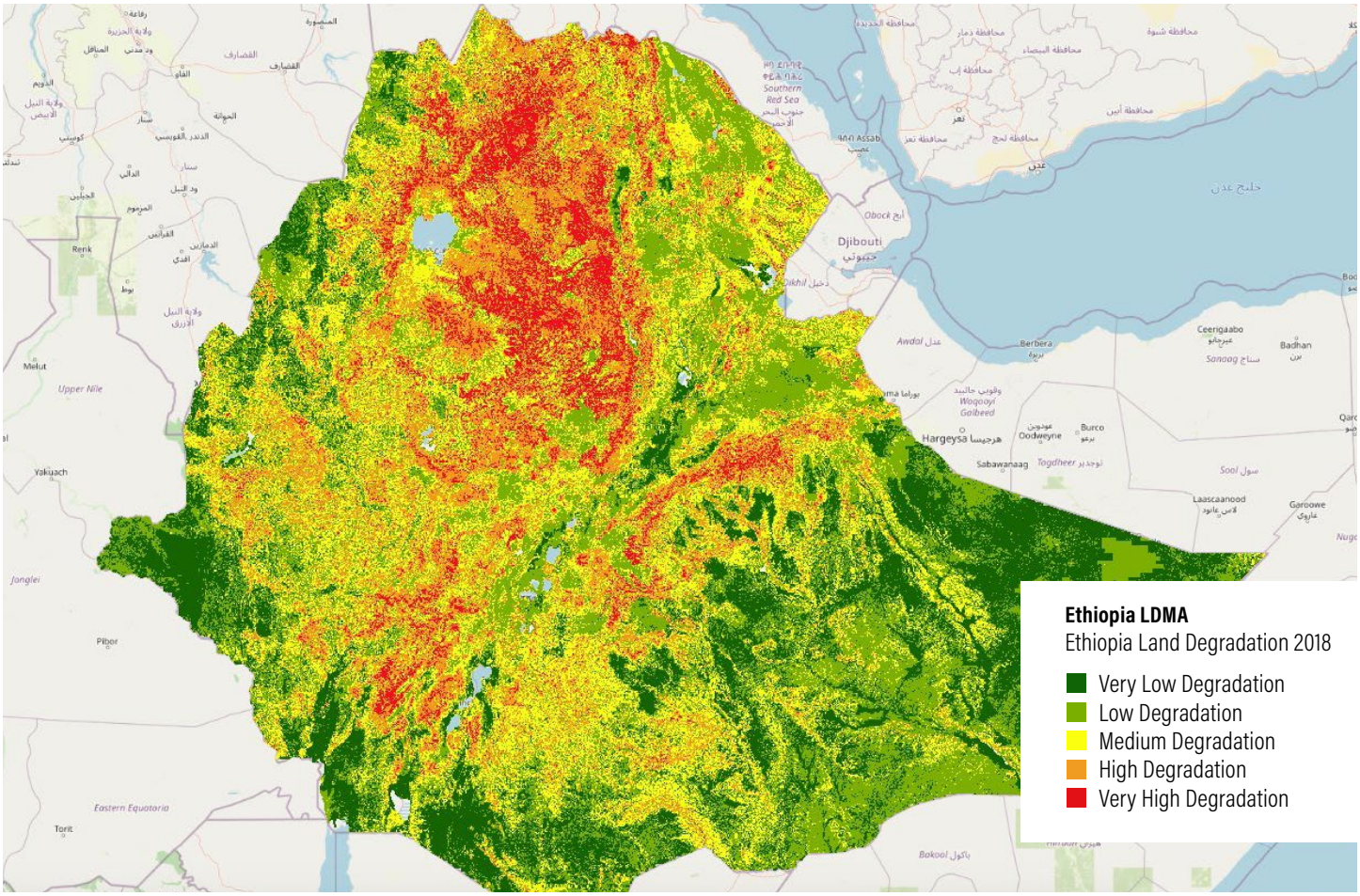
Land degradation[1] and broader environmental degradation are widespread in Ethiopia and a major cause of low agricultural productivity, rural poverty, and persistent food insecurity (World Bank 2020a; Battistelli et al. 2021). By some estimates, more than 85 percent of Ethiopia's land is moderately to severely degraded, driven primarily by land cover change stemming from vegetation clearing, expanding croplands, and urbanization (Gebreselassie et al. 2016). The cost of land degradation is estimated at 23 percent of GDP, the highest when compared to other countries in East Africa (Kirui and Mirzabaev 2015). Degraded landscapes and resulting erosion reduce the productive capacity of soils and diminish forest and watershed functions, leading to reduced yields and to inferior quantity, quality, and regulation of water flow. The impact of land degradation thus extends beyond the land surface itself, affecting natural habitats, freshwater ecosystems, and hydrological processes (Moges and Bhat 2020). The Highlands, where most of Ethiopia's 115 million people live and which comprise 90 percent of arable land, are especially affected by degradation (Figure 1) (Hurni et al. 2010). Here, natural forest cover fell from 40 percent before the 1950s to about 3 percent in 2020 (Sisay and Gitima 2020a; Wassie 2020), and landscapes have become increasingly unsuitable for cultivation (Mekuriaw et al. 2018).

Despite notable advances in poverty reduction and economic growth in Ethiopia over the past two decades, land degradation remains a key challenge to development (Gebreselassie et al. 2016). Increases in production since the 1990s have been achieved primarily by expansion of cultivated areas and intensification (Haregeweyn et al. 2015b). However, with almost no uncultivated land left in the Highlands and much cropland degraded, Ethiopia's productive capacity is threatened. Resource mismanagement and an increasingly variable climate are also intensifying risks for businesses and water infrastructure (Haregeweyn et al. 2015a). Natural resources conservation and restoration are therefore critical strategies to safeguarding Ethiopia's natural capital, economic stability, and development agenda (Taffesse et al. 2011). Studies have even warned that, unless land degradation is adequately addressed, the eradication of extreme poverty in Ethiopia is very unlikely (Gebreselassie et al. 2016).

Watershed management[2] has been at the center of Ethiopian government efforts to reverse land degradation since the 1970s (Haregeweyn et al. 2015b). Programs on soil and water conservation (SWC) and other sustainable land management (SLM) measures have been the focus of both agriculture and conservation initiatives. Even so, despite some positive experiences of conservation and productivity gains, implementation challenges and increasing human activity mean land degradation and ecosystem loss are still expanding rapidly. Understanding underlying drivers and conditions that have limited progress are critical for recommending ways forward.

Insufficient financing is one major constraint to tackling land and environmental degradation in Ethiopia (Zeleke 2017). So far, the ministries and authorities for agriculture and the environment, with support from international donors, have been the main sources of conservation funding in Ethiopia (TerrAfrica, Global Mechanism of the UNCCD 2009). However, the federal budget is insufficient for the scale of the problem, and development aid alone cannot fill the financial gap. To illustrate, Ethiopia's ambitions to become a middle-income country, resilient to climate change and with no net increase in greenhouse gas (GHG) emissions, require annual spending needs estimated at $7.5 billion to enhance agricultural productivity, forest conservation, and renewable energy sources. With federal resources for green growth–related actions estimated at about $440 million per year in 2015, and annual development

Figure 1 | **Map of Land Degradation Severity across Ethiopia**



Note: LDMA = Land Degradation and Monitoring Assessment.

Source: RCMRD 2021.

aid below that (Eshetu and Bird 2015), more funding is needed to achieve Ethiopia's sustainable, green, and climate-resilient development objectives.

Understanding the factors that contribute to effective and sustainable[3] watershed management and restoration in Ethiopia and identifying new solutions to finance conservation efforts are therefore urgent. Continued funding and implementation challenges, including limited capacity to adopt and maintain conservation practices, have translated into an inability to deliver sustained positive change at the landscape and national levels. There is need to find new entry points, in particular, looking to more innovative strategies, new actors, and approaches that can mobilize finance for and investment in NBS. Approaches include directing public revenue toward restoration, enhancing governance models and incentives for conservation, and/or unlocking private capital from actors or agencies that benefit from nature's returns (Faruqi and Landsberg 2017).

1.2 Objectives and methodology

The main objectives of this paper are to familiarize Ethiopian policymakers, project developers, and practitioners with financing and funding models that can support NBS projects[4] and to identify pathways to larger and more sustained investments in the conservation of water-related ecosystem services. We emphasize promising strategies that can bridge funding gaps

and governance approaches that help institutionalize sustainability within conservation programs—building in long-term viability and moving beyond grant-based funding. We present three case studies from other countries and explore their applicability to Ethiopia. In so doing, the paper aligns Ethiopia's watershed management agenda with global calls for greater investment in NBS.

The paper's methodological approach included literature reviews and consultations. Using key words related to watershed management and land degradation (Annex A), a review of about 30–40 published studies and select policy and strategy documents underlay the historical review. The NBS finance case studies and Ethiopian use cases[5] involved literature reviews and interviews with NBS project developers and representatives of select ministries, academia, and nongovernmental organizations (NGOs) involved in watershed management and environmental conservation (Annex B). Consultations centered on identifying key enabling factors from which lessons on institutional, regulatory, and governance modalities could be derived.

Finance strategies and associated case studies were selected according to predetermined criteria, including implementation in a middle- or low-income country; cases at a mature operational stage (i.e., tried and tested and not at feasibility stage); program outcomes leading to water security benefits (e.g., water quality and availability improvements, drought management, and flood protection); ability to deliver social, economic, and environmental cobenefits; provision of large-scale up-front capital and/or diversified and sustained funding sources to support NBS; and an ability to attract funding to implement landscape-scale, ecosystem-based, or watershed restoration interventions. In addition, the authors limited the case studies to financial mechanisms that offer most potential within Ethiopia's institutional, legal, and fiscal context, as discussed in greater detail below.

The Ethiopian context indicated three strategies with greatest promise for replication. While the financing mechanisms could be deployed in many areas across Ethiopia, use cases to showcase applicability were selected considering biodiversity importance (key biospheres), the existence of an urgent threat to existing water sources, infrastructure vulnerability to land degradation and necessary for water security, continued consideration for tackling land and water degradation, and the potential ability of beneficiaries in the selected locations to provide funding or repayment. The paper does not provide detailed guidance nor is it exhaustive in coverage. It is meant to raise awareness and stimulate interest in new pilots to increase and diversify funding for conservation practices in the country. The application of the select mechanisms would be largely novel in Ethiopia, and their scalability could necessitate reforms in policy and regulatory frameworks.

2. AN OVERVIEW OF WATERSHED MANAGEMENT IN ETHIOPIA

2.1 Ethiopia's history with watershed management

Drought-induced famines in the early 1970s and 1980s brought urgent attention to the rapid rate of land degradation underway in the Highlands (Wassie 2020; Chimdesa 2016). Soil erosion was identified as a major contributing factor and prompted Ethiopian authorities to launch SWC and SLM programs (Wudu 2019; Gebregziabher et al. 2016). Such programs have since been at the basis of efforts to confront unproductive agriculture and rural vulnerability. Large investments have been made through public programs as well as projects supported by various development partners. The first came in response to the 1973–74 famine when the World Food Program (WFP) launched a Food for Work (FfW) project together with the then Ministry of Agriculture and Rural Development (MoARD), initially as an emergency relief initiative. Food aid efforts became directly linked to efforts to reverse land degradation, and this linkage continued via public works on SWC (Zeleke 2006).

The first FfW and SWC programs, however, focused on food insecure areas and viewed reducing soil erosion as an end in itself. Success was limited by their failure to address human reliance on natural resources and livelihood insecurity (the underlying drivers). First-generation programs (1970s–1990s) (Table 1) thus proved generally ineffective due to their overemphasis on physical SWC structures without monitoring usage and impact or involving farmers in understanding their purpose and incentivizing maintenance. This resulted in many beneficiaries being unwilling or unable to adopt and maintain SWC structures, often even removing them from their lands (Tadesse 2001; Chimdesa 2016). So, while early FfW and SWC projects achieved some positive results on reducing erosion, increasing land productivity,

and aiding food security, they failed to create ownership and, in particular, to protect and enhance livelihood needs (Mekuriaw et al. 2018; Gebregziabher et al. 2016).

Implementation methods changed in the 2000s from top-down, technocratic approaches to more participatory bottom-up approaches focused on integrated environment and poverty alleviation benefits (Zeleke 2006; Hurni et al. 2010; Wudu 2019; Worku and Tripathi 2015). Evaluations of early programs spurred change: the assessments and learning led to new efforts by MoARD and other agencies, which sought a more community-centered strategy and both ecological and livelihood objectives (Zeleke 2006). Activities expanded to include biological and not just physical SWC measures, sustainable farming techniques, and complementary household-level support. The transition culminated in the preparation of MoARD's Community Based Participatory Watershed Development (CBPWD) Guideline in 2005 (Desta et al. 2005). The guideline is commonly seen as formalizing a second generation of programs linking ecological protection with livelihood security (Worku and Tripathi 2015).

Ethiopia has also put forth a number of national initiatives and governing frameworks for tackling land degradation. These have included various programs that provide food and cash in exchange for labor on public works and large government and donor–cofunded SLM programs.[6] Despite clear improvements, continued difficulties around SWC maintenance, sustainability of interventions, and an absence of linkages to economic viability, private sector involvement, and new financing for scaling have been noted in the second-generation approach (Teka et al. 2020; Chimdesa 2016; Lemenih and Kassa 2014).

Table 1 | **Watershed Management Paradigms in Ethiopia: First- and Second-Generation Approaches**

	FIRST GENERATION (1970s–1990s)	SECOND GENERATION (FROM EARLY 2000s)
Primary objective	Reduce erosion, emergency/food relief	Improve the natural resource base and livelihoods
Approach	Top-down, sector-driven, technocratic	Community-based, ownership of activities, multidimensional
Community participation	Forced	Engaged at planning and implementation stages
Scale of intervention	Large-scale planning unit	Micro-watershed, agro-ecology
Key strategies / frameworks	SWC guidelines, Agricultural Development-Led Industrialization (ADLI)	CBWDP, Ethiopian Strategic Investment Framework, CRGE
Key programs	FfW SWC programs	Managing Environmental Resources to Enable Transitions (MERET) Productive Safety Net Program (PSNP) Free Labor Contribution Period Sustainable Land Management Program (SLMP)
Technologies / practices	Physical SWC structures (e.g., bunds, terracing, gully rehabilitation, water harvesting)	Physical and biological SWC measures (e.g., reforestation/afforestation, grass strips, riparian buffers, conservation tillage) Livelihood support measures, including alternative income-generating activities (IGAs) (e.g., beekeeping), agroforestry, land certification
Monitoring	Poor monitoring and maintenance	Improved monitoring
Outcomes	Reduced erosion, some indirect ecological benefits, farm-level effects	Improved conservation of natural resources, improved incomes of farmers, both farm-level and landscape-level impact
Missing	Environmental soundness, social acceptability, technical/biophysical feasibility, integration with livelihoods	Long-term sustainability, economic viability, private sector involvement, financial innovation

Notes: SWC = Soil and water conservation; CBWDP = Community Based Participatory Watershed Development; CRGE = Climate Resilient Green Economy.

Source: Authors.

2.2 Lessons from research and experience

Numerous studies document the positive effects of watershed management and its clear potential for regenerating degraded lands and promoting rural development (Mekuriaw et al. 2018; Siraw et al. 2020; Teka et al. 2020)**.** Examples demonstrate biophysical improvements including enhanced vegetative cover, soil fertility, crop yields, groundwater and spring recharge, in addition to reduced downstream flooding and siltation (Worku and Tripathi 2015; Mengistu and Assefa 2019; Schmidt and Tadesse 2019; Meshesha and Birhanu 2015; Wudu 2019). Households have also seen increased incomes as a result of greater availability of food, water, and fodder for livestock (Assan and Beyene 2013; Yaebiyo et al. 2015; Mengistu and Assefa 2020).

The success[7] of watershed management programs is typically dependent on biophysical, socioeconomic, and institutional factors, with the extent of community buy-in and supporting institutions noted as key elements (Chisholm and Woldehanna 2012; Gadisa and Midega 2021). Some studies and practitioners note how piecemeal projects and using FfW or cash as motivators have created dependence on external support, rather than farmers and resource users becoming active partners in conservation. Many projects in fact have been unable to move beyond a pilot phase or failed to sustain positive change after funding has ceased (Schmidt and Tadesse 2019), leading to many watersheds reverting back to previous states of degradation. This fallback implies that the level of sustainability and provision of positive incentive necessary to allow handover of conservation responsibilities to communities, local authorities, and other watershed actors have not been achieved (Negasa 2020; Zeleke 2017; Gebremedhin and Swinton 2003).

2.3 Institutional and legal frameworks for investment and conservation finance

There appears to be growing interest in Ethiopia in market-based models for natural resources regulation to motivate improved management practices. The recent inclusion of innovative financing as a policy entry in the new draft Agriculture and Rural Development Policy, in addition to draft regulations for water abstraction charges and a recently proposed proclamation on PES by Ethiopia's environment and forest agency indicate a perceived need to give more economic value to nature. These developments underline an increasingly favorable enabling environment for mobilizing financing for conservation and improving the regulation of natural resources.

The government of Ethiopia has also been undertaking a number of liberalization reforms aimed at accelerating economic growth and diversifying finance for development, including from the private sector. Notable among these is the approval of a draft capital market establishment (Proclamation No. 1248/2021). Ethiopia's first securities exchange, anticipated to commence in 2022, will be established as a share company through a partnership of the public and private sectors, and will allow buying and selling of securities such as shares, bonds, and derivatives. Other key laws and policies aimed at promoting private finance include the recent Public-Private Partnership (PPP) Proclamation (No. 1076/2018), PPP Directive (No. 55/2010/2018), and PPP Framework.

Despite these positive policy developments, lingering regulatory barriers limit Ethiopia's ability to tap institutional investors to finance NBS and conservation at scale. Barriers include significant constraints on foreign investment and land ownership. Although foreign investors are allowed to participate in the business of capital goods,[8] the new investment law (No. 1180/2020) and regulation (No. 474/2020) continue to exclude foreign investors from participating in the financial sector—including commercial banking, insurance, and microfinance, which are three promising financing avenues for NBS projects (Wilson 2019). The funding gap will thus need to be addressed by international donors, development banks, public budgets, and, potentially, domestic private actors.

An additional barrier is that land ownership is vested exclusively in the state, according to Ethiopia's Constitution, resulting in land tenure restrictions and insecurity. The inability of Ethiopians to own land reduces incentive to invest productively in land or apply conservation practices, and limits transferability of land. This situation significantly constrains agricultural growth, green infrastructure investment, and wealth accumulation by households (USAID 2004).

2.4 From challenges to opportunities

Our research highlights lingering challenges and shortcomings in finance, governance, and implementation, which can be summarized as follows:

- Limited funding with reliance on government and development aid and the meager role of private investment.
- Project-based and time-bound approaches.
- Weak participation of communities and resource users in decision-making, and inadequate attention to social acceptability and economic viability aspects, leading to continued reluctance of farmers and reduced awareness of sustainable land and water management (SLWM) benefits for all actors within a watershed (Mengistu and Assefa 2020; Teka et al. 2020).
- Inadequate monitoring and evaluation of ecological, social, and economic impacts, with additional difficulties in tracking budget allocations toward NBS-related interventions.
- Lingering capacity limitations in planning, designing, and implementing sustainable watershed management programs, including inadequate tailoring to socioeconomic, biophysical, and agro-ecological dynamics (Gebregziabher et al. 2016; Chimdesa 2016).
- Poor coordination among government offices and other institutions (Chimdesa 2016). Limited cooperation in planning and implementing interventions exacerbates funding limitations (Asfaw and Neka 2017) and hampers improvements in and integration between production, market access, extension services, and land policy.
- Frequent restructuring of government institutions, staff turnover, and political instability impact continuity of activities, eroding progress and the scaling of environmental conservation initiatives (Teka et al. 2020).
- Incentive constraints inhibit adoption of conservation approaches over the long term among communities and resource users (Negasa 2020; Zeleke 2017; Gebremedhin and Swinton 2003). Reluctance to participate is exacerbated by the continued perception of natural resources as universal public goods; for example, in the case of water where users, especially large users (agriculture, industry, etc.), resist being charged.
- Persistent livelihood insecurity, dependence on natural resources for subsistence and household needs, and insecure land tenure lead to devegetation and deforestation, and frustrate adoption of conservation practices (Teka et al. 2020).

These challenges underline the need for continued improvement at the level of operationalization as well as the exploration of new funding and partnership approaches that balance and sustain production, protection, and development. A recent study notes how 73 percent of Ethiopia's total land mass—82 million hectares—could benefit from tree-based landscape restoration, boosting productivity, employment, and prosperity (MEFCC 2018). Strategy documents such as Ethiopia's Climate Resilient Green Economy (CRGE) and the recently updated Nationally Determined Contribution (NDC) also display strong institutional support for conservation and restoration and stress the need to mobilize private and more innovative finance, reflecting the opportunity to further the watershed management and conservation agenda.

Questions remain on how to finance this agenda. A paradigm shift is needed toward approaches that can incentivize resource users to embrace sustainable practices and spur financial innovation. To this end, watershed management must be pursued in terms of environmental soundness, social acceptability, and economic/financial viability (Chimdesa 2016; Haileslassie et al. 2020). Convergence of such approaches can help attract investors, tap into new funding sources, and help sustain positive impact, engaging actors that derive benefit from or are dependent on ecosystem services to contribute to their protection and restoration.

3. EXPLORING NEW FINANCING: HIGHLIGHTING DIVERSE PUBLIC AND PRIVATE SOURCES OF FINANCE FOR NATURE-BASED SOLUTIONS AND WATER SERVICES PROTECTION

3.1 Funding sources for nature-based solutions

Various instruments have been used by governments and other actors to fund conservation, including taxes, public subsidies, user fees, and direct penalties. More recent policy-finance mechanisms have focused on creating market- or incentive-based measures resting on the monetary value of ecosystem services. Other strategies have also tried to direct private finance toward enterprises with a positive socioenvironmental impact or toward safeguarding natural assets that serve key functions in many productive activities.

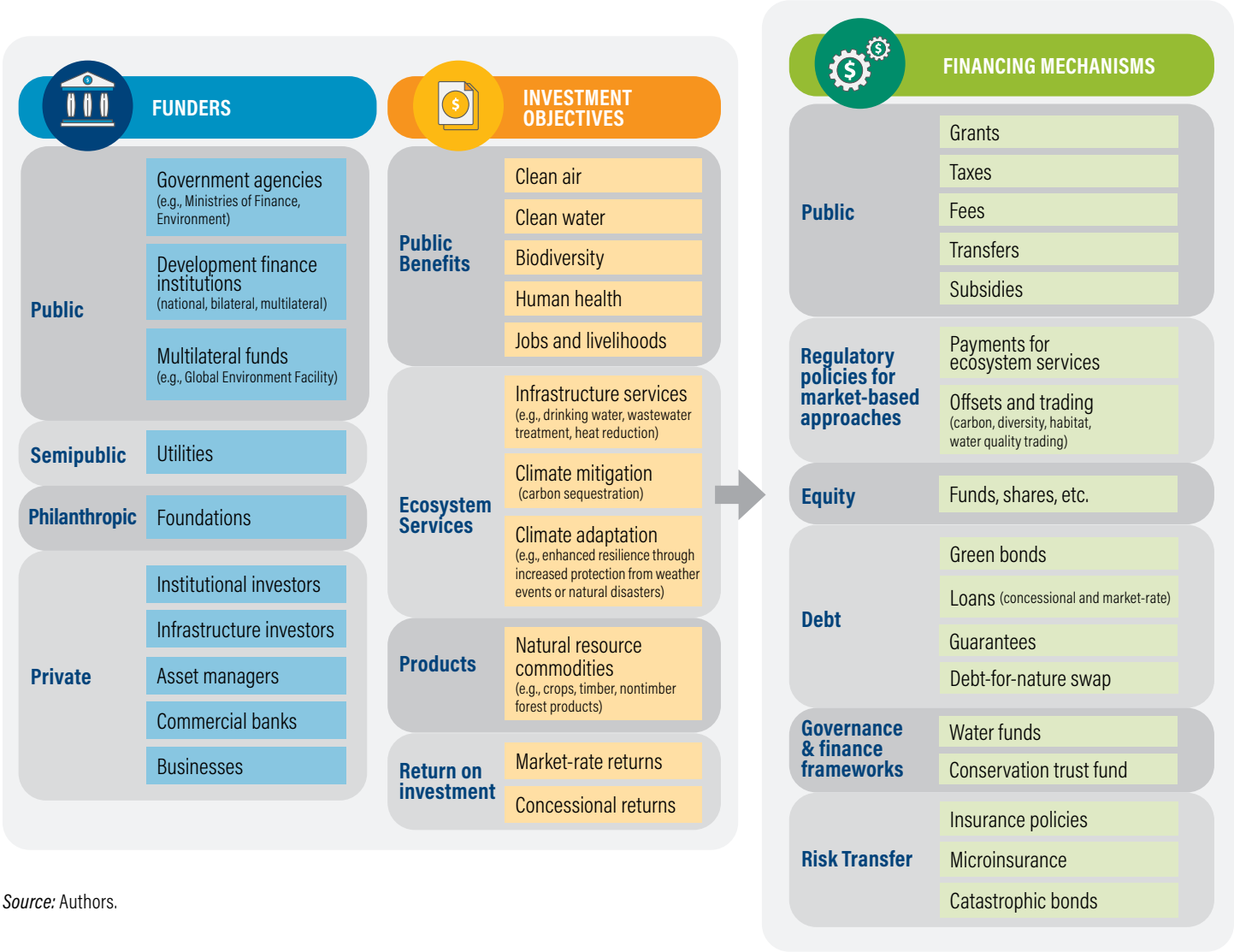
Investments in environmental conservation and NBS, however, remain low and face a severe shortage of funds worldwide (McKinsey 2016). Despite the benefits, evidence suggests that funding for NBS is still below 1 percent of total investment in water resources management (WRM) infrastructure (UNESCO World Water Assessment Programme 2018). Moreover, with current investments mostly from public sources—estimated at $113 billion (Mulder et al. 2021)—public funding is insufficient to reverse the loss of natural capital and meet related targets in the Sustainable Development Goals (SDGs) (Deutz et al. 2020; World Bank 2020b; WEF 2020). There is increasing recognition of the need to significantly increase private and blended investment in conservation (Swann et al. 2021, UNEP et al. 2021, WWF 2020a).

A growing number of financial institutions, such as development banks, institutional and impact investors, and commercial asset managers, are incorporating environmental and climatic concerns into their investment decisions. These institutions are responding to public and shareholder pressure, regulatory and policy requirements or commitments, and reputational risks (Cooper and Tremolet 2019). In addition, many companies are showing an increasing interest in NBS to steward their operations, improve sourcing and supply chain issues, and offset water and carbon footprints (Shiao et al. 2020; Bennett 2016). The growing economic reasons to invest in nature can offer new avenues for nature-based financing. Strategically combining NBS ("green") with "gray" infrastructure can achieve desired investment scales for investors and is often a more cost-effective approach for delivering infrastructure services. Reforested watersheds, for example, can reduce sediment yield, improve water quality, help manage flow, and protect machinery and structures from damage, including hydropower and water treatment facilities and municipal water systems (Ozment et al. 2016; Nesshöver et al. 2017; Mulatu et al. 2021; Juno and Pool 2020). These approaches indicate different and promising models for financing NBS.

To unlock new and diversified sources of funding for NBS, the investment objective(s) of funders must be more closely connected to benefits associated with NBS and ecosystem services. NBS can deliver a multitude of benefits. By merging the objectives of public and private funders, NBS projects can source and sequence the use of resources and expertise to finance, plan, design, implement, sustain O&M and perform monitoring, evaluation, and learning (MEL). Table 2 illustrates how public and private partners can blend and pool resources to achieve their respective investment objectives using financing mechanisms.

Other constraining factors, however, continue to hinder NBS investment. Key limitations include the fact that many NBS benefits are public goods (Ding et al. 2017) and that nature-based measures are often slow to generate revenue in the short term to sustain operating costs and repay capital investment at market-rate returns (World Bank 2020b). Scientific data, adequate tools, and expertise to evaluate NBS on a par with other investment considerations and to monitor impact are often lacking, leading to uncertainty on the correlation between investment objectives and benefits (Browder et al. 2019; Ozment et al. 2021; World Bank 2020b). NBS interventions may also require significant stakeholder engagement, which often results in higher transaction costs. Few projects meet the threshold investment size for institutional and infrastructure investors (greater than $5 million but preferred in the $100–$200 million range) (Marsters et al. 2021; Studer 2020; Ding et al. 2017) or the opportunities for replication to reach scale. For these reasons, blended financing and partnership approaches that combine public and private capital, resources, and expertise offer promising strategies to mainstream NBS.

Table 2 | **Sources of Financing for Nature-Based Solutions**



Source: Authors.

3.2 Innovative financing strategies and case studies: Catalyzing contributions to conservation and restoration

This chapter highlights three strategies to finance NBS with expected outcomes including water security benefits, such as water quality and availability improvements, drought management, and/or flood protection. While numerous NBS finance strategies and mechanisms exist, including related to green bonds, carbon markets, and insurance schemes, the paper is not exhaustive in coverage, and selected strategies were chosen based on the criteria detailed in the methodology. Case studies unveil key enabling conditions that buoyed the strategies' ability to attract diversified and sustained funding to implement landscape-scale, ecosystem-based, or watershed restoration interventions.

In selecting NBS finance strategies to feature, we considered relevance to the Ethiopian context, including biodiversity or landscape similarities and regulatory context. For example, while green bonds are emerging globally as promising financial tools to link earmarked capital to green investments, helping bundle NBS and gray infrastructure project costs, their use in Africa remains limited (currently representing only 4 percent of the global market with only 11 issuers) (Marbuah 2020). In Ethiopia specifically, the financial market is still nascent. Treasury bills are the main

financial instruments, and there is little experience with issuing government bonds (Making Finance Work for Africa 2019). Ethiopia did recently issue a bond to finance the Grand Ethiopian Renaissance Dam (GERD) (Plaza 2011); however, given the country's current uncertain fiscal and political situation, bond financing, and the immediate deployment of green bonds specifically, is likely improbable. For this reason, green bonds are not explored in this paper. However, in the future, if the Government were to use bond financing to address the significant needs in water and sanitation, agriculture, and energy, there would be a significant opportunity to incorporate NBS alongside "built" infrastructure and attract new investors into the country, particularly from sustainable, climate, or impact investors.

Given contextual and regulatory considerations, the strategies featured in this report are the following:

1. Water funds, providing a vehicle for resource users to pay for watershed services
2. Payments for ecosystem services, providing market-based incentives for the restoration, protection, or enhancement of ecosystem services
3. Debt-for-nature swaps, allowing a portion of debt repayment to be redirected toward domestic natural capital investments

Strategy 1. Water funds encourage resource users to pay for benefits provided by watershed services

Water funds rely on a user-pays model deployed at the watershed scale, where the users of watershed services contribute to efforts to protect and enhance water availability and/or quality. Water funds are institutional entities, typically developed by cities and conservation practitioners, that pool public, private, and/or philanthropic funds to support water security efforts through NBS and watershed protection activities (TNC 2021b). In an ideal funding model, downstream water users such as urban drinking water utilities, bottling companies, irrigators, or hydropower users contribute to programmatic efforts that support upstream watershed rehabilitation practices. There are 43 water funds in operation globally and 35 more in development. Most of these are found in Latin America and the Caribbean region, while only two are established in Africa with five more at the development stage (TNC 2021b).

Enduring and effective water funds have strong governance frameworks that can operate independently of political influence, diversified and consistent funding sources, and buy-in from stakeholders (Apse 2021; TNC 2021a). Given the goal of connecting downstream beneficiaries and upstream landowners, land managers, and rural residents, water funds typically require significant investment in stakeholder collaboration to build trust in the concept and among operating parties. A robust governance and partnership framework with independent boards of trustees and management, consisting of representatives from the public, private, and aid sectors, has been noted as essential (Apse 2021; TNC 2021a).

Water funds often work with partner NGOs and/or local authorities with rural upstream relationships. These agents provide technical assistance, equipment, materials, and/or payments to support a shift toward restorative agricultural methods, like soil conservation and agroforestry, that bring benefits both upstream and downstream. As farmers and resource users witness improvements to soil health and yields, they can be incentivized toward continued adoption of restorative measures. Additional partnerships with science institutions can provide necessary baseline studies and impact monitoring—in hopes of quantifying economic benefits, demonstrating the return on initial investments and motivating stronger funding commitments.

CASE STUDY: KENYA'S UPPER-TANA-NAIROBI WATER FUND

The first water fund in Africa, the Upper-Tana-Nairobi Water Fund (UTNWF), was established in 2015 for restoration of the Upper Tana River Basin. This basin supplies water to 95 percent of Nairobi's 4 million residents and an additional 5 million rural residents in the watershed. The Tana River also supports key agricultural areas and provides half of Kenya's hydroelectric power (TNC 2021c). However, the quality and quantity of this essential water source have been threatened by landscape conversions to agriculture—a factor in over 60 percent of Nairobi's residents being water-insecure (Apse and Bryant 2015). The loss of forests and wetlands has caused significant erosion, runoff, and sedimentation, increasing turbidity, leading to higher water treatment costs and severe and expensive disruptions in hydroelectric services (TNC 2021c).

The UTNWF was grounded in a business case that estimated that a $10 million investment over 10 years would yield $21.5 million in economic benefits over a 30-year time horizon (Apse and Bryant 2015). The investment would be used to help communities in the Tana catchment adopt more sustainable farming practices. The TNC-led study indicated that interventions like riparian buffers, reforestation, and terracing could increase water yields by 15 percent during the dry season and reduce river sedimentation by as much as 50 percent, delivering cost savings downstream. In addition, farmers could generate up to $3 million annually from increased yields, the energy utility could realize up to $600,000 due to reduced service disruptions, and the water utility could see up to $250,000 in cost savings from avoided filtration costs (Apse and Bryant 2015). Since its creation, 15,000 hectares have been put under sustainable management. The water fund has engaged with 26,000 farmers and aims to reach a total of 50,000 in 2022 (TNC 2020).

The strong business case rationale helped mobilize initial cash and in-kind contributions totaling $20 million (TNC 2021c). TNC also helped create a Water Fund Steering Committee comprising key government and industry authorities, including the city water and sewerage company, the electric company, water-related government agencies, breweries, bottling companies, and a water technology company. This steering committee has since established an endowment—with a target capitalization of $5 million—to provide longer-term funding, offering a differentiated revenue stream. Fundraising for annual budget allocations and the endowment are ongoing and the majority of UTNWF is still reliant on grants (Apse 2021)—indicating a need to strengthen the user-pays model and/or to establish new funding streams.

The UTNWF came about as a result of collective action galvanized to forestall a bleak future of water insecurity for millions of Kenyans. Key enabling conditions for the fund include the following:

- **Robust business case:** Hydrological modeling was used to demonstrate economic gains as a result of direct investment, securing the initial contributions to jumpstart UTNWF's creation. Such biophysical models also help optimize the type, scale, and location of NBS interventions, allowing limited resources to be used efficiently.
- **Broad stakeholder participation:** The board membership from key industry, government, and NGOs reflects a broad and robust network and collective buy-in. However, the success of water funds also relies on engaging thousands of farmers upstream to embrace sustainable practices.
- **Strong governance structure**: The water fund approach relies on a strong public-private governance framework, independent of political influence. Consistent leadership and "champions" can be key elements in the defining early years. Members of the UTNWF board serve three-year renewable terms to build confidence and consistency.
- **Investing in financial security:** Many water funds remain dependent on grants and public funds, with only small and voluntary contributions from the corporate sector. Continued resource mobilization is thus essential (Ozment et al. 2021). For this reason, good financial management and the establishment of endowments can increase a fund's future financial security. Improved MEL post-restoration could help demonstrate correlation between investment and economic impact, spurring more contributions from beneficiaries.

Strategy 2. Payments for ecosystem services incentivize the restoration, protection, or enhancement of ecosystem services

Environmental degradation is caused in part by the general failure to monetize the goods and services that ecosystems provide (Ding et al. 2017). Environmental and social benefits typically have no market value. In recognizing that healthy ecosystems produce benefits such as clean water and commercial products, certain policies or strategies can incentivize actors to protect and enhance the delivery of ecosystem services. One such market-based approach is payments for ecosystem services (PES). PES are formalized agreements deployed at national or subnational scale to incentivize ecosystem restoration by paying or otherwise compensating landowners, land managers, or other natural resource users to implement prescribed land management practices associated with environmental service outcomes. These can include watershed protection measures to improve water quality, forest conservation for carbon sequestration, or conservation of biodiversity (WWF 2020b).

PES emerged in the 1990s as a market-based alternative to top-down conservation policies (Alpizar and Madrigal 2020). PES often use public sources of funding from taxes, fees, or subsidies, but may

also involve private actors with operational dependencies on natural resources. Water users, for example, can compensate for improved stream flows or reduced sedimentation that impacts water quality via improved land-use practices upstream of operations. As of 2018, there were over 550 active PES programs worldwide with an estimated $36–$42 billion in annual transactions (Salzman et al. 2018). Despite strong interest in this model, impacts can vary. A global assessment of PES revealed that the most effective schemes have four elements: motivated "buyers" (government or ecosystem service users), motivated "sellers" (land users willing to change land-use practices), metrics (a measurable ecosystem service), and low transaction costs (Salzman et al. 2018).

CASE STUDY: COSTA RICA'S PES PROGRAM

Costa Rica developed one of the earliest national-level PES programs in 1996 to halt deforestation rates that were among the highest in the world during the 1970s and 1980s (Barton 2013). The country was experiencing significant forest conversion to agriculture and cattle ranching, which threatened water quality, flood protection, and biodiversity, as well as the burgeoning ecotourism industry (Randall 1994). Through its 1996 Forest Law, the government prohibited land-use change and deforestation. Subsequently, a PES scheme was devised to protect forests, promote reforestation, and compensate landowners for the opportunity cost of nonconversion (Barton 2013).

The PES program is administered by the National Forestry Fund (FONAFIFO) and pays for four environmental outcomes: carbon sequestration; biodiversity protection; landscape beauty; and hydrological services for drinking, irrigation, and energy production (Convention on Biological Diversity n.d.). It makes direct cash transfers to landowners for 10- to 15-year contracts to perform specific land-use improvements, such as forest protection, reforestation, and agroforestry, to achieve the desired environmental outcome. Notably, FONAFIFO and partners have been able to lower transaction costs for payers and participants by establishing a centralized fund for contributions, standardized long-term contracts, and use of spatial data systems to inform priority locations (Perez Castillo 2020).

The program receives funding from domestic and international sources and has expanded its scope to address funding challenges and broaden payers. Funding comes predominantly (over 80 percent) through a partial tax on fossil fuels (3.5 percent tax) (Kim et al. 2016) and revenue from a national water tariff (Blackman and Woodward 2010). FONAFIFO has also successfully negotiated contributions from local businesses and hydropower producers that accrue benefits of upstream forested watersheds (Blackman and Woodward 2010), and secured funding from GHG abatement activities, including the sale of Certified Tradable Offsets (Subak 1999). Despite diversity in funding streams, however, funding has been insufficient to meet demand: the current budget accommodates only 42 percent of applicants (Kim et al. 2016), motivating the program to explore new financing methods and increased private sector participation.

The program has helped yield important environmental results, although critics indicate that not all landowners or resource managers benefit equally. Forests now cover 50 percent of Costa Rica's land area again (up from 20 percent in the 1980s), while over one million hectares have been enrolled (IIED 2012). Between 2010 and 2020, 625,413 hectares have been conserved, better managed, and reforested, despite limitations and early challenges with area prioritization and monitoring (Zamora et al. 2022). At program inception, eligibility was restricted to landowners with clear land rights, often barring impoverished, communally managed Indigenous lands. More recently, the program developed formal consultation processes and alternative compensation protocols for Indigenous communities, including the provision of communal services such as hospitals and schools (Arriagada et al. 2015). Still, concerns persist regarding selection of participants and preference for large-scale landowners.

While the PES program has demonstrated ecosystem rehabilitation and wealth accumulation at the household level, additional studies are needed to quantify and determine the promising return on investment for companies and beneficiaries. Limited financial participation (2 percent) from private operators displays a continued need to demonstrate economic benefits (Kim et al. 2016). Additional efforts to collect data and monitor impact can help demonstrate proof of performance, quantify economic gains or cost savings, and prove investment return, motivating and further expanding the breadth of contributors.

Costa Rica has adopted a mix of economic and regulatory policies to protect its forests. Key enabling conditions of the PES program's success include the following:

- **Consistent funding streams:** The fuel tax and water charges provide stable funding streams that engender trust in meeting contractual obligations. These consistent streams have also provided the basis for loan repayments to development banks, including a $32.8 million loan from the International Bank for Reconstruction and Development (IBRD) (Blackman and Woodward 2010).
- **FONAFIFO's culture of innovation:** FONAFIFO's relative autonomy as the managing body and its commitment to exploring new funding has helped develop new market mechanisms and increased private sector participation, countering financial insecurity and the reliance on grants or one or few sources. In 2010 an additional funding model emerged: Costa Rica's largest national bank established a biodiversity credit card where users' spending accumulates biodiversity credits, similar to how credit card users can accrue airline miles. These credits translate into the bank donating 10 percent of credit card commissions to the Biodiversity Sustainability Fund.
- **Compliance and enforcement:** Through FONAFIFO's monitoring partners, Sistema Nacional de Áreas de Conservación[9] (SINAC) and FUNDECOR, contracts and credit trading programs are monitored and verified through a combination of spatial analysis and field visits. Agreement compliance and monitoring enhance the credibility of PES transfers, help reassure contributors that their investments are for practices on the ground, and offer evidence that the desired ecological and management outcomes are occurring.
- **Improved rural livelihoods:** The program has provided income to over 18,000 families whose income streams relied on more environmentally harmful practices (UNFCCC 2021). Many families have also been able to utilize their PES transfers to obtain credit, unlocking wealth-generating opportunities. The consistency of the payments has helped to secure loans for equipment, materials, or property, or even pay to legalize land tenure (UNFCCC 2021), thereafter reducing pressure on landscapes and ecosystems and having a cascading effect on poverty.

Strategy 3. Debt-for-nature swaps redirect repayments toward domestic natural capital investments

Many low- and middle-income countries are grappling with significant sovereign debt amidst pressure to stimulate sustainable, inclusive growth. Repurposing sovereign debt toward the protection of nature can be a promising option to reduce a country's debt in exchange for a commitment to ecosystem conservation or environmental sustainability. This is known as a debt-for-nature swap (DfNS). DfNSs are transactions whereby a donor, often a conservation organization, purchases and subsequently cancels the debt owned by a government. Through an established agreement, savings from the reduced debt service are invested in local conservation projects (UNDP 2017). While the country is still obligated to pay out the debt (often at a reduced rate), there are additional benefits of investing in local conservation projects as the debt can be repaid in local currency, which reduces volatility of debt repayments in foreign currencies.

While DfNSs have been utilized since the 1980s, they are reemerging as a tool to repurpose COVID-19 debt loads and address inclusive growth, climate adaptation, and disaster risk mitigation, and safeguard biodiversity. This strategy can be particularly helpful for indebted countries with limited or deteriorating protected areas and/or for natural resource-dependent economies,[10] as an investment in these natural areas can spur economic growth, enhance the sustainability of resource-dependent sectors, and create local jobs. However, negotiating and structuring DfNSs require legal, financial, and environmental expertise, and collaboration among ministries of finance and environment, impact investors and/or development banks, conservation organizations, and investors holding the debt.

CASE STUDY: THE SEYCHELLES' DEBT-FOR-NATURE SWAP

In 2015 the Republic of Seychelles restructured $21.6 million in sovereign debt and redirected its debt repayments toward the expansion and management of its marine protected areas (MPAs). Threatened by the growing impact of climate change, including rising sea levels, flooding, and shoreline erosion, as well as declining fish populations and increasing pollution, the Seychelles was motivated to participate in ushering in a new "blue economy," an approach for the sustainable management and use of marine resources (World Bank 2021a). The transaction helped the Seychelles government meet its 2012 target of protecting over 30 percent of its marine areas, establish a sustainable fishing program, and create an enduring model for managing its MPAs—critical to tourism and the local economy, two-thirds of which depends on the coastal ecosystem (Gerretsen 2020).

The Nature Conservancy's NatureVest served as broker and raised $15.2 million in impact capital loans and $5 million in grants from philanthropies. These funds were transferred to the newly created Seychelles Conservation and Climate Adaptation Trust (SeyCCAT), a conservation trust fund, which in turn loaned the $20.2 million to the government. The government utilized these funds to repurchase $21.6 million of debt from its creditors (the Paris Club), which provided a discount rate of 93.5 cents on the dollar. Four years later significant milestones were achieved: MPAs increased from 0.04 percent in 2016 to 30 percent (158,000 square miles) in 2020, and unsustainable marine development activities were barred.

The Seychelles' DfNS demonstrates that countries with high debt and a history of default can still secure private financing from impact investors. Seven years earlier, the Seychelles' total public debt was over 150 percent of GDP and it defaulted on $406 million in debt payments, leading to an International Monetary Fund (IMF) intervention (Gerretsen 2020). Despite the financial risk, the government's political motivation to invest in marine natural capital and its enactment of strict fiscal policies following the default, which led to economic growth of 4.2 percent from 2009 to 2019 (World Bank 2021a), helped buoy investor and TNC confidence to pursue the deal.

The enabling conditions that assisted this transaction included the following:

- **Political commitment increased investor confidence:** The Seychelles' commitment to protect its marine area and transition to a blue economy assured impact and sustainability investors of political will toward conservation despite significant financial risk. This strengthened its image as a conservation partner.
- **Strong governance structure:** The swap spurred the creation of an independent and fiscally responsible conservation trust fund, SeyCCAT, offering assurances on transparency, oversight, and capacity to manage and redistribute funds appropriately. This ultimately led to additional funding through the 2018 issuance of the world's first $15 million blue bond, with proceeds earmarked for water and marine projects. Support was provided by the World Bank and Global Environment Facility.
- **Sustainable funding streams to engage communities and support partners:** SeyCCAT utilizes the debt repayments to repay TNC's impact loan; fund $5.6 million in conservation activities, including a grant program with plans to disburse $280,000 per year for 20 years to support local communities and conservationists; and capitalize an endowment of $3 million by investing $150,000 per year for 20 years at a compounding interest rate of 7 percent to generate a consistent funding stream to support long-term efforts.

3.3 Key reflections from the case studies

The above case studies highlight pathways to tackle environmental degradation that apply a combination of financing strategies and governance frameworks to incentivize ecosystem service investments. Together, they reveal the following:

- **Robust legal, regulatory, and management frameworks are necessary to mobilize action and increase transparency on decision-making and resource allocation**. To unlock new funding, there is a strong need to increase investor and donor confidence in the management and deployment of funds to ensure environmental, social, and/or economic returns. This includes creating independent organizations, like a conservation trust fund or water fund, where funding from multiple sources can be pooled and deployed in a more effective manner.
- **Initiatives that improve the financial security of conservation entities and households also increase their liquidity and credit worthiness**. This enables the building of wealth through debt or savings, which can then be used to weather economic downturns, reduce reliance on external support, and invest in ecosystem protection. Restored landscapes also have much potential for material benefit and creating jobs (Faruqi and Landsberg 2017; EFCCC 2021). New income sources and profitable value chains can result from new products, highlighting opportunity for leveraging reinvestment into a landscape (Pistorius et al. 2017).
- **Increased financial security of NBS through long-term funding is necessary to sustain projects from initial capitalization costs through to O&M and MEL expenditures.**

- **Strong resource user and stakeholder engagement increases adoption of conservation measures**. Collaboration can engender trust among upstream/downstream actors and strengthen familiarity on NBS investment among environmental, economic, and even financial sector actors.
- **Greater investment in biophysical, geospatial, and financial data is needed to inform the business case and capture/validate the impacts of NBS interventions.** This is vital to secure buy-in by private and public sector payers. Science-based assessments, cost-benefit analyses of action vs. inaction, and financial models can persuade sectoral planners and infrastructure engineers to value and prioritize NBS in investment considerations (Ding et al. 2017).
- **There is a need to both diversify and aggregate funders and funding streams to increase the amount of committed funding for NBS and mitigate perceived or real risk, especially through a greater role for blended and private finance.** The private sector prefers to operate at a large financial scale as it reduces transaction costs, which is important to filling the funding gap for NBS investments. However, actual implementation requires partners with on-the-ground capacity to engage rural stakeholders.

4. ASSESSING THE APPLICABILITY OF INNOVATIVE FINANCING MECHANISMS FOR NATURE-BASED SOLUTIONS AND WATERSHED PROTECTION TO ETHIOPIA

This chapter explores the application of the financing mechanisms highlighted by the case studies to Ethiopia's landscape and watershed protection needs through select "use cases." The proposed use cases are indicative of opportunity and are high-level examinations: the implementation of the featured strategy would require careful attention to contextual considerations, relevant stakeholders, the financing options, and other operational details. Initiating and scaling conservation efforts in Ethiopia are hampered by a lack of adequate financial resources and by both limited familiarity with and capacity to pursue more innovative financing strategies.

4.1 Assessment of financing mechanisms through select use cases

In view of shared NBS investment objectives and similar circumstances, the following section applies the three financing strategies to select settings in Ethiopia:

1. Water funds to protect vital artificial and natural reservoirs
2. PES involving downstream hydropower dams
3. DfNS for forest and biodiversity conservation

Use Case 1. Establishing water funds to protect vital artificial and natural reservoirs

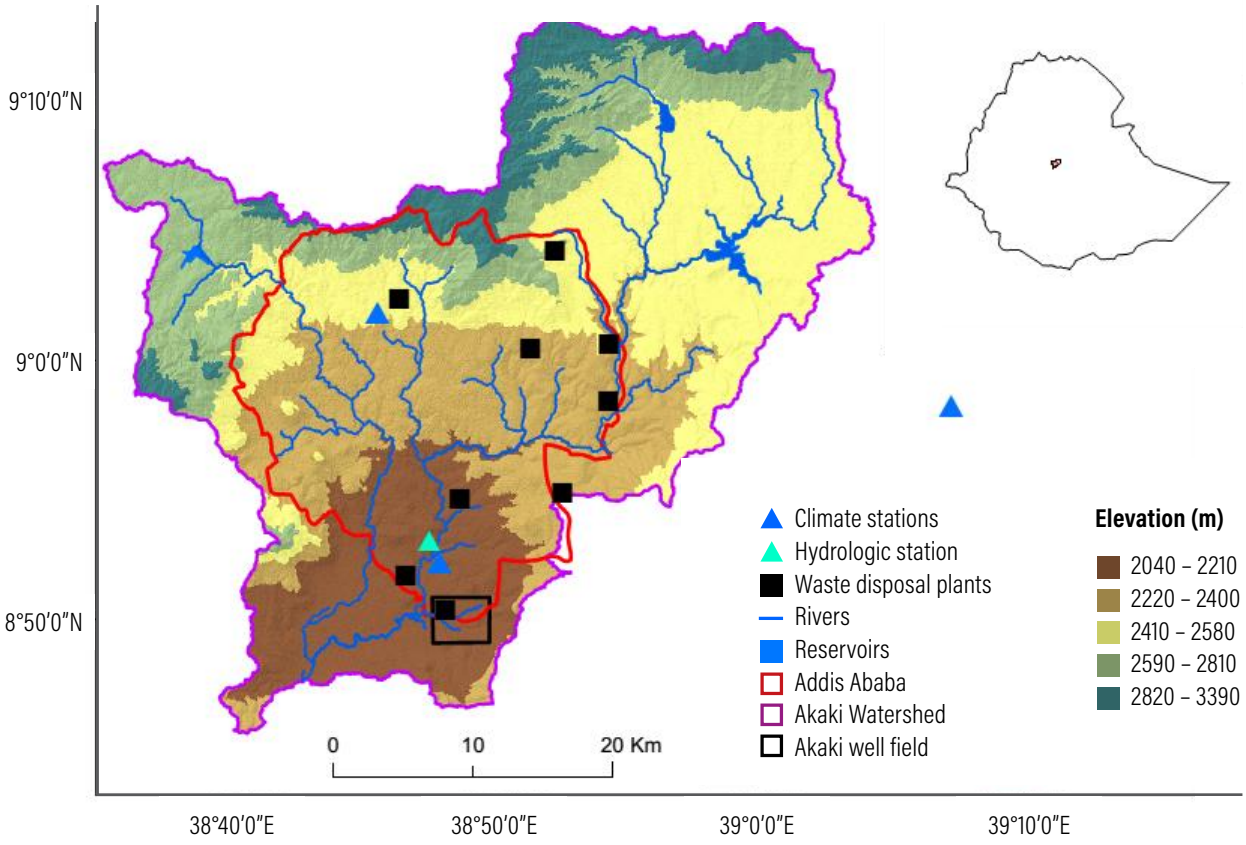
A water fund approach could be a promising tool to help safeguard water storage infrastructure and freshwater ecosystems. We explore two settings: Addis Ababa and Lake Tana.

ADDIS ABABA AND OROMIA WATER FUND

Addis Ababa—Ethiopia's capital and most populous city—is particularly at risk of water insecurity due to its large and growing population. Addis Ababa's key source water area is the Akaki Watershed (Figure 2), located in the Oromia Region and Awash Basin. Significant urban growth (Figure 3) has driven land-use change, accelerating water demand and causing unprecedented water shortages over the last two decades. Rapid land cover changes in the Akaki Watershed have seen forested areas reduced by half since 1985. The Akaki is now covered primarily by cultivated land and built-up areas, and much of the watershed is degraded due to unsound land-use practices. The resulting runoff, erosion, and siltation are impacting key water sources, in particular the Legadadi, Dire, and Gefersa Reservoirs—the city's water supply reservoirs (Pegasys 2021; Alemu and Dioha 2020).

Addressing Addis Ababa's water risks necessitates collaborative water planning and the protection of source waters by restoring the landscapes in its surrounding catchment. A water fund could be established to achieve this. A feasibility study commissioned by TNC in 2021 notes how unmet water demand in the city could increase by 48 percent between 2015 and 2030 and proposes that both opportunity and interest exist to establish a water fund for Addis Ababa and the Oromia Region (Pegasys 2021). A water fund could

Figure 2 | The Akaki Watershed Showing the Location of City Reservoirs



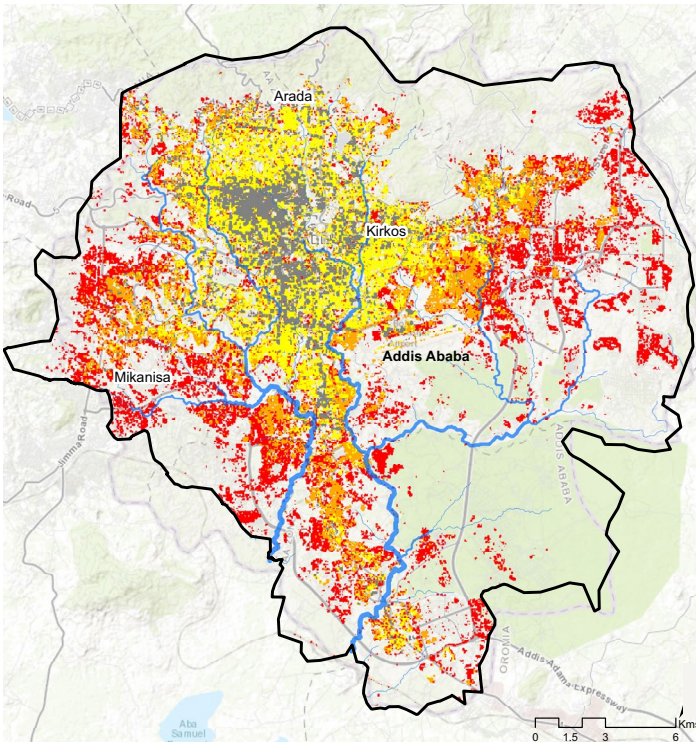
Note: m = meters.

Source: Pegasys 2021.

serve as a catalytic governance and funding framework to strengthen collaboration between city and region, bridging administrative jurisdictions and incentivizing land-use improvements by watershed actors. Key stakeholders include federal institutions (Ministry of Water and Energy [MoWE], Ministry of Finance [MoF]; Ministry of Planning and Development [MoPD]); regional institutions (Oromia Bureau of Agriculture and Natural Resources; Oromia Bureau of Minerals, Water and Energy); the Addis Ababa Water and Sewerage Authority (AAWSA); and the Awash Basin Authority. Other key stakeholders include private companies in the catchment (such as Coca Cola, Pepsi, MOHA Bottlers, Nestle, BGI, Heineken), development partners, and academic and research institutions (Addis Ababa and Oromia state universities[11]) that have an economic stake in water supply or interest in watershed conservation. All these actors would need to be engaged to build buy-in and mobilize financial contributions needed to, first, establish a water fund board and, thereafter, pool resources for catchment rehabilitation.

An Addis Ababa Water Fund could rest on several sources of funding. Firstly, private sector operators such as beverage companies, hotels, and other manufacturing industries located in and around the city could contribute annual lump sums or a fixed percentage of annual sales, which would go into a financing facility set up by the fund. The expansion of industrial parks and foreign investment in recent years, together with a growing culture of corporate social responsibility, could provide additional opportunity for such forms of PPP, governed by Ethiopia's PPP Proclamation. The city administration could also increase tariffs on water users to ensure a more consistent funding stream. A recent study (AEWPP 2020) shows that Addis Ababa has some of the cheapest water in Africa, with an average cost of $0.13/cubic meter ($m^3$), indicating that additional tariffs would be needed to provide sufficient contributions (Anteneh et al. 2019; Cardenas and Whittington 2019; Pegasys 2021).

Figure 3 | **Urban Growth around Addis Ababa (1975–2015)**



Legend

River Network
Strahler order
1
2
3
4

Admin Boundary (GADM Type 2)
Built-up area in 1975 | Area (Sq. Km) 25.18
Built-up area added by 1990 | Area (Sq. Km) 47.71
Built-up area added by 2000 | Area (Sq. Km) 35.33
Built-up area added by 2015 | Area (Sq. Km) 65.75

Notes: Sq. Km = Square kilometers; GADM = Database of Global Administrative Areas.

Source: Prepared by WRI, Urban Water Resilience Team (Unpublished).

A clear business case would be necessary to motivate contributions to the fund. Following a feasibility study, estimates of the costs, benefits, and risks can increase political buy-in and mobilize funding from different actors. Next steps include preparing a business case and exploring willingness-to-pay from city and regional agencies. A clear organizational structure and financial setup for managing contributions, such as a finance facility and investment fund, would also be essential to build confidence, transparency, and efficient fund management (Pegasys 2021a). Based on the UTNWF experience, donors and NGOs will likely be needed for anchor funding and fund capitalization and management. As watersheds typically encompass many actors and, in this case, overlie diverse jurisdictions, development partners can also serve as intermediaries, facilitating negotiation between upstream and downstream actors and across administrative boundaries, helping navigate potential conflict resolution needs.

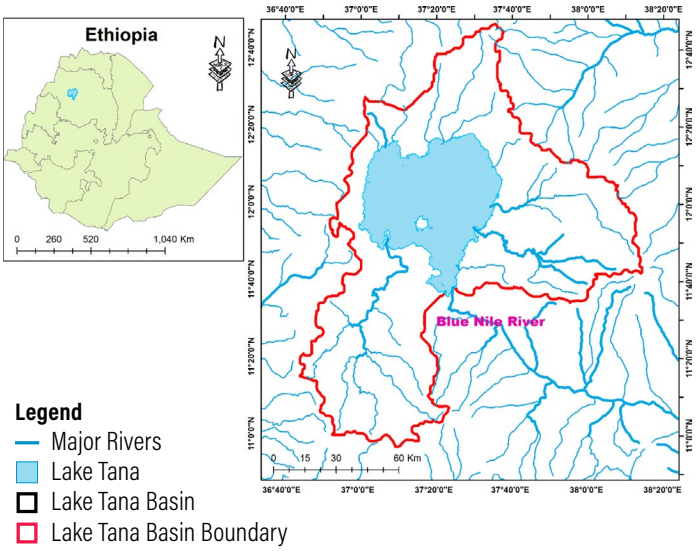
Restoring the surrounding catchment will likely not solve Addis's water supply challenges. Addis Ababa has limited and aging water supply infrastructure, which needs updating and expansion (storage and distribution networks, etc.). The city must also improve water-use efficiency by, for example, reducing leakage and loss. Still, a water fund can create an improved governance mechanism that enhances cooperation on water issues, while at the same time spurring adoption of green-gray approaches and dedicated funding for NBS.

A WATER FUND FOR LAKE TANA

Lake Tana in the Amhara Region is a critical ecosystem with huge importance to local livelihoods and economic activities. Lake Tana is the largest lake in Ethiopia (Figure 4), comprising about 50 percent of its freshwater, and is the main source of the Blue Nile (Abbay River). The area is a hotspot of biodiversity, and both the lake and its surrounding catchment provide a multitude of services to riparian communities and commercial water users. The lake, its wetlands, and landscapes are vital to local fisheries, agriculture, grazing, transportation, drinking water, and even electric power generation (Tewabe 2015). Tana is also a United Nations Educational, Scientific, and Cultural Organization (UNESCO) Biosphere Reserve in recognition of its cultural, historic, economic, and environmental significance.

Despite its ecological importance, the Lake Tana catchment—the Tana Subbasin—has experienced vast ecological degradation in recent years. Here, too, deforestation and expanding agriculture and industry have resulted in vast areas of degraded land and forest loss, with increasing pollutants and sediment transport into the lake. This sediment load, rich in nutrients, is creating favorable conditions for lake eutrophication and for rapid expansion of water hyacinth (Mujere 2016). Water hyacinth—one of the world's most invasive water weeds—causes serious ecological and socioeconomic problems, primarily by reducing water quality and flow, hindering fishing and navigation, blocking canals and drainage systems, and creating a microhabitat for a variety of disease vectors. The cost of removing the weed in 2020 alone was estimated at $1.5 million (Dersseh et al.

Figure 4 | **Map of Lake Tana and Tana Basin in Ethiopia**



Source: Enyew et al. 2020.

2019). Of growing worry is the weed's advancing at an alarming rate and its clogging of intakes at irrigation, water supply, and hydropower structures. The infestation is expected to spread to the Blue Nile and even endanger power generation at the GERD (Enyew et al. 2020).

Creating a water fund for Lake Tana could support catchment protection, agricultural production, and biodiversity conservation, all while curbing water hyacinth. As a center of growing economic and tourism activities, hotels, recreation facilities, manufacturing industries, and even an industrial park are found in the subbasin. Moreover, the Tana-Beles Hydroelectric Power Plant, the Tana-Beles Sugar Factory, and various horticultural operations are also located in the vicinity of the lake. All these could be potential contributors to the water fund. With national ambitions to make the Tana Subbasin an economic hub, the context is ripe for motivating stakeholders around the establishment of a water fund. Regional government offices, the Abbay Basin Development Office, the recently established Lake Tana and Other Water Bodies Protection and Development Agency, and local irrigation Water User Associations (WUAs) could be key players in facilitating its establishment, with local educational and research institutions providing supportive analysis. Finally, both national and international NGOs and donors with interest in conserving this center of biodiversity would be additional key partners—providing both technical and financial support.

RECOMMENDATIONS

Although water funds are typically developed with one city as primary recipient, their potential to improve governance of source waters and protection of reservoirs by bridging jurisdictional, financial, scientific, and operational needs underscores the model's relevance beyond cities to freshwater ecosystems like Tana as well (Mulatu 2015). Funding solely from downstream municipalities and private companies in Ethiopia will likely not suffice in the near term. Linking to near-term social, economic, and ecological priorities would improve acceptance and contributions by different public and private funders. Establishing endowments from the start would help ensure an additional, consistent future funding stream and help enhance the institutional and financial sustainability of water funds for Addis, Tana, or other cities/locations.

Use Case 2. Payments for ecosystem services involving hydropower operators in catchment conservation

Ethiopia has adopted a rapid growth and development strategy with the ambition of becoming a middle-income country by 2025. Growth is to be fueled by substantial expansion of irrigation, industry, and hydropower. The country is building reservoirs, irrigation canals, and hydroelectric dams. Many of these dams are intended to be multipurpose, with water for irrigation and drinking, flood control, and energy production (Mekonnen 2022). The country is highly dependent on hydropower, which accounts for about 90 percent of total installed energy generating capacity (Hailu and Kumsa 2021). Sustainable operation over the long term is therefore crucial to development.

Many of Ethiopia's dams are under threat from accelerated sedimentation caused by increasing erosion in their upper watersheds. Almost all major rivers in Ethiopia originate from the Highlands, and many carry a high silt content due to heavy erosion (Mekonnen 2013). Consequently, accelerated siltation of reservoirs is impacting storage capacity, reducing hydroelectric-generation capacity, increasing O&M costs, and reducing the life span of the structures, all leading to the loss of the intended services from those reservoirs (Adugna and Cherie 2021). Frequent power cuts and rationing of electricity distribution nationally are partially attributed to the loss of storage capacity at hydroelectric dams.[12] The implications for water, food, and energy security—and on Ethiopia's development plans—are huge.

Catchment conservation has clear links with hydropower generation. In many watersheds across Ethiopia, the sediment-hydropower link warrants intervention and financing of upstream watershed restoration in the form of PES, with the involvement of dam operators and power generators. Such schemes could provide new, complementary resources for watershed management, diversifying revenue streams—including public revenues—toward conservation.

The establishment and empowerment of a structure similar to Costa Rica's FONAFIFO could help initiate and run PES schemes in Ethiopia. The multiple tasks, coordination, and expertise needed to implement PES necessitates the involvement of different institutions at both federal and subnational levels. The Environmental Protection Agency, MoWE, and MoA have (often overlapping) mandates for water resources management, irrigation, tackling soil erosion and degradation, and watershed management, which makes them important actors. The Ethiopian Electric Power company and Ethiopian Electric Utility would be crucial to providing the actual financing for watershed restoration measures—and, in the process, would become new actors in conservation finance.

RECOMMENDATIONS

There is growing interest in PES and market-based models in Ethiopia. Approval of the recently proposed proclamation on PES and water abstraction charges could enhance the enabling context for employing this financing strategy. Hydro-based PES schemes can pilot contracts with one or select hydropower dams, such as the Gibe Dams. Contracts can then, perhaps, be gradually scaled up, for example, to cover additional ecosystem services and eventually broaden "buyers" to include private companies, large irrigators, and so on. Also, in the future, the program could expand financial tools, such as the use of irrigation charges. Creating a national PES program can address land and watershed degradation at a greater scale than a localized PES scheme or water fund. PES application at larger scale, however, would likely necessitate a more formal regulatory framework and clear enforcement mechanisms.

Water-related PES has immense potential in Ethiopia with payments and incentives provided directly to upstream communities for improved resource-use practices—with cobenefits for agricultural-based livelihoods. The country's hydropower dams could be considered anchor funders toward the compensation of watershed services since they are in a position to generate revenue from the services delivered. Ethiopia can draw lessons from similar schemes piloted and extended elsewhere, including in Costa Rica (Porras and Miranda 2010) and Vietnam (Pham et al. 2013). Additional partners, like NGOs or civil society organizations (CSOs), local authorities, and WUAs, would be important to mobilize communities, organize the land restoration interventions, and disburse payments. Importantly, upstream land users must understand the benefits arising from sustainable watershed management—and must be given capacity through cash, in-kind, or technical assistance contributions. Secure land tenure is still a greater advantage in PES (Greiber 2009).

Use Case 3. Debt-for-nature swap to protect Ethiopia's remaining Afromontane forests

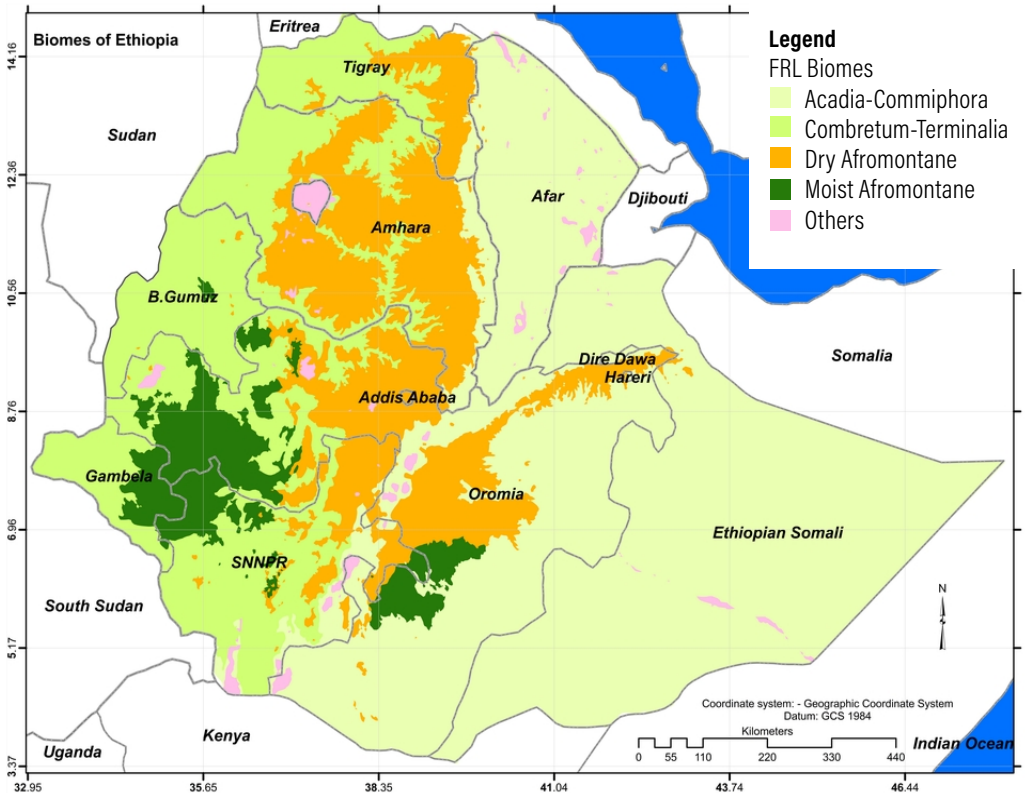
Ethiopia's Highland forests are considered globally significant ecosystems. In particular, Afromontane forests, located primarily in south and southwest Ethiopia (Figure 5), are part of the Eastern Afromontane Biodiversity Hotspot, a globally important biosphere and center of endemism and crop genetic resources. Despite its natural wealth, the larger region is characterized by expanding ecosystem degradation and intense poverty (Bird Life International 2012).

Some of the remaining moist Afromontane forests are in the Kafa area, the Bale Mountains National Park, and the Harenna Forest. Afromontane forests once covered large parts of Ethiopia and were a source of livelihood for millions of people. The Kafa is even considered a "Key Biodiversity Area" and was designated a Biosphere Reserve because of its significance as the birthplace of Arabica coffee. Remaining cloud forests support thousands of wild Arabica species (Mekonen et al. 2017). Coffee alone contributes 5 percent to Ethiopia's GDP and 30 percent of export earnings (Mengesha et al. 2020). Despite this and the area's significance, it is estimated that around 40 percent of forest cover was lost between 1988 and 2008, principally due to conversion for agriculture and exploitation for fuelwood and timber. Other factors include human encroachment, overgrazing, and mining (Mekonen et al. 2017; Wakjira 2015; Getahun et al. 2013). The result is increasingly fragmented, patchy, and poorly protected natural habitats (Martin and Burgess 2022).

A DfNS could redirect Ethiopia's debt repayments toward the protection of Afromontane forests before they vanish. The Seychelles experience shows how DfNSs can mobilize conservation financing while improving the livelihood of communities and economic activities dependent on those ecosystems. A DfNS could help mobilize the resources needed for forest rehabilitation while promoting the sustainable management of landscapes and the safeguarding of the last wild coffee forests—spurring interest from investors keen on greening their portfolios or on safeguarding this crop of immense global value.

A DfNS agreement is particularly relevant considering Ethiopia's high indebtedness and the global importance of its biodiversity. Ethiopia is one of Africa's high debt stress countries. As of June 2020, total public debt was about 57 percent of GDP, slightly more than half of which is external (African Development Bank 2021). Since 2017, the country has been classified

Figure 5 | Map of Ethiopian Biomes and Remaining Moist and Dry Afromontane Forests



Note: FRL = Forest Reference Level.

Source: MEFCC 2017.

as being at high risk of public debt distress due to weak export performance coupled with increased import-intensive public infrastructure investments. Expansion of public debt in the context of large public expenditure requirements could constrict the fiscal space and lead to repayment risks (AfDB 2021). The rating agency S&P Global recently cut Ethiopia's sovereign rating to "CCC+" from "B-," and Fitch downgraded it to "CCC" from "B," citing recent political instability and delays to debt structuring (Fitch Ratings 2021; Reuters 2021). A DfNS approach would draw on the linkage between reducing the country's debt and improving management and expansion of Ethiopia's protected areas. It would also allow Ethiopia to convert its international debt into its own currency (birr) and serve as a mechanism for "green" investments.

RECOMMENDATIONS

Experiences from other countries show that DfNSs require the involvement of a debtor, a creditor, and conservation investors, in addition to other supporting institutions. In the Ethiopian context, the government would be the debtor while the creditor could be either another country, a commercial bank, or a multilateral financial agency. Given its novelty, the involvement of development partners experienced in brokering DfNSs could help structure the deal while also reducing the risk of default. The Seychelles case shows the importance of a third-party conservation investor and partner in providing technical expertise. Notable institutions from the Ethiopian government side would need to be the MoF, the National Bank of Ethiopia, the Development Bank of Ethiopia, and MoPD. Academia and conservation organizations could then help provide the evidence on the feasibility, design, and impact of DfNS deals to different biospheres in the country. Finally, similar to the Seychelles, establishing an independent conservation trust fund to ensure that proceeds are invested for their intended purposes would be vital to the success of such an agreement.

Ethiopia should consider DfNS as a tool for restructuring its debt while meeting the conservation needs of its important biospheres and protected areas, and their associated forestscapes, landscapes, and watersheds. This is especially important in the aftermath of the COVID-19 pandemic and ongoing conflict, which have worsened the country's debt burden. DfNSs should include associated improvements to livelihoods with assistance programs for sustainable natural resources management that target local communities, along with strengthened enforcement and monitoring.

5. WAYS FORWARD: USING INNOVATIVE FINANCING TO USHER IN A NEW ERA OF WATERSHED MANAGEMENT IN ETHIOPIA

Natural capital is under increasing threat from human pressures and lack of investment. But nature has social and economic value with the potential to attract different sources of finance (Natural Capital Coalition 2021b). The need to safeguard natural resources at the basis of livelihoods and key productive sectors can help incentivize a conservation mentality (Liagre 2015). This investment case for nature is at the core of many PPPs, impact investing, and market-based approaches to conservation finance (World Bank 2020b).

There is great potential to pilot new, innovative financing mechanisms in Ethiopia to address the rate of resource depletion. But scaling investments in NBS and enhancing the watershed management agenda will necessitate addressing regulatory barriers and improving the general investment climate. Functional legal frameworks, particularly regarding private investment, tenure security, and a stable macroeconomic and political context, are critical (Chaturvedi et al. 2019). For instance, secure property rights strengthen PES transactions while a conducive regulatory environment for private investment promotes capital investments (Greiber 2009). Recent proclamations and legal and policy reforms show promise, including the PES and PPP propositions. Yet, political instability has implications for these issues and conservation efforts more broadly, as it shifts priorities and aggravates natural capital degradation with long-term consequences for people.

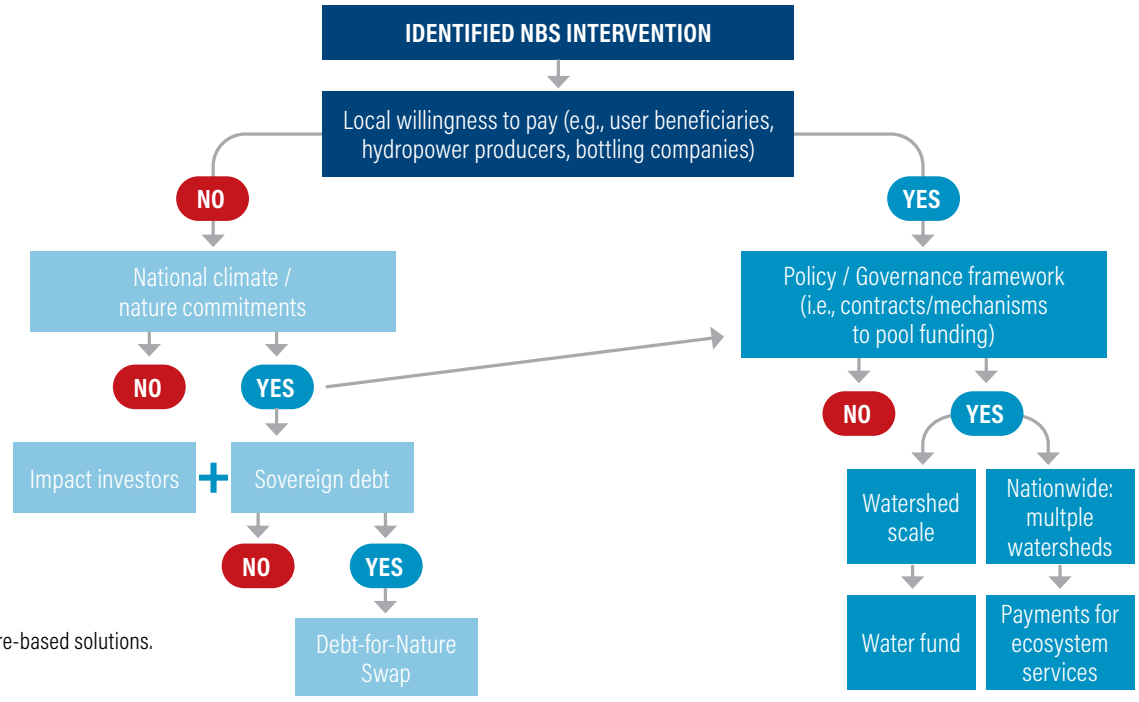
The mobilization and participation of resource users is fundamental to ensure that those driving harmful pressures on landscapes and habitats are considered when developing solutions. Implementing NBS needs local capacity and knowledge to design, plan, and carry out activities that align with biophysical and socioeconomic contexts. Bringing about enduring change in a landscape requires triggering continued adoption of conservation practices by resource users and local authorities, moving away from a project-by-project approach and setting conservation initiatives on a more sustainable path. Conservation must be

valuable to farmers, which implies meeting short-term subsistence needs while conserving the resource base to ensure its long-term ability to support livelihoods (Shiferaw and Holden 1998; Mengesha et al. 2020). Livelihood insecurity must be addressed together with environmental conservation (Mengistu and Assefa 2020)—promoting sustainable and inclusive development.

Despite the need for more innovative—including private—financing, public and donor contributions should remain vital sources of funding for conservation. Ethiopia, in fact, has demonstrated commitment through its pledge to the pan-African AFR100 to restore 15 million hectares of land by 2030. Other initiatives include the Green Legacy national restoration campaign, which aims to plant 20 billion seedlings by 2024; the CRGE Facility, which acts as a national climate fund; and more ambitious targets in the country's updated NDC. Ethiopia's NDC makes commendable commitments on climate action, but the resources needed to ensure a green economy, sustainable development, and climate-compatible development are vast: 20 percent of commitments are to be domestically financed (equivalent to $6.32 billion/year), while 80 percent require international support (Dagne Belay et al. 2021; EFCCC 2021). Diverse NBS finance approaches for Ethiopia can help generate new financial flows or reorient existing budget allocations toward conservation, thus representing fresh resources to finance or cofinance restoration and spur green investments. Figure 6 illustrates a simple decision tree and the steps to pursue for the proposed financial mechanisms in this paper.

There is increasing global interest in employing NBS to reduce water risks and deliver concurrent social, economic, and environmental benefits. The key is to deploy strategies that can value the cobenefits of NBS and integrate them in the decision-making processes of public agencies, development banks, financial institutions, NGOs, and conservation organizations to achieve their respective investment objectives. The process of valuing NBS benefits can increase the number of willing payers and motivate new actors. NBS investment must be piloted, proven, and thereafter mainstreamed into sovereign, subnational, and household decisions. Otherwise, NBS will continue to be the providence of conservation organizations as opposed to a vital solution to help achieve sustainable economic growth and livelihood security for generations to come.

Figure 6 | Simplified Decision Tree for Implementing a Water Fund, Payments for Ecosystem Services, or Debt-for-Nature Swap



Note: NBS = Nature-based solutions.

Source: Authors.

To fully seize the potential of NBS financing, action must be taken by public institutions and other actors, along with continued care at the level of operationalization. Key recommendations include the following:

- The Ethiopian government should bear initial risks when piloting new financing mechanisms and ensure clear regulations and compliance with agreements. It is critical that conservation and cross-sectoral collaboration be mainstreamed into ministerial policy and strategy, including, for example, aligning natural resources sectors with finance sectors, removing perverse incentives that may drive degradation (Ding et al. 2017; Mengesha et al. 2020), improving watershed management at the level of extension systems, and integrating watershed protection into the water supply development agenda. Furthermore, the government should contribute anchor and sustained funding streams, such as via partial tax, to support these efforts.
- Development partners, NGOs, and CSOs should encourage government agencies to explore new conservation financing instruments, and then support their execution, creating platforms for multistakeholder engagement and providing expertise in designing new programs and brokering new deals.
- Academic and research institutions must continue to develop the evidence base for the social, economic, and ecological benefits of NBS.
- Watershed actors, especially downstream end users of water—including cities, private sector operators, and others reliant on water and other natural resources—must be involved in upstream watershed conservation and landscape restoration (Juno and Pool 2020).

Finance and incentives remain key, both to initiate interventions and to secure the right conditions that encourage continued investment in ecological protection. Ethiopia needs a more resilient economy, and investing in ecosystem health and recovery presents a clear opportunity. This approach must include NBS investments that enhance the health of the country's freshwater ecosystems and landscapes and provide concurrent livelihood opportunities. The hope is to inspire new ideas, new initiatives, and—perhaps—even a third generation of watershed management programs in Ethiopia, on a pathway toward greater resilience and sustainability.

ANNEX A: KEY SEARCH WORDS RELATED TO WATERSHED MANAGEMENT IN ETHIOPIA

Agricultural vulnerability	Integrated watershed management
Climate change impact	Land degradation
Climate finance	Land use land cover change
Climate-smart agriculture	Land use planning
Community-based watershed development	Landscape management
Conservation policies and regulations	Livelihood vulnerability
Conservation practices	Natural resources
Deforestation	Nature-based solutions
Determinants of farmer adoption	Participatory watershed development
Economics of land degradation	Regreening
Ecosystem degradation	Sedimentation
Ecosystem services	Social safety net
Environmental degradation	Soil and water conservation
Food insecurity	Soil degradation
Forest degradation	Sustainable agricultural practices
Forest landscape restoration	Sustainable land management
Highlands	Water risks
History of watershed management	Watershed management
Innovative finance	Watershed services

ANNEX B: LIST OF INTERVIEWEES

NAME	ROLE	INSTITUTION
Tena Alamirew (PhD)	Deputy Director	Water and Land Resource Center, Addis Ababa University
Colin Apse	Director, Africa Freshwater Conservation	The Nature Conservancy
Maylin Mora Arias	Director, DAF-Turismo Sostenible	SINAC
Juan Pablo Perez Castillo	Head, Limon Regional Office	FONAFIFO
Slav Gatchev	Deputy Managing Director	NatureVest
Shiferaw Demissei Gemeda	Director, Water Administration Directorate	Ethiopian Ministry of Water and Energy
Bisrat Getachew	Senior Expert, Natural Resources Management Directorate	Ethiopian Ministry of Agriculture
Kibebework Getachew Eshete	Director, Forest Ecosystem Services Valuation and Carbon Measurement	Ethiopian Environmental Protection Authority
Fredrick Kihara	Director, Africa Water Funds	The Nature Conservancy
Dawit Wubishet Mulatu (PhD)	Senior Research Fellow and Consultant	Policy Studies Institute and World Bank, Ethiopia
Daniel Sullivan	Manager, Strategic Policy	City of Cape Town

ABBREVIATIONS

ADLI: Agricultural Development-Led Industrialization

CBPWD: Community Based Participatory Watershed Development

CSO: Civil Society Organization

CRGE: Climate Resilient Green Economy

DfNS: Debt-for-Nature Swap

EEPCO: Ethiopian Electric Power Company

EFCCC: Environment, Forest, and Climate Change Commission

ESIF: Ethiopian Strategic Investment Framework

FfW: Food for Work

FLCP: Free Labor Contribution Period

GDP: Gross Domestic Product

IGA: Income Generating Activity

LULC: Land Use Land Cover

MERET: Managing Environmental Resources to Enable Transitions

MEL: Monitoring, Evaluation, and Learning

MoA: Ministry of Agriculture

MoARD: Ministry of Agriculture and Rural Development

MoF: Ministry of Finance

MoWE: Ministry of Water and Energy

NDC: Nationally Determined Contribution

NBS: Nature-Based Solutions

NGO: Nongovernmental Organization

ODA: Overseas Development Aid

O&M: Operations and Maintenance

PES: Payments for Ecosystem Services

PSNP: Productive Safety Net Program

ROI: Return on Investment

SDG: Sustainable Development Goal

SLM: Sustainable Land Management

SLWM: Sustainable Land and Water Management

SLMP: Sustainable Land Management Program

SWC: Soil and Water Conservation

TNC: The Nature Conservancy

UTNWF: Upper-Tana-Nairobi Water Fund

WFP: World Food Program

WRM: Water Resources Management

WUA: Water User Association

GLOSSARY

Blended finance: In the sustainable development sector, blended finance is the strategic use of development finance, concessional donor funds, and catalytic capital from private, public, or philanthropic sources to mobilize additional finance or market-rate capital toward sustainable development objectives and/or to mitigate specific investment risk. This approach can improve the risk-reward profiles of investments that cannot advance on strictly commercial terms and provide financial returns to investors. The approach can also help enlarge the total amount of resources available to middle- or lower-income countries, complementing in-country investments and overseas development aid (ODA) inflows.

Bond: A fixed-income financial instrument that allows issuers to raise money from the capital markets by offering to repay bond proceeds over a specified term at an agreed-upon interest rate.

Conservation trust fund: A private, legally independent organization that bundles funding from international donors, governments, and the private sector to support conservation, restoration, and/or biodiversity efforts (adopted from "Conservation Finance Alliance" 2020).

Environmental degradation: The deterioration and depletion of natural resources such as air, water, and soil and the destruction of ecosystems, habitats, and wildlife due to or accelerated primarily as a result of human activity.

Ecosystem services: Commonly defined as the benefits, goods, and services people obtain from natural ecosystems that sustain human well-being. The Millennium Ecosystem Assessment identified four categories: provisioning services (the provision of food, fresh water, fuel, fiber, and other goods); regulating services (such as climate, regulation of water flows, disease regulation, and pollination); supporting services (such as soil formation, productivity and nutrient cycling, maintenance of biodiversity); and cultural services (such as educational, aesthetic, and cultural values as well as recreation and tourism) (Millennium Ecosystem Assessment 2005).

Green-gray infrastructure: Green-gray infrastructure refers to the strategic approach of combining "green" infrastructure or natural systems that provide an infrastructure service, like bioswales, rain gardens, floodplains, or forests, with traditional "gray" infrastructure, such as dams, dikes, roads, or water treatment plants.

Green investment: Green investing refers to investing activities aligned with environmentally and climate-friendly business practices and the conservation of natural resources. Investors can support green initiatives by buying green bonds, green mutual funds, or green index funds, by holding stock in eco-friendly companies or supporting companies that promote eco-friendly projects.

Green, social, and sustainability bonds are similar to traditional bonds but their use of proceeds must be allocated toward eligible projects as defined by their classification. These bonds are regulated by a set of principles outlined by the International Capital Markets Association. Issuers of green bonds must allocate their proceeds toward low-carbon, sustainable, or environmental projects. Social bonds require proceeds to support social

outcomes and can be used for health care, affordable housing, and other socially beneficial projects. Sustainability bonds are emerging on the market and represent a combination of both social and green bond criteria for use of proceeds.

Innovative finance: Innovative finance refers to both nontraditional forms of finance, like green bonds, and/or traditional finance mechanisms, like taxes or insurance, applied to nontraditional projects for development aid and/or nature-based solutions.

Land degradation: A negative trend in land condition caused primarily by human-induced processes and manifested in the long-term reduction or loss of biological productivity, ecological integrity, or value to people. Land-use changes and unsustainable land management are direct human causes of land degradation, with agriculture being a dominant sector driving degradation. Forest degradation is degradation and loss of forest landscapes, while watershed degradation reflects land degradation that also affects a watershed's natural hydrological processes.

Natural capital: Natural capital can be defined as the world's stocks of natural assets, which include soil, air, water and all living things. It is from natural capital that humans derive a wide range of services, often called ecosystem services, which make life possible (Natural Capital Coalition 2021).

Nature-Based Solutions (NBS): NBS refer to actions to restore, protect, or manage ecosystems to address societal challenges, simultaneously providing human well-being and ecological benefits. As an umbrella term, NBS comprises a number of activities including soil conservation, reforestation, source water protection, wetlands restoration, and agricultural best management practices.

Payments for ecosystem services (PES): PES is a term given to a variety of arrangements through which the beneficiaries of environmental services—such as watershed protection, forest conservation, carbon sequestration, and landscape beauty—pay or in other ways reward those whose lands provide these services, with subsidies, market payments, or other forms of compensation. Compensation is typically made to land users or landowners who agree to adopt certain actions to manage their lands to provide or secure an ecosystem service. PES is a market-based mechanism to encourage conservation.

Soil and water conservation (SWC): Activities and practices applied to help maintain or enhance the productive capacity of land, water, and vegetation in areas prone to degradation through prevention or reduction of soil erosion, compaction, and/or salinity; conservation or retention of water; and maintenance or improvement of soil fertility. In addition to preserving organic matter and enhancing land productivity, SWC helps manage and reduce surface runoff, protect susceptible areas like steep slopes, and shield downstream watercourses from sedimentation and pollution. SWC practices are implemented as part of watershed management.

Sustainable land management: Refers to the adoption of land-use systems, practices, and technologies aimed at the protection, restoration, and sustainable use of natural resources and the restoration of ecosystem functions. The use of land resources, including soils, water, and vegetation, aims to produce goods to meet human needs while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions. Appropriate management practices adapted to biophysical and socioeconomic conditions enable land users to maximize the economic and social benefits from the land while maintaining or enhancing ecological support functions.

Watershed degradation: Refers to the loss of the productive potential of land and water. Degradation is characterized by changes in ecosystem health and hydrological behavior resulting in inferior quality, quantity, and timing of water flow. With upstream and downstream areas in a watershed linked through hydrological processes that depend directly on precipitation, runoff, and land management, land use measures can impact the availability of water resources.

Watershed management: Watershed management describes a process that seeks to rehabilitate degraded soils and restore hydrological functions by implementing land-use practices and water management measures to protect and improve the quality of natural resources within a watershed boundary. Watershed management was initially considered almost synonymous with soil and water conservation but today goes beyond that to comprise additional actions that aim to improve the living conditions and livelihood opportunities of people living within a watershed.

Water security: The availability of water in sufficient quantity and quality to meet the needs of socioeconomic development, livelihoods, health, and ecosystems, together with an acceptable level of water-related risks to people, the environment, and economies (Grey and Sadoff 2007).

Watershed services: Ecosystem services related to water quantity and quality benefits, including the provision of adequate water supply, water purification, erosion control, aquifer recharge, flood control, flow regulation, and riverbank stabilization.

ENDNOTES

1 Land degradation is a negative trend in land condition manifested in the long-term reduction or loss of biological productivity, ecological integrity, or value to people. In this paper, land degradation refers primarily to physical and biological degradation of soils and landscapes. We use watershed degradation to reflect land degradation that also affects a watershed's natural hydrological processes, and environmental degradation as a larger process indicating the deterioration and depletion of natural resources, including air, water, soil, and forest, and the destruction of ecosystems, habitats, and wildlife due to or accelerated primarily as a result of human activity.

2 Many techniques are used to restore degraded lands, from capturing water in soils to growing trees on slopes or farms. These techniques are known by different names: landscape restoration, watershed management, climate-smart agriculture, and more. In this paper, we refer to watershed management and landscape restoration almost interchangeably but use "watershed management" to imply a sustainable land management and restoration effort that uses the watershed boundary as the planning and implementation unit to reclaim both productive and hydrological functions.

3 The term "sustainable" is broadly meant to reflect a condition wherein natural and socioeconomic systems survive and flourish together over the long term.

4 The authors refer to NBS primarily in relation to "NBS for water," focusing on measures that can help maintain or improve watershed services like water supply and erosion and flood control, and thus maintain watershed health.

5 In this paper, "case study" refers to the more in-depth, detailed examination of a real-world country case examining the occurred adoption and application of a NBS financing strategy. On the other hand, the term "use case" denotes the preliminary examination of the application of a strategy or model to a particular location or context in Ethiopia. Use cases remain speculative as they have not occurred or been adopted yet.

6 Land and forest restoration interventions in Ethiopia have recently been financed through programs like the Productive Safety Net Program (PSNP). The PSNP was launched in 2005 as a social safety net to reduce dependence on emergency food aid, providing food and cash transfers to millions of beneficiaries in exchange for labor on public works—including landscape restoration (Solomon et al. 2018). The PSNP complements Ethiopia's Free Labor Contribution Period (FLCP) Program, which involves woreda and kebele administrations organizing community labor for land restoration work. Further, in 2008, the Ethiopian Strategic Investment Framework (ESIF) for Sustainable Land Management was developed as an umbrella planning and partnership framework to coordinate and align government and development actors across SLM interventions. From the ESIF emerged the phased sustainable land management programs (SLMPs), funded through International Development Association contributions and other donors (World Bank 2020a). SLMP Phases I and II adopted an integrated landscape management approach at watershed level, with watershed management supported alongside land certification and institutional strengthening. Now in its third phase, the SLMP continues to place strong emphasis on watershed rehabilitation and the conservation of agro-ecosystems along with increasing emphasis on economic viability (World Bank 2022). Note: woreda is the equivalent of a district while kebele is the next level down, similar to a ward, village, or community. Both are local-level administrative units under zone and region in the Ethiopian government administrative structure.

7 In this paper, "success" is understood in a number of ways: A successful watershed management initiative is one that delivers environmental and socioeconomic improvements over time; for example, land users or managers continue to use conservation practices after the exit of external support. Or, "success" can imply that conservation practices have been mainstreamed and incorporated into policy and official practice. A successful innovative financing strategy is one that has involved a transaction or agreement for environmental protection outcomes, such as cleaner or more reliable water supplies, and provided positive returns to relevant parties, whether financial or other.

8 Meaning the leasing and renting of real assets such as machinery.

9 Translated to "National System of Conservation Areas."

10 To note, there are also commodity market factors that influence whether or not DfNS is an appealing tool to deploy.

11 This includes relevant institutes in the universities, such as the Water and Land Resource Center at Addis Ababa University (AAU), and other international research institutes like the International Water Management Institute or World Resources Institute.

12 Examples of early sedimentation of reservoirs are exemplified by the Koka Dam. It is estimated that over 30 percent of the total storage volume has already been lost, which has had a negative impact on the annual energy generation from the plant (Gebreselassie et al. 2016).

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ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our Challenge
Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision
We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach
COUNT IT
We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT
We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT
We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.