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# Nature-Based Solutions in Latin America and the Caribbean

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FINANCING MECHANISMS FOR REGIONAL REPLICATION

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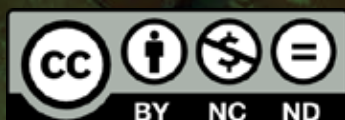
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An aerial photograph of a city street, showing buildings with red and brown roofs, trees with green and yellow leaves, and cars on the road. The image is rotated 90 degrees clockwise. A semi-transparent dark green rectangle is overlaid on the right side of the image, containing the table of contents.

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## Highlights

- Nature-based solutions (NBS), which enhance, restore, and protect natural ecosystems, can contribute to sustainable economic growth and inclusive development, and can buffer society against the impacts of climate change.
- NBS can provide a multitude of benefits: they can save money, generate attractive returns for investors, increase resilience and protection of communities and infrastructure, and enhance natural capital assets.
- Despite these benefits, NBS face a significant investment gap. Public and philanthropic sources alone do not meet the need. Consequently, NBS are not achieving their full potential.
- New financing models can leverage these traditional funding sources with the growing financial commitments for nature from the private sector, unlocking billions of dollars earmarked for green investments.
- This report aims to connect unmet NBS investment needs in Latin America and the Caribbean (LAC) with new financial resources. It highlights five strategies that leverage private capital to finance NBS. These include green bonds, land-based financing strategies, blended market-rate and concessional loans, insurance policies, and endowments.
- To adopt these strategies and support investment in NBS, LAC will need new partnerships to build relationships among diverse actors, additional science and proof of concept, stronger governance and more capacity, dedicated and consistent funding streams, and more robust policies that prioritize NBS.

# EXECUTIVE SUMMARY

## The Emergence of Green Finance Offers Untapped Opportunities for Nature-Based Solution Investments in Latin America and the Caribbean

**The LAC region is grappling with pandemic-related recessions, severe economic and social impacts from climate change, and inadequate and outdated infrastructure.** Environmental degradation, land conversion, and lack of investment (Alpizar et al. 2020) also threaten natural ecosystems vital to key industries in LAC, such as tourism, agriculture, forestry, and fishing, endangering the region's long-term recovery. Strategic investments in healthy, well-functioning ecosystems can buttress populations against these mounting threats and nurture economic growth.

**Nature-based solutions refers to the “strategic restoration, protection, or management of ecosystems to intentionally address societal challenges” (Cohen-Shacham et al. 2016).** NBS depend upon a country's natural capital assets like soil, plants, and air (Convention on Biological Diversity 2018). This paper focuses on NBS opportunities that target specific infrastructure needs and outcomes, such as restoring forests to improve water supply or protecting coral reefs to reduce flood risk.

**LAC's infrastructure needs are estimated to be between US\$179 billion and \$313 billion annually (Cavallo et al. 2020).** To meet these needs and spur economic recovery and unlock inclusive economic and job creation, governments across LAC are seeking multifaceted infrastructure investments with high multiplier effects (Izquierdo et al. 2020). NBS can provide these by replacing or complementing gray infrastructure, such as dams, pipes, seawalls, roads, and treatment plants. The combination, commonly referred to as “green-gray” infrastructure, can be more cost-effective and sustainable than traditional, gray infrastructure alone (Browder et al. 2019). NBS enhances these investments by helping deliver essential services like water and energy, safeguard built infrastructure, reduce costs over the long term, and create opportunities to generate revenue. In addition to the economic benefits, NBS can help countries

reach their Sustainable Development Goals (SDGs) and nationally determined contributions pledged under the Paris Agreement.

**To fully realize the potential of NBS, the private sector will need to contribute financially.** Public coffers are insufficient to meet the investment need for NBS and infrastructure projects. While governments recognize the multitude of public benefits NBS provide, such as helping adapt to the impacts of climate change or safeguarding biodiversity, public and donor budgets are constrained or shrinking. For example, the global investment gap for biodiversity alone is projected to be between \$598 billion and \$824 billion per year for the next 10 years (Lovejoy et al. 2020). Private sector actors need pathways to accelerate investment in NBS to help close this funding gap.

**To unlock green finance, NBS projects must tackle challenges to bankability and scalability.** Investors want more large-scale and bankable, investment-ready projects that can generate revenue or provide cost savings. They need better performance data on how and when nature will deliver results, business cases demonstrating financial returns, and the lower transaction costs that large-scale (high dollar-value) or replicated projects can provide (Watkins et al. 2019; Cooper and Trémolet 2019). NBS project developers, such as nongovernmental organizations (NGOs) and governments, need more capacity and resources to develop such “investment-ready” projects, and they need policies that better incorporate NBS into infrastructure planning (Silva et al. 2021). There are examples of successful NBS projects that have secured private capital or accessed the capital markets and demonstrated strategies to mainstream NBS investments in LAC and bridge the pervasive divide between finance and nature.

**Fortunately, the pool of green finance, private sector funds earmarked for environmental and climate-related investments, is rapidly growing.** A new coalition of institutional asset managers and investors aims to raise \$10 billion for nature (Golden 2021). Twenty-five of the world’s largest banks have set aside sustainable finance commitments (Pinchot and Christiansen 2019). New regulatory frameworks and initiatives stemming from the SDGs and the Paris Climate Agreement, such as Europe’s Sustainable Finance Disclosure Regulation, have fueled a growing market for environmentally sustainable investments (Cooper and Trémolet 2019). This demand for environment, social, and governance investing creates

a promising opportunity for NBS and green-gray infrastructure. The urgent challenge, then, is to bring worthy NBS projects together with investment funds seeking these kinds of opportunities.

## About This Issue Brief

**This issue brief reviews five NBS financing strategies alongside six successful case studies where NBS projects unlocked private capital or accessed capital markets.** The strategies presented serve as guideposts for NBS project developers seeking finance, governments pursuing financing for infrastructure models that protect nature and promote resilience, and green financiers searching for sustainable investments that can deliver environmental, social, and economic returns. This paper also reviews the necessary steps to transfer these financing strategies to LAC to overcome low credit ratings, high ratios of debt to gross domestic product, weak governance structures, and legal and political barriers. The solutions include helping to prepare investment-ready projects, demonstrating the value of NBS to investors and infrastructure planners, and adopting policies that prioritize NBS.

**The case studies represent NBS opportunities for a range of infrastructure regions and sectors (energy, water and sanitation, and housing and urban development).** The authors compiled the list of case studies by conducting desktop research on conservation finance websites and reports (list in Appendix C), documenting the state of play of NBS projects in LAC, and consulting with NBS project developers. The list was refined to identify the strategies most transferable to replicate in LAC because the financial instrument or strategy (e.g., green bonds or blended finance) is already being used in the region.

**This brief is one in a three-part series of knowledge products that aim to set an agenda for key decision-makers and investors on why and where in LAC to invest in NBS, and to provide guidance on how to set enabling conditions for scaling NBS.** The series explores the current status and trends of NBS activities—both broadly throughout LAC and more specifically in operations of the Inter-American Development Bank (IDB)—to establish a baseline from which decision-makers can build to drive increased support for NBS. The series also explores the institutional, economic, and financial conditions required to scale up NBS investment and outlines strategies to apply them to the LAC context. This series includes two other issue briefs:

**“Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank,”** which reviews 28 green-gray and NBS projects in the IDB’s Infrastructure and Energy Sector and Climate Change and Sustainable Development Sector, as well as knowledge and capacity-building efforts across the IDB, to help clients routinely generate NBS concepts in project design and successfully finance and implement NBS projects.

**“Nature-Based Solutions in Latin America and the Caribbean: Regional Status and Priorities for Growth,”** which identifies 156 projects throughout LAC that utilize NBS either on their own or in combination with gray infrastructure to address water quantity and quality concerns; reduce urban, coastal, and river flooding; or reduce landslide risk. Over half of the projects are still under preparation. The others have started implementation. Across the board, most projects are still seeking funding to ensure that they can reach the scale that delivers the benefits they envision. This brief takes stock of NBS activities in the region, outlines their potential to contribute to progress on the SDGs, and identifies key barriers to and opportunities for growth and scaling.

**This series is intended for a broad range of stakeholders who are key to advancing NBS,** including national and subnational governments, infrastructure operators, donors, development banks and other financial institutions, and civil society. This work was produced by the Inter-American Development Bank and World Resources Institute with support from Cities4Forests, the FEMSA Foundation, and the Pan-American Development Foundation.

## Strategies to Finance NBS

**The report explores five key strategies through a review of six case studies where NBS projects successfully secured financial support.** The case studies present potential strategies for other NBS projects to pursue to secure funding or finance. As the report reveals, the success of these projects hinged on key enabling political, regulatory, and social conditions. Table ES-1 highlights the five financing strategies utilized in the case studies, and the financing instruments and repayment mechanisms (where applicable) that unlocked finance for NBS.

Playa Del Carmen, Mexico. Photo by dronepicr



**Table ES-1 | SUMMARY CHARACTERISTICS OF THE FINANCING STRATEGIES TO ADVANCE NBS**

FINANCING STRATEGY	INFRASTRUCTURE SECTOR	CASE STUDY	FINANCING INSTRUMENT(S)	PROJECT INVESTMENT SIZE	FUNDING/ REPAYMENT MECHANISM*	LOCATION	NBS OR GREEN-GRAY COMPONENTS
Debt finance	Water and sanitation	Dutch sovereign green bond	Sovereign green bond	€5.985 billion (US\$6.68 billion)	Taxpayers*	Netherlands	Green-gray infrastructure to establish nature preserves and reinforce dikes as flood defense
	Water and sanitation	Central Arkansas Water green bond	Green bond	\$31.8 million	Watershed protection fee (ratepayer fee)*	Arkansas, United States	Green-gray approach to protect forests for water quality and improve water delivery through pipeline upgrades
Blended finance	Energy; water and sanitation	Forest Resilience Bond	Concessional and market-rate loans	\$4.6 million	Ratepayer fees + state funding (taxpayers)*	California, United States	Forest restoration to reduce catastrophic wildfires
Policy frameworks	Housing and urban development	SAC Tacubaya	Land-based financing mechanisms	~425 - 1,549 million pesos (\$22 - 81 million)	Developer fees	Mexico City, Mexico	Green-gray infrastructure to reduce stormwater runoff through bioswales (etc.) and improve water delivery through pipeline upgrades
Financial risk mitigation	Housing and urban development	Quintana Roo's insurance policy for coral reefs	Conservation trust fund + insurance policy	\$3.8 million (maximum payout)	Tourism operators' earmarked fees	Quintana Roo, Mexico	Restored beach and coral reef as disaster risk mitigation
Funding diversification	Water and sanitation	Fondo para la Protección del Agua (FONAG Water Fund)	Utility/company contributions + endowment	\$21.5 million (endowment size)	Utility/company income	Quito, Ecuador	Restored watershed to improve water quality

\* Repayment mechanism includes only debt-financing instruments, which require return payments.

Source: Authors.

**Strategy 1: Debt finance. Green bonds are emerging as a fast-growing sector in the bond market, offering investors a familiar vehicle to allocate capital toward their sustainability commitments.**

Green bonds differ from traditional bonds in that they require that proceeds support environmental or low-carbon investments. Green bonds are now one of the most popular financing mechanisms for green capital allocations because investors are familiar with this fixed-income instrument, trading platforms are well established, and price discovery and reporting are increasingly transparent (Cooper and Trémolet 2019). Green bond issuance can be an effective tool for accessing capital for green-gray infrastructure investments as they broadly comply with international taxonomies of eligible activities for these instruments.

Two case studies demonstrate the success of using green bonds to finance NBS:

- The Dutch government issued a €5.985 billion (\$6.68 billion) sovereign green bond, which offered a cost-effective way to finance green-gray infrastructure, including nature reserves and upgraded dikes, to protect against flooding.
- Central Arkansas Water issued a \$31.8 million certified green bond to finance green-gray infrastructure. The proceeds of the bond were allocated to forest acquisition costs to protect the forested watersheds for water quality, and to increase the efficiency of water delivery through pipeline upgrades.

Green bond issuances are increasingly common in LAC, with 13 out of the 33 countries participating in the market (CBI 2020; IDB and GBTP 2021). As

of December 30, 2020, Chile, Mexico City, and the Argentinean provinces of Jujuy and La Rioja are currently the only sovereign and subnational issuers of green bonds (CBI 2019b; IDB and GBTP 2021). While bonds are important instruments for financing green-gray infrastructure projects, investor appetite for emerging market debt, respective credit ratings, and the institutional capacity and ability to issue capital market debt are some of the hurdles to the growth of the LAC market. To enhance the creditworthiness of sovereign nations and subnational governments, national, central, and multilateral development banks can support these entities through credit-enhancing guarantees (assurances to cover losses) and/or first-loss options (promising to absorb losses before other lenders do). However, subnational governments in LAC often do not have direct access to the bond market, due to federal regulations currently impeding access, and thus must rely on sovereign or direct lending by multilateral development banks for resources. New policies and structural reforms that strengthen fiscal capacity, accounting practices, and transparency could enhance credit ratings and access to this market.

Governments and other potential green bond issuers face the additional challenge of identifying a pipeline of NBS projects in their budgets eligible for green bond proceeds. Prioritizing NBS in budget allocations, procurement tenders, and infrastructure capital planning projects can help. For more information on qualifying green-gray infrastructure projects, see another issue brief in this series, “Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank” (Oliver et al. 2021).





**Strategy 2: Blended finance. Blended finance can catalyze market-rate investment in NBS.** Many NBS projects are attempting innovative approaches to water security and disaster risk management. Because they are new, these options face more complexity or higher risks than traditional infrastructure. However, the benefits of NBS can be substantial and can accrue to multiple sectors and communities. At this early stage of adoption, NBS need backing by multiple stakeholders to recruit the necessary financial support.

A blended finance approach can provide the risk-mitigation tools to address NBS uncertainty and/or promote the commercial viability of NBS projects. The strategy uses public or philanthropic capital (known as “catalytic capital”), which can accept lower returns, take on higher risk, or bear higher costs, to encourage the private sector to invest in green-gray infrastructure projects, spurring lending that would have previously been infeasible. In California (United States), a mix of concessional and market-rate loans for disaster risk mitigation paid for the \$4 million up-front costs of improving forest health on public lands to reduce the risk of catastrophic wildfires and improve delivery of water and energy services for a downstream utility. In LAC, development banks, bilateral and multilateral organizations, foundations, and governments can provide this catalytic capital to help mobilize private investment for NBS projects.

**Strategy 3: Policy frameworks. City-led, land-based financing instruments, such as building rights transfers and developer fees, can generate revenues to finance green-gray infrastructure.** These instruments raise revenues by charging fees for

the right to build or by billing developers for the extra costs associated with delivering additional public services. This strategy is most successful in cities with a growing demand for development, transparent and inclusive governance structures, and strong urban planning. The Tacubaya neighborhood of Mexico City is using land-based financing tools to generate revenue for proposed affordable housing, sustainable transportation, and green-gray infrastructure investments, such as improved water supply through catchment and recycling solutions. Funding has supported feasibility studies for NBS enhancements to drainage and stormwater capacities in public spaces, which included rain gardens, bioswales, and bioretention lagoons.

Land-based financing for infrastructure is well established in LAC, including in cities in Brazil, Argentina, and Colombia. As cities begin to incorporate disaster risk and climate change into planning and policies, land-based financing mechanisms can serve as a critical revenue raising tool to fund new NBS and green-gray infrastructure projects that address these challenges. For instance, Santa Fe, Argentina, is utilizing land-based financing mechanisms, like betterment levies, to cofinance green-gray infrastructure for flood risk mitigation. The city performed a feasibility assessment to evaluate the effectiveness of additional tree cover, new vegetated areas, runoff reduction systems, and floodable public spaces for absorbing excess water during flood events. As cities develop such plans, it is critical that urban planning policies permit investment into alternative infrastructure, like NBS. More studies are needed to demonstrate the value and economic case for investing in resilient green infrastructure.



**Strategy 4: Financial risk mitigation. The insurance industry can provide knowledge to gauge the potential benefits of NBS.**

The industry's standardized models and simulations can generate up-front estimates of project-based risk reductions, which can then be translated into project returns and potential revenue. Insurance models for disaster risk are well accepted by investors and are already used to price risk in capital markets. This established industry research thus plays a critical role in helping to mainstream NBS. In the Mexican state of Quintana Roo, the Trust for Coastal Zone Management, Social Development, and Security (CZMT) purchased an insurance policy designed to make payouts after high-wind storm events to restore damaged coral reefs, which provide a critical buffer against tropical storms. These insurance policies can mitigate disaster risk if payouts are reinvested in NBS that protect communities and physical infrastructure. These policies require scientific and climate modeling data for design and payout structuring and work best in countries with strong governance structures and established insurance markets. Efforts are underway to replicate such policies elsewhere along the Mesoamerican Reef for coral reefs, beaches, and mangroves.

**Strategy 5: Funding diversification. Current NBS projects can increase financial security by diversifying funding streams to weather economic downturns.**

Grant and donor funding currently underpin most NBS projects in LAC. These funding sources can be inconsistent in duration and size, leaving many NBS projects in peril of failing to secure sufficient funding to meet projects' costs for planning, implementation, maintenance, and ongoing impact monitoring and evaluation. To enhance their financial security, NBS projects need to diversify their funding streams and tap into revenue-generating models, like an endowment. Endowments are funds invested in capital markets to provide returns to support endowed organizations. In Quito, Ecuador, the Fondo para la Protección del Agua (FONAG, a water fund) grew its endowment from \$21,000 to \$21.5 million over the course of 20 years. Endowments can shore up the financial security of organizations, such as conservation trust funds and water funds, that invest in NBS and natural capital assets. Two conditions are necessary for establishing an endowment: (1) organizations need to set aside funds for future gains rather than short-term project or organizational needs and (2) donors need to be willing to commit funds to an endowment to boost an organization's fiscal security as opposed to its on-the-ground impacts.

## Recommendations

The strategies highlighted in this brief showcase ways NBS can become more financially viable by applying new funding models and accessing diverse funding sources. These strategies can help to mainstream NBS, deliver the multitude of co-benefits to communities, businesses, and governments, and usher in a more sustainable, resilient future. The following steps will help increase private sector participation and unlock new and diverse funding streams:

1. **Incorporate NBS into planning and policies** to make identifying high-value, feasible NBS a routine part of infrastructure project preparation, creating a pipeline of investment-ready NBS projects.
2. **Integrate NBS into familiar infrastructure financing models**, like green bonds or land-based financing mechanisms, to meet the minimum investment thresholds, lower transaction costs through project aggregation, and increase investor acceptance of and familiarity with NBS.
3. **Increase ease and efficiency of identifying eligible NBS projects in government budgets for green bond issuances.**

4. **Increase certainty and consistency of cash flows to increase investor confidence in repayment.**
5. **Increase monetization of NBS.** Monetizing the value of NBS co-benefits can provide additional revenue streams to support the financial and commercial viability of NBS.
6. **Demonstrate performance metrics and proof of concept.** Ongoing performance monitoring and evaluations are needed to verify that expectations are met and provide proof of concept to investors.

While barriers persist to funding NBS, multiple avenues can open the way and accelerate progress toward accessing finance. New policies that prioritize NBS and integrate them into traditional planning and financing processes can support higher adoption rates. Greater clarity and data around NBS performance, business rationale, and scientific modeling can reduce information asymmetries among NBS project developers, infrastructure service operators, policymakers, and investors. Trusted private sector actors, like insurance companies, can validate the business rationale for investing in NBS as a resilience strategy to mitigate climate and disaster risk. Funds earmarked for sustainable investments can leverage public and philanthropic expenditures, unlocking new sources of finance for NBS and green-gray infrastructure.



Salina Cruz, México Photo by BID Ciudades Sostenibles.



# INTRODUCTION

Nature-based solutions (NBS) can offer cost-effective strategies to tackle infrastructure needs, address climate mitigation and adaptation goals, meet biodiversity targets, and strengthen community resilience against natural disasters. The term nature-based solutions refers to the “strategic restoration, protection, or management of ecosystems to intentionally address societal challenges” (Cohen-Shacham et al. 2016).

In this brief, NBS are targeted at specific infrastructure needs and outcomes, for instance, restoring forests to enhance water quality or protecting coral reefs to reduce flood risk. These strategies can deliver multiple economic and ecological co-benefits such as creating jobs, preserving resources, and lowering the cost of delivering infrastructure services. NBS can also provide monetized benefits to channel into larger-scale financing, enhancing human health and wellness, increasing food and water security, and improving habitat and biodiversity (Browder et al. 2019).<sup>1</sup>

Latin America and the Caribbean (LAC) are well positioned to mainstream NBS, both to protect and enhance natural capital resources and to fuel inclusive economic growth. The region hosts over 40 percent of the world's biodiversity (Bovarnick and Alpizar 2010), 12 percent of its mangrove forests, 10 percent of its coral reefs, and its largest expanse of wetlands (UNEP-WCMC 2016). These natural capital resources are intrinsically linked to economic growth in LAC. Many countries in the region depend upon healthy ecosystems to produce commodities for domestic consumption or export (agriculture, forestry, fisheries, etc.), support tourism, and deliver essential services (like drinking water) (Bovarnick and Alpizar 2010; Pinzón et al. 2020). Yet these natural assets face mounting threats from environmental degradation, land conversion, and lack of investment (Alpizar et al. 2020).

The investment gap in natural assets needs to be addressed. Despite a 24 percent increase in annual climate finance in 2017–18 over 2015–16, the forestry, agriculture, and natural resource sectors only secured 3 percent of all tracked climate finance in 2017–18 (Buchner et al. 2019). A landscape assessment of public international funding, which included climate finance and official development assistance funds, estimated that NBS adaptation projects accounted for only US\$3.8 billion to \$8.7 billion (0.6–1.4 percent) out of the \$579 billion total climate finance flows in 2018

(Swann et al. 2021). NBS projects are not securing significant funding and thus are not achieving their full potential.

With pandemic-related economic hardships shrinking donor budgets, diversifying NBS funding streams is becoming all the more urgent. A companion brief in this series, “Nature-Based Solutions in Latin America and the Caribbean: Regional Status and Priorities for Growth,” finds that the bulk of funds that support LAC's NBS projects come from grants (Ozment et al. 2021). Of 156 NBS projects in LAC, 56 are exclusively grant-funded, 42 are partially grant-funded, and 91 are seeking additional funding or financing (Ozment et al. 2021). Only a few projects managed to monetize the value of NBS for beneficiaries. Failure to do this hindered their capacity or ability to secure contributions from these beneficiaries, including infrastructure service providers and other potential funders. To address the scale of infrastructure need, more NBS projects must become bankable (investment-ready), scalable, and tap into private investment and capital markets.

The money is out there, waiting to be tapped. Institutional investors are committing an ever-growing share of their portfolios to sustainable or “green” investment strategies. In 2021, a coalition of investment asset managers, including HSBC Pollination Climate Asset Management, Lombard Odier, and Mirova, announced a commitment to raise \$10 billion for nature by 2022 (Rust 2021). An international group of asset managers launched the Net Zero Asset Managers Initiative, which includes over 128 signatories with \$43 trillion in assets under management, committed to supporting the goal of net zero greenhouse gas emissions by 2050 or sooner (Net Zero Asset Managers Initiative 2021). These sustainability commitments are motivated by a growing understanding that sustainable investments can reduce risk, enhance portfolio resilience, boost profits, and safeguard reputations (Cooper and Trémolet 2019).

In addition, a survey of over 161 asset owners, asset managers, and financial intermediaries found that new regulations stemming from the SDGs and the Paris Climate Agreement have fueled demand for sustainable investments (Cooper and Trémolet 2019). These investors also want to move beyond climate and carbon targets, to preserving natural assets such as clean water, forests, and biodiversity (Cooper and Trémolet 2019). The Task Force on Nature-Related Financial Disclosures, a new global initiative to meet the growing interest in sustainable investment, has endorsements from over 68 financial institutions, corporations and private firms, consortiums, and governments. They have directed it to develop a framework to incorporate nature-related risks and opportunities into the decision-making processes of companies and financial institutions (TNFD n.d.).

Despite these needs and opportunities, and the growing availability of private funding, NBS represents a small niche in the sustainable finance market (Cooper and Trémolet 2019). Current private sector funding for NBS in LAC mainly comes from corporations as part of their corporate social responsibility targets and sustainability initiatives (Watkins et al. 2019), as opposed to key investment opportunities that deliver financial returns or are used as risk-mitigation tools.

NBS projects face several challenges to securing private sector capital. Community-led NBS projects often consist of small deal sizes, which can fail to reach the \$5 million minimum threshold to unlock institutional capital (Studer 2020). Their being tailored to the local context and stakeholders promotes social inclusion, but it also increases their lack of homogeneity, which can increase transaction costs for investors. In addition, NBS projects often lack historical performance data to measure risk and provide confidence in expected returns. Finally, these projects can have long return profiles, requiring long-term financing options. For example, forests offer cost-effective water filtration services but require time to establish to prevent increased runoff, and cost savings associated with this investment thus can take years to realize.

Fortunately, a number of encouraging case studies of bankable NBS projects from across the globe offer guidance to enhance the future success and impact of NBS. Many of these examples are from developed countries and may not yet be easily replicable in countries with weaker institutions, limited access to capital markets, and a lack of NBS performance data. However, the sustainable finance market is growing swiftly, presenting new opportunities to test innovative financing mechanisms for NBS in LAC.

## METHODOLOGY

This report examines six case studies of successful efforts that are unlocking private capital or accessing the private markets to mainstream NBS in LAC. The examples that follow cover different geographies, investment objectives, and infrastructure sectors (energy, water and sanitation, and housing and urban development).

A list of case studies was compiled by conducting desktop research on conservation finance websites and reports (list in Appendix C), documenting the state of NBS projects in LAC, and consulting with NBS project developers, development bankers, and investors. The list was narrowed to case studies with accessible data, and then further refined to include financial instruments or strategies that could be replicated in LAC. For instance, green bonds or blended finance are already being used in the region and could be used more widely. Subsequent phases of this research can highlight additional case studies showcasing additional NBS financing mechanisms.

The conclusions drawn from the six studies offer key insights for how to advance NBS projects in LAC toward bankability and financial security. They also distill recommendations for key actors in LAC to encourage a more robust NBS agenda.

# 1. DEBT FINANCE THROUGH GREEN BONDS

To make large-scale infrastructure investments, governments and infrastructure operators need to raise capital for up-front project costs that can be repaid over a long time horizon. Bonds offer a solution. They have long been used to finance long-term infrastructure investments. These fixed-income debt instruments are well understood by investors. Markets for trading them are well established, providing high liquidity and relatively low transaction costs (Studer 2020). They enable issuers to aggregate financing needs for small projects into one financial instrument to achieve scale. With the emerging success of green bonds (Box 1), investors can channel green capital into green-gray infrastructure projects.

## Box 1 | GREEN BONDS

While there is no universal definition of what constitutes “green,” different taxonomies, standards, and principles provide guidance and reference to the market. In 2016, the International Capital Market Association (ICMA) developed the voluntary Green Bond Principles (GBP), which require green bond proceeds to be allocated to climate mitigation or adaptation projects, broadly defined for their environmental impacts. According to the GBP, issuers must declare how proceeds are managed and used, and articulate the process for project evaluation, selection, and reporting (Mulder 2018). To assure investors of projects’ “green” credentials and avoid the possibility of “greenwashing,” the Climate Bonds Initiative developed more detailed asset standards and a certification process that requires third-party verification of the green bond framework, use of proceeds, and scoring of incorporation of climate and risk vulnerabilities into business operations.

In addition to green bonds, ICMA has recently developed principles for sustainability and social bonds. These taxonomies have been applied since 2020 and further differentiate the use of proceeds for investors (Harrison and Muething 2021). Social bonds allocate proceeds to social projects, and sustainability bonds allocate proceeds to both green and social projects (Harrison and Muething 2021). This report focuses only on green bond issuances for NBS due to the maturity of the market. Future studies should include an examination of sustainability bond issuances as their taxonomy also includes NBS and green-gray infrastructure in its eligibility requirements.

Currently green bonds are the most popular debt instrument for allocating green investor capital (Cooper and Trémolet 2019), and supply is increasing to meet that demand. The Climate Bonds Initiative (CBI), a nonprofit focused on mobilizing the green bond market, estimates that global cumulative issuances surpassed \$1 trillion in early 2021 (CBI 2021a), a mere 14 years after the first green bond was issued.

Thirteen of LAC’s 33 countries have issued green bonds as of December 30, 2020 (IDB and GBTP 2021), and the market is growing. CBI estimated that the LAC green bond market reached \$7.9 billion in 2020, up 65 percent since 2019 (Harrison and Muething 2021). More than half of the total originated from Chile, including four sovereign bonds worth \$3.8 billion (Harrison and Muething 2021). Most green bond proceeds in LAC are earmarked for transport (51 percent), followed by energy (28 percent), and buildings (9 percent). Land use represents 8 percent of the total allocations (Harrison and Muething 2021). All of these sectors have great potential to incorporate NBS, further detailed in another issue brief in this series, “Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank” (Oliver et al. 2021). As investors become more familiar with the “green” characteristics of these bonds and seek investments that better track to SDGs, climate, and natural capital, demand may increase for bonds that earmark proceeds for NBS explicitly.

## CASE STUDY: The Netherlands’ Sovereign Green Bond

### SUMMARY

National governments can issue sovereign green bonds to raise capital and use tax revenue to pay interest to investors. This financial instrument is appropriate for financing NBS projects that might otherwise be hampered by uncertainty over performance, cash flows, deal size, or track records. Sovereign green bonds can showcase the environmental benefits of NBS to investors, while relying on the issuer’s credit strength to raise the needed funds.

In 2019 the Dutch issued a 20-year bond for \$6.68 billion. The bond was oversubscribed (over 3.5 times) and proceeds were allocated to a well-established set of NBS and traditional infrastructure projects.



## BACKGROUND

The people of the Netherlands have always lived with the threat of floods. Since the Middle Ages, they have engineered green and gray solutions, like dikes, dams, and floodplains (van Alphen 2020). In the 2000s, vulnerability assessments revealed that many flood defenses were not up to code, spurring political action to develop a dedicated program, the Delta Programme, with an annual budget of €1.3 billion (~\$1.45 billion), known as the Delta Fund (Ministerie van Infrastructuur en Waterstaat 2014, n.d.; Jordan 2019; Boonman 2021). With over a decade of consistent funding invested in flood-related stakeholder engagement, spatial analyses, and project design and implementation, the Dutch curated a suite of hybrid green-gray infrastructure projects to protect against frequent flood events and rising sea levels. In 2019, the Dutch tapped into a new financing instrument, the sovereign green bond, to pay for many of these projects. The Delta Programme prioritizes NBS, and its entire portfolio of green-gray projects meets the eligibility criteria for certified green bonds (Boonman 2021).

## ABOUT THE SOVEREIGN GREEN BOND

The Dutch sovereign green bond was the first of its kind with a triple-A rating and one of the largest to date at \$6.68 billion (€5.985 billion). With its strong credit rating (Box 2), this bond represented a sure bet for investors. The Dutch State Treasury Agency issued the bond through Dutch Direct Auction, a rule-based and transparent process established to sell government debt securities (Ministerie van Financiën 2021; CBI 2019a). It declared that preference would be given to “green” investors in order to grow and reward sustainable commitments from financial institutions (Dutch State Treasury Agency 2019a, 2019b). Those that could prove their green credentials were allowed to register early and given allocation preference of up to 10 percent on their bids at the cutoff spread (Dutch

Table 1 | DETAILS OF THE DUTCH SOVEREIGN GREEN BOND

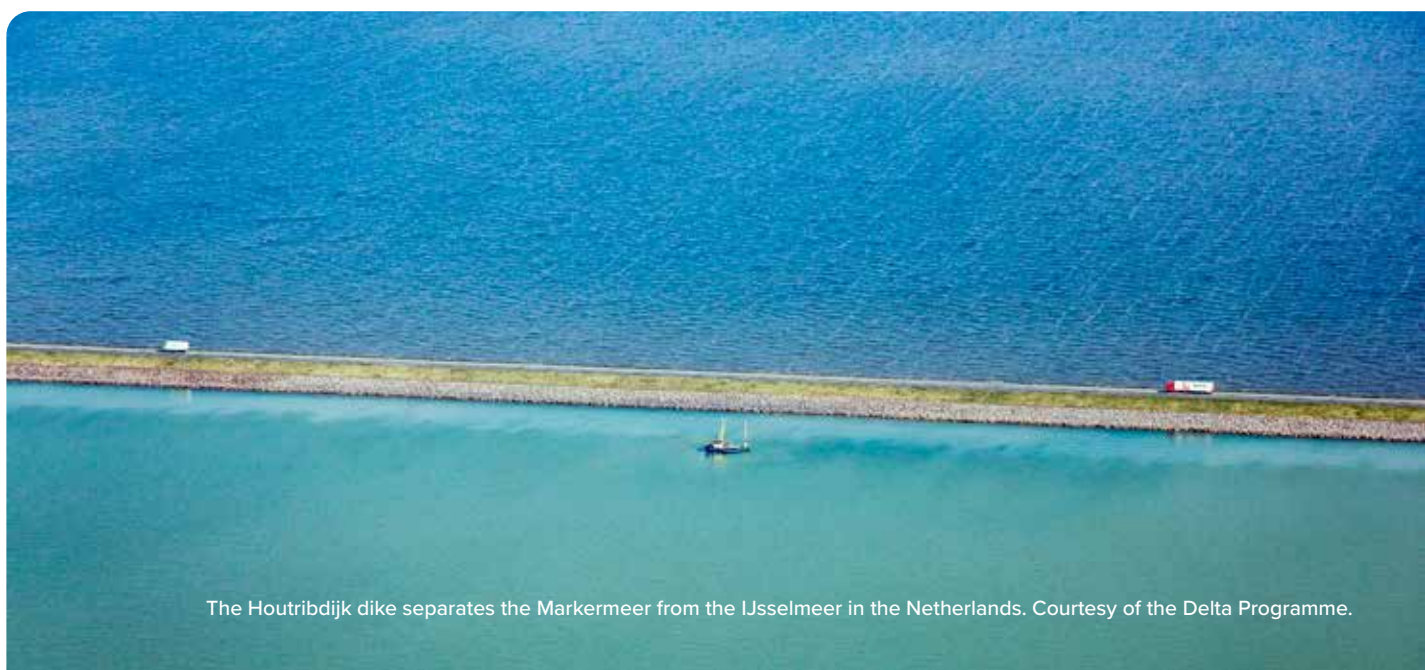
INVESTMENT DETAILS
<b>Issuer:</b> State of the Netherlands
<b>Credit rating:</b> AAA
<b>Date issued:</b> May 21, 2019
<b>Date to maturity:</b> January 15, 2040
<b>Bond size:</b> US\$6.68 billion (€5.985 billion)
<b>Interest rate (coupon):</b> 0.50%
<b>Rate of return at maturity (issuance yield):</b> 0.557%
<b>Party responsible for repayment:</b> Dutch Ministry of Finance

Sources: Dutch State Treasury Agency (2019a, 2019b, 2020).

State Treasury Agency 2019b). This resulted in 32 green investors registering early and 28.5 percent of the total issuance going toward “real green accounts” (Dutch State Treasury Agency 2019a, 2019b).

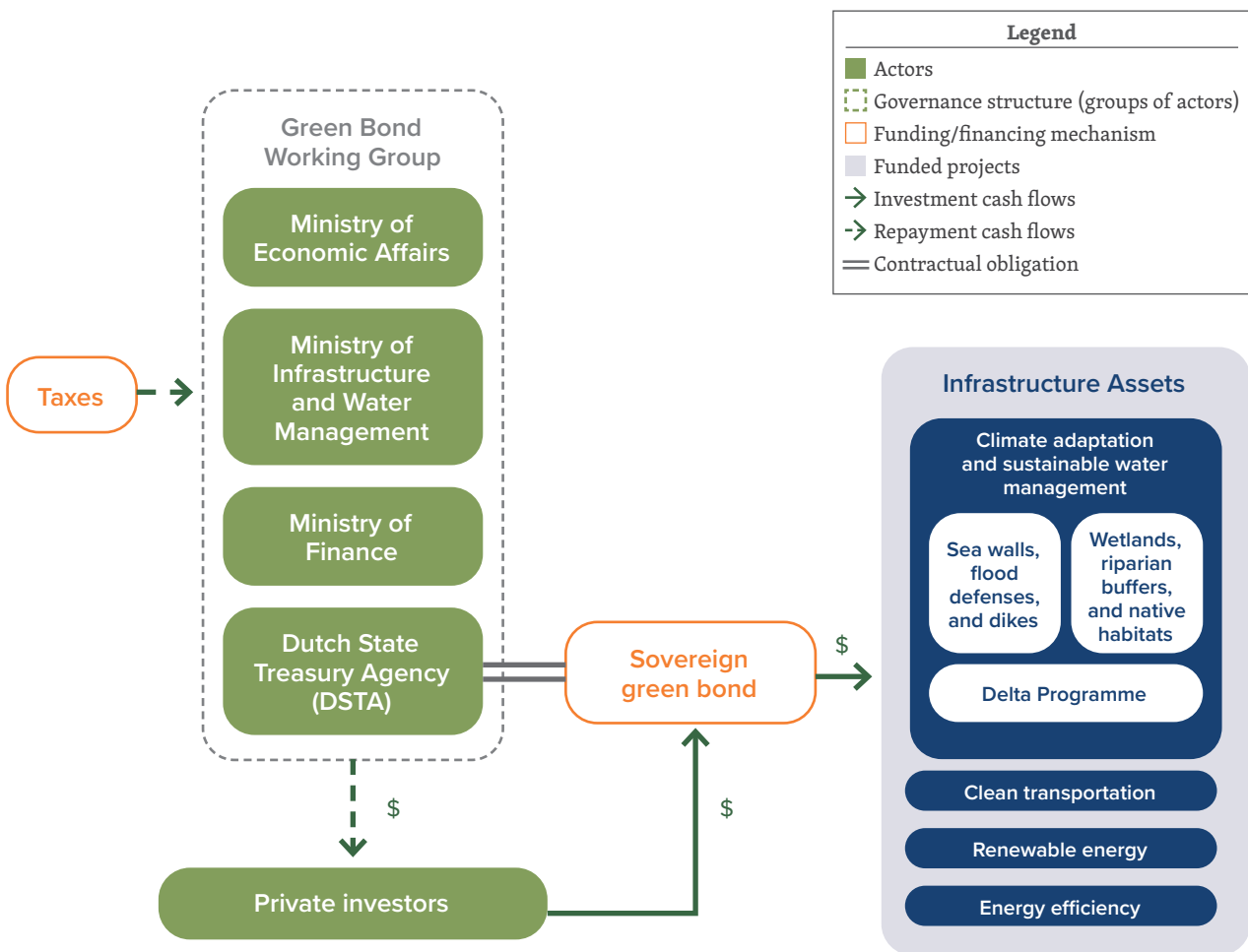
In the little under two hours the auction lasted, investors placed bids worth over €21.2 billion (\$23.6 billion) for €5.985 billion (\$6.68 billion) worth of certificates, resulting in a 3.5 times oversubscription for the bond. The Dutch State Treasury Agency was able to fill orders at the desired low interest rate (0.50 percent), resulting in a low rate of return at maturity of 0.557 percent for investors (Table 1) (Dutch State Treasury Agency 2019b).

An interdepartmental Green Bond Working Group, with representatives from the Ministry of Finance, Ministry of Economic Affairs and Climate, and Ministry of Infrastructure and Water Management, coordinated project selection, which enabled all proceeds to be allocated in under two years (Dutch State Treasury Agency 2019a, 2020) (Figure 1).



The Houtribdijk dike separates the Markermeer from the IJsselmeer in the Netherlands. Courtesy of the Delta Programme.

**Figure 1 | DUTCH SOVEREIGN GREEN BOND ALLOCATIONS TO GREEN-GRAY INFRASTRUCTURE**



Source: Authors.

The proceeds were earmarked to four national budget categories: clean transportation (50 percent), climate adaptation and sustainable water management (CASWM) (29 percent), renewable energy (17 percent), and energy efficiency (4 percent). The proceeds under CASWM provided €1.736 billion (~\$2.1 billion) to the Delta Programme to mitigate climate risk (sea level rise and drought) and increase flood protection. Although NBS are not specified in the funding allocations, the Delta Programme prioritizes NBS (Boonman 2021) and its entire portfolio of green-gray projects meets the eligibility criteria for certified green bonds. At least €208 million (\$248 million) was provided explicitly to programs that incorporate NBS into flood-risk reduction projects (Dutch State Treasury Agency 2020), including the Zandmaas and Grensmaas public works projects that are enhancing a combined 1,635 hectares of natural lands as a flood defense (Dutch State Treasury Agency 2020; Rijkswaterstaat n.d.a, n.d.b). These natural spaces can absorb excess water during flood events, protecting downstream communities.

Green bonds can provide a credible and responsible investment strategy. They are touted for their ability to attract diverse investors; and the Dutch green bond did not disappoint, attracting bids from pension funds, insurance companies, asset and fund managers, private and public banks, trusts, and hedge fund managers, among others (Dutch State Treasury Agency 2019a).

Given its initial success in 2019, the Dutch government reopened its bond to issue more debt in February 2021, when it raised an additional €1.715 billion (\$2.074 billion) (Ministerie van Financiën 2021). Since the first issuance in 2019, the Delta Fund, which provides funding to all Delta Programme projects, has been financed through green bonds (Boonman 2021).

### ENABLING CONDITIONS

Through the Delta Programme, the Dutch have built a pipeline of investable green-gray projects that easily fit the sovereign green bond criteria. The pipeline enables the Dutch to reopen the green bond,

issue more debt, and quickly allocate the proceeds to eligible projects. Preference for NBS in the Delta Programme ensures that NBS are considered alongside gray infrastructure approaches. The green bond's strong credit rating lowered the cost of borrowing to finance these large-scale infrastructure investments. In addition, the volume of the bond's early "green" registrants and oversubscription indicate that investors have a growing appetite for green projects.

### OPPORTUNITIES TO REPLICATE IN LAC

Challenges regarding creditworthiness, high ratios of debt to gross domestic product, and low fiscal capacities are among the barriers to issuing debt in LAC. Most countries in LAC have low credit ratings, which makes it more expensive to borrow, with lenders concerned about increasing sovereign debt (Box 2). Despite these hurdles, global low interest rates and pandemic-related stimulus packages buoyed issuances in LAC. In 2020, sovereign bond issuances were 54 percent higher than in 2019, and 44 percent higher than the average from 2015–19, with total sovereign bond issuances amounting to \$65.1 billion (ECLAC 2021).

#### Box 2 | CREDIT RATINGS

Interest rates on bonds are highly correlated to credit ratings (Bustillo et al. 2018), which are an independent assessment of the political, financial, and economic risk that may influence a borrower's ability to repay debt (Mulder 2018). Typically, the higher the perceived risk of default, the higher the interest rate needed to attract investors.

None of the LAC countries has a AAA rating. Of 33 countries, 26 do not have any history of credit ratings. The Fitch credit rating agency listed only seven as investment grade in its 2020 outlook, with Chile rated the highest (A), followed by Peru (BBB+), Colombia (BBB), Mexico (BBB), Panama (BBB), Aruba (BBB-), and Uruguay (BBB-) (Shetty and Seville 2019). The 2020 pandemic-related economic downturn lowered credit ratings for many countries.

While few subnational governments have credit ratings, Mexico City has maintained an AAA rating (investment grade) since May 2001 (Fitch Ratings 2020).

Although sovereign bond issuances are up in LAC, Chile is the only sovereign government in LAC to issue green bonds as of December 30, 2020. With support from the Inter-American Development Bank (IDB), Chile has issued six certified green bonds for \$6.08 billion with proceeds earmarked for low-carbon transport, renewable energy, energy efficiency low-carbon building upgrades, and water infrastructure (CBI 2021b). No NBS projects were identified, although all sectors have the potential to incorporate them.

The opportunity to replicate the Dutch bond emerges as governments evaluate debt-financing options for infrastructure investments to stimulate postpandemic growth and create jobs. Issuing properly structured (certified and/or with a third-party verification) green bonds can attract a more diversified investor base, unlock sustainable finance commitments, and showcase advances in meeting climate, biodiversity, and SDG targets. Green bonds can offer a safeguard to LAC communities that investments will deliver environmental objectives, as the process requires third-party verification and public disclosure of expenditures. For countries with lower credit ratings, development banks can use credit guarantees to reduce the risk profile, and therefore the interest rates, of lending capital to these entities.

As in the case of the Netherlands' green bonds, LAC governments and banks need improved tracking systems to identify and prioritize NBS projects in their budget allocations, which will help develop a pipeline of eligible green-gray projects for future green bond issuances. Establishing a framework for cross-departmental working groups can increase collaboration among finance, environmental, and infrastructure sectors and support the identification and prioritization of NBS projects. The growing investor demand for green deals and the pressing need to invest in infrastructure create new and promising opportunities to finance more NBS and green-gray projects. For additional examples of investable green-gray projects, see "Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank" (Oliver et al. 2021).

## CASE STUDY: Central Arkansas Water's Certified Green Bond

### SUMMARY

Utilities and municipalities can sometimes also issue green bonds, utilizing expected cash flows from ratepayers or taxpayers to repay the bonds. This case study presents the motivations that led a medium-sized utility in the United States, Central Arkansas Water (CAW), to issue the first-ever green bond to protect forestlands for water quality. It highlights the revenue-generating capacity of some NBS investments that can attract project developers.

### BACKGROUND

Arkansas's largest drinking water utility, CAW, relies on a heavily forested watershed to provide affordable, safe drinking water to 500,000 residents in the greater Little Rock area. The forest reduces water treatment costs for the utility by providing natural filtration, preventing erosion and sediment loading, and reducing runoff from pollutants. However, development pressures are increasingly threatening the forested watershed. If the utility loses more than 53 percent of its forest coverage (Tetra Tech 2007), water quality will be dramatically impacted, increasing treatment costs.

CAW implemented a monthly watershed protection fee in 2007 to protect its watershed. This fee currently raises nearly \$2 million annually from ratepayers and has protected over 4,800 acres through acquisition or conservation easements. While the dedicated annual cash flows support CAW's investment objective of watershed protection, development pressures outpace and outprice CAW's annual watershed protection funds. To achieve scale, which would dramatically increase the pace of watershed protection and reduce the per acre cost, CAW needed to raise more capital for land acquisition.

In 2020 CAW was planning to issue debt for gray infrastructure upgrades and decided to include funding for land acquisition. Instead of issuing another traditional bond, CAW pioneered a hybrid "green-gray" green bond.

### ABOUT THE GREEN BOND

CAW prepared a \$31.8 million certified green bond, a tax-exempt revenue bond with 67 percent (\$21.8 million) earmarked for gray infrastructure upgrades and 33 percent (\$10.6 million) for NBS (Mascagni 2020). The low-carbon gray infrastructure compo-

nents include pipe replacements, new generators, and repairs to a spillway. Of the \$10.6 million for NBS, \$6 million supports a 4,000-acre forest acquisition that is awaiting additional federal funds to supplement the purchase price, \$1.2 million is set aside for riparian conservation easements, and \$3.4 million is being used to refinance a 2018 bond that purchased 460 acres of forested property (Mascagni 2020).

Upon acquisition of forested lands, CAW changes the forest management practices, transitioning away from a model that maximizes timber profits and toward a more sustainable model that optimizes water quality, carbon sequestration, and timber revenue. Recently, CAW became the first water utility to certify its forests under the Sustainable Forestry Initiative (SFI) certification process (Rupar 2021), which requires a third party to verify that CAW is following SFI's best management practices.

With its strong credit rating of AA2, CAW was able to take advantage of low interest rates (2.136 percent true interest cost), which lowered the cost of capital, and secured a premium (investors are paid more) for the bond (Table 2; EMMA n.d.). The bond will be repaid using a combination of the dedicated watershed protection fee and general ratepayer fees. As with other green bond issuances, this bond attracted a diversified group of investors. The international bank Morgan Stanley purchased the bond, motivated to be a leader in the green finance space.

**Table 2 | DETAILS OF CENTRAL ARKANSAS WATER'S CERTIFIED GREEN BOND**

INVESTMENT DETAILS
<b>Issuer:</b> Central Arkansas Water
<b>Credit rating:</b> AA2
<b>Bond purchaser:</b> Morgan Stanley
<b>Date issued:</b> November 24, 2020
<b>Date to maturity:</b> October 1, 2042
<b>Bond size:</b> \$31.8 million
<b>Average interest rate:</b> 2.44%
<b>True interest cost:</b> 2.136%
<b>Amount allocated to NBS:</b> \$10.6 million (33%)
<b>Amount allocated to traditional infrastructure:</b> \$21.2 million (67%)
<b>Repayment cash flows:</b> dedicated watershed protection fees and ratepayer fees
<b>Additional future sources of revenue:</b> carbon offset fees and timber harvests

Sources: EMMA (n.d.); Mascagni (2020).

CAW plans to monetize the NBS benefits of its acquisition through sustainable timber harvests and/or voluntary carbon offsets (Figure 2). These additional revenue streams could support the operating and maintenance costs of forest management, pay the transaction fees associated with due diligence and third-party negotiations, and/or contribute to future acquisitions.

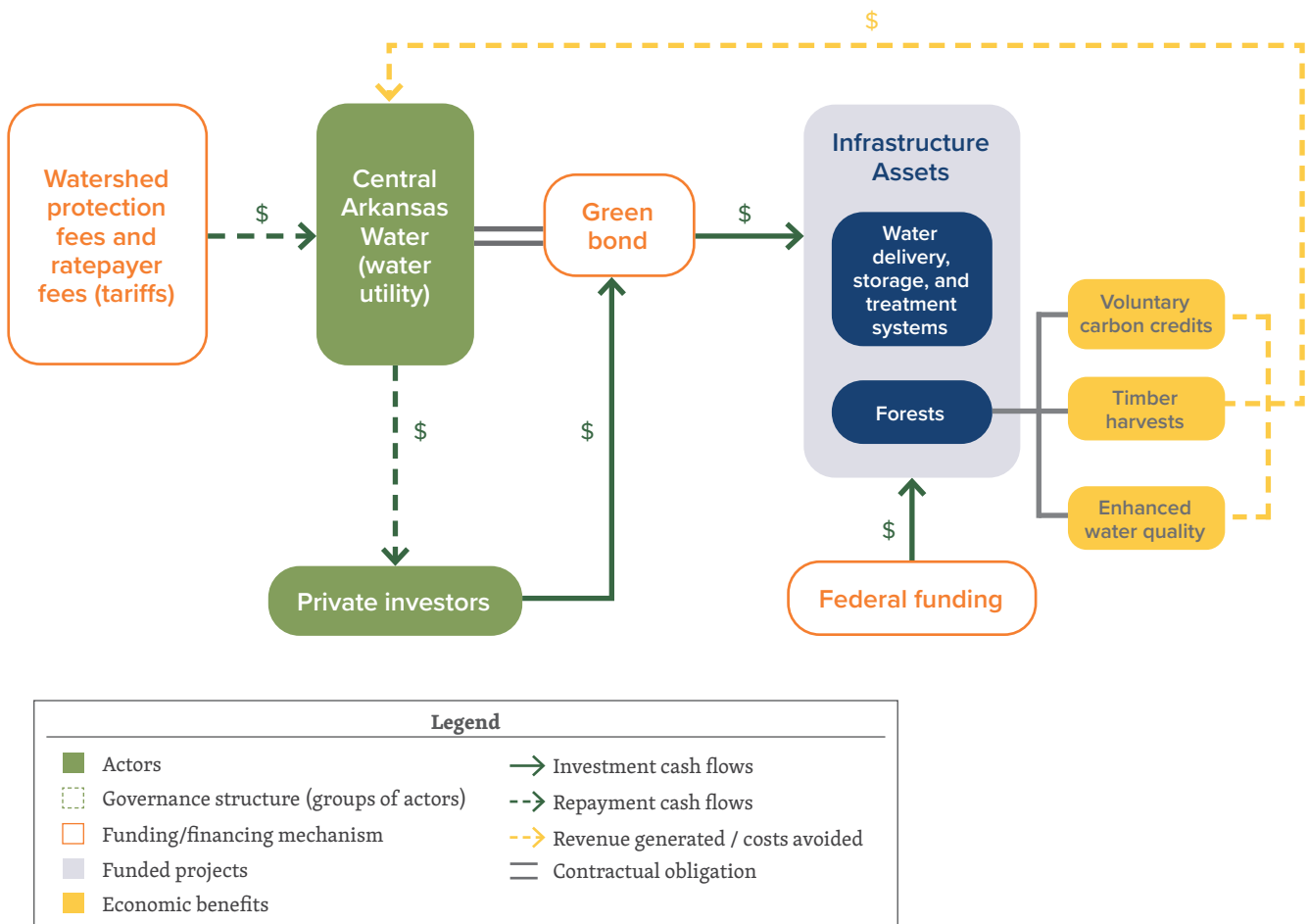
**ENABLING CONDITIONS**

CAW benefits from a strong credit rating (AA2) and a dedicated funding source for NBS protection, which it utilized to issue the certified green bond. Unlike cases where public funding is the catalyst for attracting private capital, CAW is utilizing its green bond to secure federal funding. Monetizing the forests through sustainable timber and carbon offsets can assuage utility concerns about long-term operating and maintenance costs, and acquiring forests at scale reduces the per acre costs of management and strengthens the return profile of the investment.

**OPPORTUNITIES TO REPLICATE IN LAC**

In LAC, only a handful of local governments have issued bonds, including Rio de Janeiro, Belize City, Bogotá, and Aguascalientes (Mexico) (Schloeter 2016). Only three subnational governments, those of Mexico City and the Argentinean provinces of Jujuy and La Rioja, have issued green bonds (Netto 2020). Mexico City’s investment grade credit rating (AAA) is unique in the region and has helped spur investor interest in its two green bond issuances in 2016 and 2017, respectively, totaling over \$161.9 million (Rojas 2017; IDB and GBTP 2021). Part of the proceeds from the 2016 \$49.3 million green bond were allocated toward Mexico City’s Green Corridor project to improve sustainable transportation (i.e., electric buses and bike lanes) and increase urban tree cover (Rojas 2017). Both green bonds invested in water and wastewater infrastructure (flood mitigation and drainage projects), energy efficiency, and clean transportation (IDB and GBTP 2021). Argentina’s 2017 green bonds raised approximately \$200 million each with proceeds allocated to renewable energy projects (Green Finance LAC 2021).

**Figure 2 | CENTRAL ARKANSAS WATER’S GREEN BOND ALLOCATIONS**



Source: Authors.

Similar to sovereign green bonds, creditworthiness presents a challenge for issuing utilities and subnational governments in LAC. Issuances remain low because many operate in regulatory frameworks that make it very expensive to raise capital due to lengthy processes of legal or political approval, high collateral needs, or grant transfer formulas that are not transparent. Utilities and subnational governments can also be barred from monetizing assets, like NBS, thereby reducing their ability to repay debt or pay for ongoing operations and maintenance. Throughout LAC, efforts to decentralize the finance system and strengthen the fiscal capacity of these subnational governments and utility entities could result in additional financing sources for infrastructure and NBS. New policies and legal frameworks are needed to enhance the ability of these entities to issue debt and monetize NBS assets.

Low credit ratings for local governments can be addressed by increasing certainty and transparency about future cash flows for repayment by sovereign transfers, taxpayers, or ratepayers. Alternatively,

national governments and/or development banks can support these local entities by lending the strength of their balance sheets through credit guarantees or first-loss positions.

These entities should also explore CAW's strategy of monetizing NBS—either through sustainable forestry or generating revenue from carbon offsets. With some of the world's largest forests and mangroves, LAC is a prime location to explore how these co-benefits of NBS can be a funding source for NBS projects. Though the carbon market is still nascent, investors anticipate demand rising as national governments and corporations seek to achieve carbon-neutrality (Cooper and Trémolet 2019).

Land tenure challenges in LAC can inhibit acquisition strategies to improve management upstream. However, the capital raised through green bonds can support any number of upstream activities, including payments for ecosystem restoration or improved practices. The use of proceeds can be tailored to fit the local context.



Courtesy of Central Arkansas Water. Photo by Matt Phillips.

## 2. BLENDED FINANCE USING CONCESSIONAL AND MARKET RATE LOANS

Blended finance is a strategy to help reduce project risk and secure market-rate capital. The approach leverages different pools of capital from public, private, and philanthropic entities with different impact mandates and risk tolerances. (GIIN 2018; Convergence n.d.; Box 3). Blended finance is critical to overcoming barriers to investment where creditworthiness is a concern, and as such, is highly relevant to LAC.

### CASE STUDY: Forest Resilience Bond

#### SUMMARY

The Forest Resilience Bond (FRB) is an innovative financing model that blended concessional capital with market-rate loans to finance \$4 million worth of forest health treatments in California's Tahoe National Forest. These restoration efforts alleviate the risk of catastrophic wildfires that threaten people and livelihoods, houses and roads, water quality and quantity, and hydropower electricity generation.

#### Box 3 | BLENDED FINANCE

Blended finance requires public or philanthropic capital (known as "catalytic capital") to take on more risk or lower returns (or no returns) to catalyze additional investment from the private sector (GIIN 2018). This catalytic capital can include concessional or below market-rate loans, junior equity positions, subordinated debt, first-loss capital, credit guarantees, and/or technical assistance to reduce the overall cost of capital for projects utilizing any combination of these financing instruments (GIIN 2018).

The blended finance strategy can come at a high up-front cost, requiring both time and resources to engage with stakeholders and structure deals. But it catalyzes and lowers the cost of securing private sector capital, and can address funding gaps for sustainable development, climate targets, and ecosystem restoration by securing private sector participation (Convergence 2020), providing a credible pathway for NBS financing.

#### BACKGROUND

In the western United States, catastrophic wildfires have grown in frequency and severity over the past several decades. Last year, 2020, was one of the worst fire years on record, with nearly 50,000 fires burning over 8.8 million acres ("National Interagency Fire Center" 2020). In addition to the potential loss of life, wildfires can damage and disrupt nearby infrastructure, drinking water quality and quantity, and tourism and recreation, costing the economy billions of dollars (Hoover and Hanson 2020; Dale et al. 2018; Madeira and Gartner 2018; Zhuang et al. 2017). For instance, California's 2017 wildfire season resulted in over \$12 billion in insurance claims and long-term economic losses projected to exceed \$100 billion (Barrett 2018). In particular, forest fires can accelerate the flow of sediments and debris into waterways, raising treatment costs, harming water quality, and disrupting hydroelectric generation.

Despite the high costs of inaction, annual fire-fighting expenditures leave public coffers far short of the funding necessary to tackle the challenge. Estimates suggest that the cost of restoration treatments on public lands is \$65 billion (Madeira and Gartner 2018). To address this shortfall, Blue Forest Conservation (BFC, a nonprofit), World Resources Institute (WRI), Encourage Capital (an environmentally focused private equity firm), and the US Forest Service (USFS) codeveloped the FRB.



Courtesy of Blue Forest Conservation.

### ABOUT THE FRB

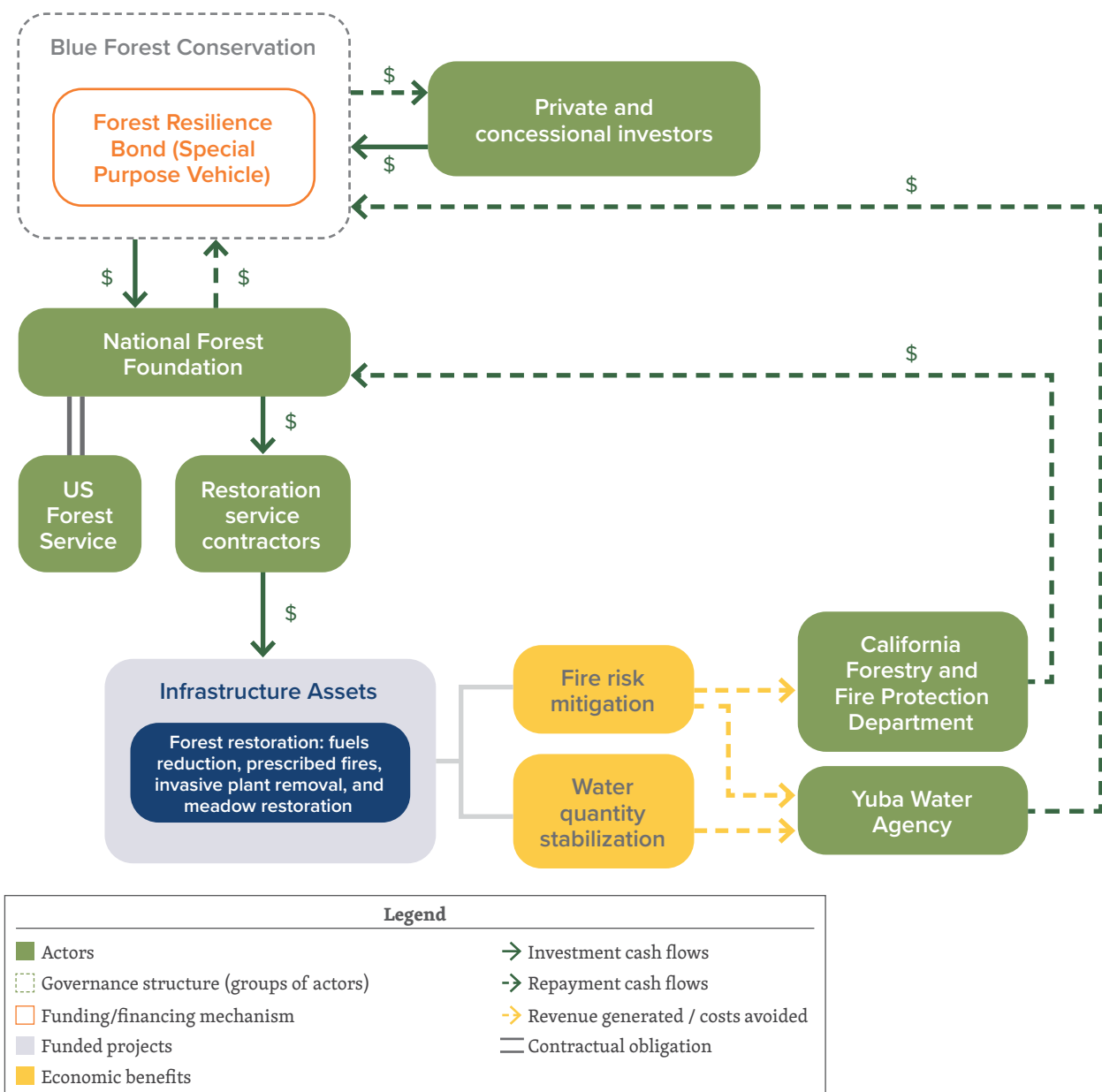
The FRB secures private loans for forest restoration, mobilizing swift action to protect beneficiaries and their watersheds. To repay investors, the FRB signs contracts with beneficiaries, who commit to a repayment schedule. Simply put, the FRB is a special purpose vehicle, created to contract services and distribute capital for a specific project.

In 2018, after three years of stakeholder engagement and environmental review, a pilot FRB was launched in the North Yuba River watershed in California’s Tahoe National Forest. The USFS identified over 15,000 acres in the watershed as facing a high risk

of catastrophic wildfire, which would impact downstream water users. Among those users is the Yuba Water Agency, which provides drinking water to over 60,000 residents, generates 400 megawatts of hydro-power, and delivers water to eight irrigation districts across 60,000 acres of farmland (Yuba Water Agency n.d.).

WRI performed a cost-benefit analysis, comparing the economic losses of a catastrophic fire (based on real losses from the nearby King Fire) and the probability of such an event occurring with and without the \$4 million in forest restoration treatments. WRI researchers estimated \$8.8 million in avoided costs and increased revenues from additional water flows

**Figure 3 | CAPITAL AND CONTRACTING FLOWS FOR THE FOREST RESILIENCE BOND**



Source: Adapted by authors from Convergence and BFC (2020).



**Table 3 | DETAILS OF THE PILOT FRB IN THE TAHOE NATIONAL FOREST**

INVESTMENT DETAILS
<b>Investment size:</b> US\$4 million
<b>Concessional investors:</b> Gordon and Betty Moore Foundation and Rockefeller Foundation
<b>Market-rate investors:</b> Calvert Impact Capital and AAA Insurance
<b>Return on investment for concessional loans:</b> 1%
<b>Return on investment for market-rate loans:</b> 4%
<b>Borrower:</b> FRB Yuba Project I, LLC
<b>Loan type:</b> senior unsecured
<b>Term:</b> January 1, 2018–December 1, 2023
<b>Repayment:</b> State of California (principal repayments), Yuba Water Agency (principal + interest repayments)

Source: BFC (n.d.).

for hydropower (Knight and Gritter 2020). With this expected return on investment, the Yuba Water Agency committed to pay \$1.5 million over five years through a service contract (work agreement) with the FRB (Figure 3). The State of California, through its California Climate Investment Program, committed \$2.6 million in grant funding to repay investors over the same term through FRB loan agreements.

With committed cash flows, BFC was able to unlock \$4 million in private capital. BFC secured two concessional loans from foundations (the Rockefeller Foundation and the Gordon and Betty Moore Foundation) at 1 percent annual returns, which helped crowd in two market-rate investors (Calvert Impact Capital and AAA Insurance) at a 4 percent annual return (Table 3). Both market-rate investors were motivated by the co-benefits of the investment: the insurance company was interested in reducing future payouts to fire-insured policyholders and the impact investor was interested in the bond’s environmental and social benefits.

Funding was not the only challenge. The USFS had limited capacity to swiftly contract with forest restoration crews. The National Forest Foundation, an organization chartered by Congress to administer private gifts to support national forests, stepped in to both hire and manage the crews that perform the restoration work through a master stewardship agreement. The influx of private capital combined with additional boots on the ground accelerated the pace of restoration treatments by at least six years (BFC n.d.; Knight and Gritter 2020).

BFC partnered early with researchers and academics to quantify and value the forest restoration benefits over the tenure of the FRB (BFC 2021). Two years into the four-year restoration treatments, BFC is already seeing results from activities on the ground. Thus far, the partners have performed fuels reduction, thinning, and vegetation removal on 1,703 acres and aspen regeneration on 298 acres (which protects 8,163 acres). This has sustained the water supply in an area that generates 21,060 acre-feet every year and contributed a small increase of 500 acre-feet of water supply. In addition, these activities resulted in 42 direct and indirect jobs and sustained production of 3,998 megawatt hours of renewable hydropower energy (BFC 2021). By investing in monitoring and evaluation, BFC is proving the environmental, economic, and social value of forest restoration treatments and generating demand for other FRBs in other regions.

The success of the Yuba pilot has inspired planning across 275,000 acres and launched another restoration project of more than 35,000 acres at a lower elevation in the same watershed of the Tahoe National Forest. Several additional FRB projects are being considered in other landscapes across the western United States (Knight and Gritter 2020). Recently, Yuba Water committed an additional \$6 million for the next FRB (Yuba Water Agency 2021). California state funding for forest restoration has also significantly increased over the past five years, with an expected \$500 million in 2022 budget allocations, up from \$20 million prior to 2015 (Knight and Gritter 2020). A strength of the FRB is that the legal framework, project structuring, and contractual agreements can be replicated.

### ENABLING CONDITIONS

FRB project developers incorporated the economic rationale early in project planning and presented a robust business case to the NBS beneficiaries (utilities and the state), unlocking clear repayment cash flows. These cash flows assured investors that their capital would be returned in time with interest. New partnerships supported on-the-ground implementation, overcoming administrative and capacity constraints. Dedicated funds to quantify the impact of the restoration treatments have helped convince downstream beneficiaries of this work’s value and unlocked new business opportunities for BFC across the U.S. West.

### OPPORTUNITIES TO REPLICATE IN LAC

Harnessing private capital to pay up-front costs of disaster risk mitigation, like forest restoration treat-

ments, can accelerate project planning and implementation. However, investors need assurances that their investments can be repaid with consistent cash flows. Governments and utilities can provide these assurances by contracting annual repayments to these types of projects in budgets.

Project developers can also secure these cash flows by incorporating the business rationale for NBS earlier in project preparation. Project preparation facilities can offer the additional training, good data, capacity support, and skill sets to better prepare and structure bankable projects.

In countries where private capital may be too expensive (i.e., borrowing money costs too much), other forms of blended transactions can be utilized, such as concessional capital and public funding. Honduras, for example, used a model similar to the FRB to deploy concessional capital for a forest restoration project. The IDB and the Green Climate Fund provided \$35.73 million in loans, \$8.27 million in nonreimbursable donations, and \$35 million in conditional grants awarded upon achieving project milestones to the National Forest Service of Honduras to immediately implement forest restoration activities in 29 basins (IDB and GCF 2018). Restoration activities there aim to preserve and protect the drinking water for vulnerable downstream communities. The Government of Honduras is liable for the loans, and the forest restoration activities are expected to provide economic opportunities to local communities, increase water security, and improve forest health.

These types of blended transactions are already at play in LAC, although many are not focused on NBS. Since 2014, global blended transactions have grown to represent 17 percent of deals (102 out of 600), and LAC is now the target region for 35 percent of global fundraising efforts (Convergence 2020). In LAC, development banks, climate funds, governments, and foundations can provide support for blended transactions by offering the suite of catalytic instruments, including loan guarantees, concessional capital, and first-loss positions. These institutions play a pivotal role in growing this strategy in LAC. If they prioritize NBS in their lending and giving operations, they can compel even greater public and private investment in NBS.

### 3. POLICY FRAMEWORKS USING LAND-BASED FINANCING MECHANISMS

Faced with tightening budgets, cities can finance infrastructure, public improvements, and development projects with revenue from land-based financing instruments, also known as land value capture tools. Examples include (1) *building rights transfers*, the sale of the vertical development potential from one building to another; (2) *impact fees* or linkage fees (locally referred to as mitigation and integration measures), one-time fees generated from new construction or development projects that require infrastructure improvements (Germán and Bernstein 2018); (3) *developer exactions*, fees to defray the additional costs of public services associated with special permission projects (Germán and Bernstein 2018; Smolka 2013); or (4) *betterment levies*, fees that extract a portion of the future increase in expected property value as a result of the public infrastructure investment (Harnik and Welle 2009). These instruments, combined with good governance and social inclusion, can generate benefits for all residents.

#### CASE STUDY: Mexico City's Land-Based Financing Instruments in Tacubaya

##### SUMMARY

Land-based financing instruments have traditionally been used to finance built infrastructure projects and public spaces, as those assets are believed to improve land values. This case study explores the Tacubaya neighborhood of Mexico City, where city officials are evaluating NBS along with gray infrastructure, betting that proximity to these assets increases the value of nearby real estate and improves social and economic conditions for all residents.

## BACKGROUND

Mexico City has instituted several land-based financing policies starting in the late 1980s as a way to finance the revitalization of its historical center (Morales Schechinger 2004). In 2015, the city identified five neighborhoods, including Tacubaya, that needed infrastructure and could benefit from these same land-based financing instruments to improve social and environmental conditions.

Tacubaya is a socioeconomically diverse, historic neighborhood with a mix of residential and commercial properties, ripe for development but hampered by deteriorating and inadequate infrastructure for transportation, public spaces, and housing. The neighborhood faces mounting risks of both water insecurity exacerbated by urban growth and vulnerability to flooding, with few safeguards in place to protect infrastructure. To mitigate these challenges, Tacubaya is evaluating strategic infrastructure investments.

## ABOUT SAC TACUBAYA'S LAND-BASED FINANCING MECHANISMS

To finance the infrastructure upgrades, Mexico City officials created the Sistema de Acción por Cooperación (Acting by Cooperation System, or SAC) Tacubaya, a public-private entity that assesses and approves land-based financing transactions and allocates revenues for public improvement projects within Tacubaya's 141-hectare jurisdiction (CDMX 2016). These investments may include an improved transportation center and public markets, additional affordable housing, and water infrastructure upgrades that incorporate NBS elements, such as rain gardens, bioswales, green roofs, and bioretention lagoons.

SAC Tacubaya is composed of an accreditation technical committee, which is chaired by city urban planning officials who assess the land-based financing transactions for projects within the Tacubaya jurisdiction. A second technical committee oversees the SAC Tacubaya Trust Fund, where all revenues from the transactions are deposited. This committee is responsible for selecting public infrastructure projects to receive funds and is composed of community and commercial leaders, developers, property owners, and city officials. This group is a governance platform that considers diverse interests, hearing from project developers and community leaders, determining

neighborhood priorities, coordinating investment in public infrastructure projects, and ensuring that the projects benefit all residents.

SAC Tacubaya relies on various land-based financing mechanisms, including impact fees and development exactions. The most profitable model has been selling building rights transfers. These transfers allow more dense urban development than zoning laws would otherwise permit (Germán and Bernstein 2018). In the SAC Tacubaya model, the Mexico City government added up the "building rights" over four of Tacubaya's public parks, which came to 960,257 square meters of density potential (building rights) that were not going to be used (SEDUVI 2018). Those rights could be transferred and sold by SAC Tacubaya to landowners within its jurisdiction.

While public data for the value per square meter of building rights are not available, estimates using cadastral values (the recorded taxable value as defined by land registration) suggest a range from 2,001 to 7,290 Mexican pesos (US\$105–\$383) (CDMX 2020a). Based on the lower bound of this estimate, the instrument could generate a minimum of 2 billion pesos (\$101 million) for the SAC Tacubaya Trust Fund (Table 4).

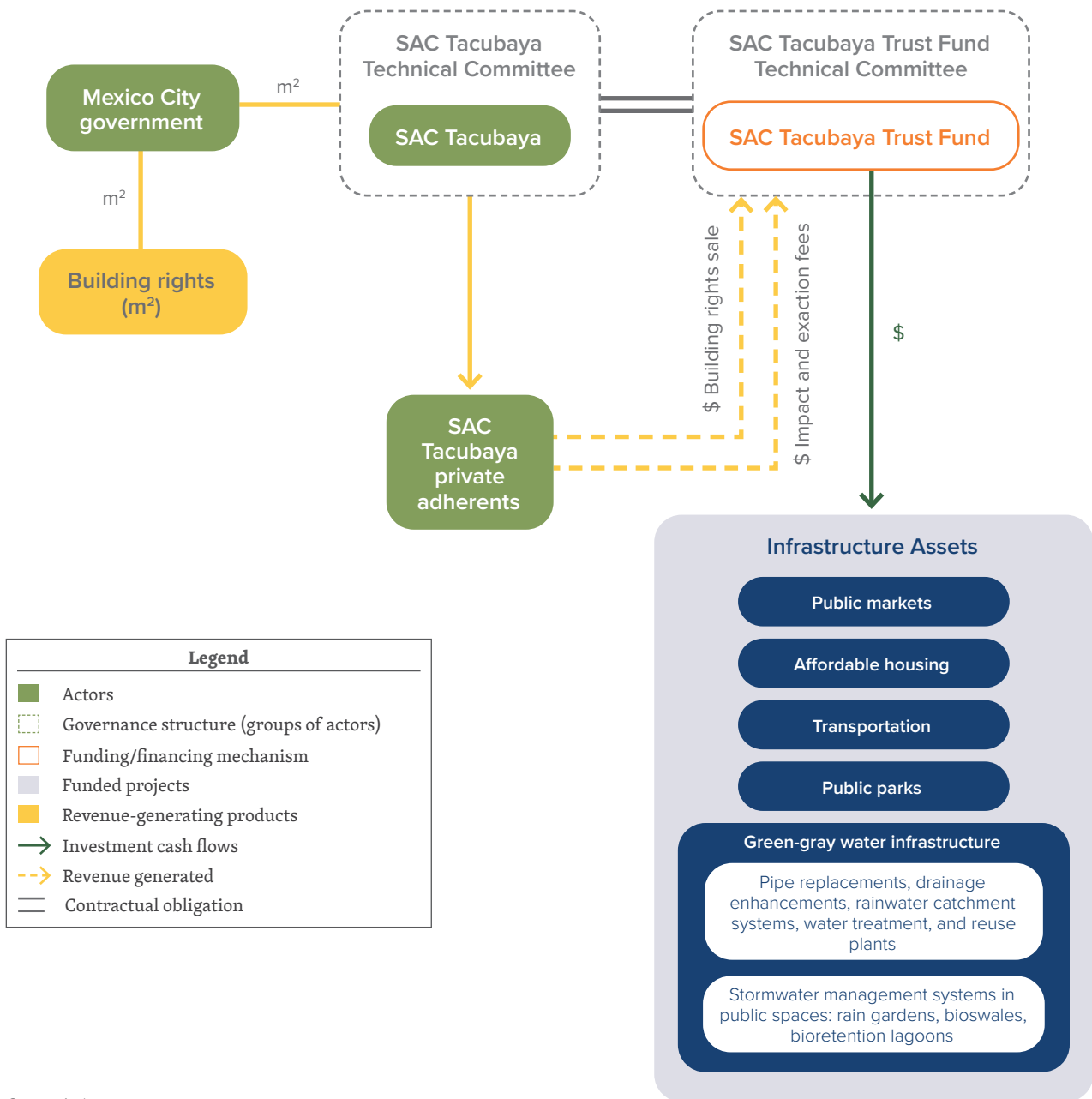
To purchase building rights, developers and property owners need to become "adherents" of SAC Tacubaya, which in essence requires compliance with SAC Tacubaya's stricter urban planning regulations. Theoretically, adherents support these instruments because the revenues from building rights transfers or impact fees flow to the SAC Tacubaya, and into infrastructure that improves the neighborhood, boosts property values, ensures water security and resilience, and increases social equity (Figure 4).

**Table 4 | DETAILS OF SAC TACUBAYA'S BUILDING RIGHTS TRANSFERS**

INVESTMENT DETAILS
<b>Number of transferable building rights:</b> 960,257 m <sup>2</sup>
<b>Cadastral values (as a proxy of building rights value):</b> 2,001–7,290 Mexican pesos (US\$105–\$383) per m <sup>2</sup>
<b>Building rights allocated as of December 2018:</b> 212,500 m <sup>2</sup>
<b>Value of impact fees:</b> 54–392 pesos (\$2.73–\$20) per m <sup>2</sup>
<b>SAC Tacubaya Trust Fund (estimated based on data from 2018):</b> 425 million to 1,549 million pesos (\$22 million to \$81 million)

Sources: SEDUVI (2018); CDMX (2020a, 2020b).

**Figure 4 | CASH FLOWS ASSOCIATED WITH LAND-BASED FINANCING TOOLS IN TACUBAYA**



Source: Authors.

Using assumptions based on the lower bound cadastral values and publicly available data, the authors estimate that the building rights transfer model could have raised 425 million to 1,549 million pesos (\$22 million to \$81 million) to help build social housing (housing with limits on sales prices), restore the public market and public spaces, establish a new transportation center, and conduct feasibility assessments for green-gray water infrastructure. The feasibility assessments examined the pre-feasibility of replacing the water distribution network, enhancing drainage

capacity, applying water recycling solutions, and installing rainwater catchment systems on roofs, as well as incorporating rain gardens, bioswales, and bioretention lagoons for stormwater management into public spaces.

**ENABLING CONDITIONS**

Land-based financing mechanisms require development demand, urban planning, staff know-how to properly design and value policies, and staff capacity to monitor and collect fees, in addition to a well-de-

signed legal framework to enact and enforce land-based financing policies. For these instruments to support NBS, the urban planning policies must allow funds to be allocated toward NBS and not be limited to gray infrastructure options. The SAC Tacubaya model had all of these components.

Social and political dynamics also play a role in the success of the strategy in Tacubaya. SAC Tacubaya's transparent governance structure was critical to securing public buy-in and assuaging concerns over misapplication of policies and mismanagement of the trust funds. Including representatives from diverse neighborhood interests ensures that project plans and capital investments benefit all of Tacubaya's residents, not just the developers or those with power. Community stakeholders have the ability to influence SAC Tacubaya's priorities, which underlines the importance of increasing community support for NBS.

#### OPPORTUNITIES TO REPLICATE IN LAC

Land-based financing instruments have long been deployed in LAC. In Colombia, betterment levies, a levies or fees based on improved land values, have been used for decades to finance public works, mostly road construction (Peterson 2008). Brazil sells "air right" certificates to construction projects with plans to exceed height limitations to fund redevelopment projects (Suzuki et al. 2015). Cities with strong governance and urban planning frameworks coupled with growing demand for development can employ this strategy as an alternative or complement to debt-financing instruments, like bonds or loans.

These policies can be strengthened if they incorporate climate mitigation, adaptation, and/or disaster risk management strategies into urban planning and financing (Hammer et al. 2018). Cities rely on urban planning codes and official technical standards to guide feasibility and funding decisions for infrastructure investments. These codes and standards can restrict the types of eligible infrastructure solutions. They are often limited to traditional, built systems and exclude NBS alternatives, like wetlands, rain gardens, and bioswales. For land-based financing instruments to fund NBS and green-gray infrastructure investments, urban planning policies and official technical standards will need to be amended to be inclusive of NBS.

Pilot projects and feasibility studies are starting to gain traction. For instance, Santa Fe, Argentina, is tapping land-based financing mechanisms, including

betterment levies, to cofinance green-gray infrastructure for flood risk mitigation (Maldonado et al. 2020). The green-gray solutions include increasing vegetation in green spaces, installing runoff reduction systems, and designing public spaces to serve as floodplains during flood events (Maldonado et al. 2020). Cali, Colombia, has performed a feasibility assessment for using land value capture tools to finance resilient green infrastructure, like increased tree cover, vegetation, and green spaces, for flood mitigation as well (Grafakos et al. 2019). Additional studies and demonstration projects correlating land values with NBS infrastructure would help other cities adopt land-based financing instruments for NBS.

## 4. FINANCIAL RISK MITIGATION THROUGH AN INSURANCE POLICY

The insurance industry can help predict how NBS will perform, provide cost-benefit estimates, and serve as a trusted intermediary to investors. Insurance models for disaster risk are well accepted by investors and are used to price risk in capital markets (Vijhala and Rhodes 2015). The industry's standardized models and simulations can generate up-front estimations of project-based risk reductions, which can then be translated into project returns and potential revenue (Vijhala and Rhodes 2015). The industry is skilled at aggregating and pooling benefits to capture cost savings and transfer financial risk.

With continued advancements in the historical data collection and scientific modeling of NBS, the insurance industry will be a key partner in designing future financial mechanisms that appeal to investors and better incorporate climate and disaster risk into decision-making.

Insurance policies are not a reliable source of capital for start-up NBS projects, as they are designed to pay for restoration or improvements to existing NBS as a result of loss or impairment. However, when thinking of rebuilding with insurance payouts, NBS can and should be included in rebuilding efforts to mitigate future risk and better protect people, livelihoods, and property.

## CASE STUDY: Quintana Roo's Insurance Product for Coral Reefs

### SUMMARY

In the Mexican state of Quintana Roo, a conservation trust fund secured the first insurance policy designed to make rapid payments for ecosystem restoration after storms. The payments are used to restore the coral reefs that protect the tourist centers along Mexico's Caribbean coast, Cancún and Puerto Morelos.

### BACKGROUND

Coral reefs serve two critical roles for coastal communities in Quintana Roo: they underpin the \$9 billion tourist industry and offer cost-effective storm protection for pristine beaches and coastline infrastructure (Smith 2018). Coral reefs can reduce up to 97 percent of the storm's wave energy (Ferrario et al. 2014). In Quintana Roo, historical data indicate that the number of people whose property would be affected by storm events over a 10-year horizon would be 4,600, with \$63 million from flood damage and other economic losses if the coral reefs disappeared (Reguero et al. 2019).

The State Government of Quintana Roo, supported by tourism operators and The Nature Conservancy (TNC), established the Trust for Coastal Zone Management, Social Development, and Security (CZMT) in 2018. The conservation trust fund is designed to receive funding from multiple sources, including a durable funding stream from coastal property owners' fees, to repair and maintain beaches and coral reefs. A multistakeholder technical committee decides how CZMT funding will be invested. Funds are disbursed based on recommendations of the CZMT subcommittees and respective advisory councils (TNC n.d.a). The new funding streams will complement years of funding from several donors, including TNC and conservation partners, whose efforts have helped to restore sections of the reef.

One of the CZMT objectives is to maintain the reef, which has been degraded by overfishing, pollution, bleaching, and storm damage. Severe storms put these restoration efforts at risk, especially category 4 or 5 hurricanes that pass over or near the reefs (TNC n.d.a).

Response within 90 days of the storm event gives coral reefs a better chance of survival. TNC and partners have been training brigades of volunteers to move in quickly to assess damage, removing debris, repairing broken coral, and collecting coral fragments

to grow in nurseries for future transplanting (Smith 2018; TNC n.d.b).

Although essential to maintaining a vibrant, healthy ecosystem, a quick response is also expensive, ranging from \$50,000 to \$150,000 for 20–30 days of work along 20 kilometers of coastline (Smith 2018). Sufficient funding is generally not available to conduct any poststorm response.

### ABOUT THE INSURANCE POLICY

To protect the years of conservation investment in the coastal ecosystem, stabilize operating cash flows, and finance poststorm response, the CZMT secured a parametric insurance policy.

Insurance products mitigate financial loss and can be structured to provide different forms of relief. Parametric policies provide quick payouts upon the occurrence of a predetermined event (some within 10 days). In the case of Quintana Roo, this rapid payout is triggered if wind speeds within a defined geographic area exceed 100 knots. In the 2019 policy, a maximum of \$3.8 million could have been paid out over the course of the one-year term. A key design challenge for these policies is understanding the relationship between the trigger event (wind speeds) and the severity of physical damage (coral reef loss) as parametric policy payouts are predetermined and not dependent upon the severity of the damage.

There are three elements of a parametric insurance policy: (1) a delineated geographic boundary in which the trigger must occur, (2) predetermined triggers that initiate payout, and (3) a payout structure for a specified term. The Quintana Roo policy covers 167 kilometers of coastline and has a tiered payout structure: for wind speeds between 100 and 130 knots, 40 percent of maximum payout will be delivered; wind speeds between 130 and 160 yield 80 percent; and wind speeds in excess of 160 knots yield maximum payout (100 percent) (TNC n.d.a, n.d.b) (Table 5, Figure 5).

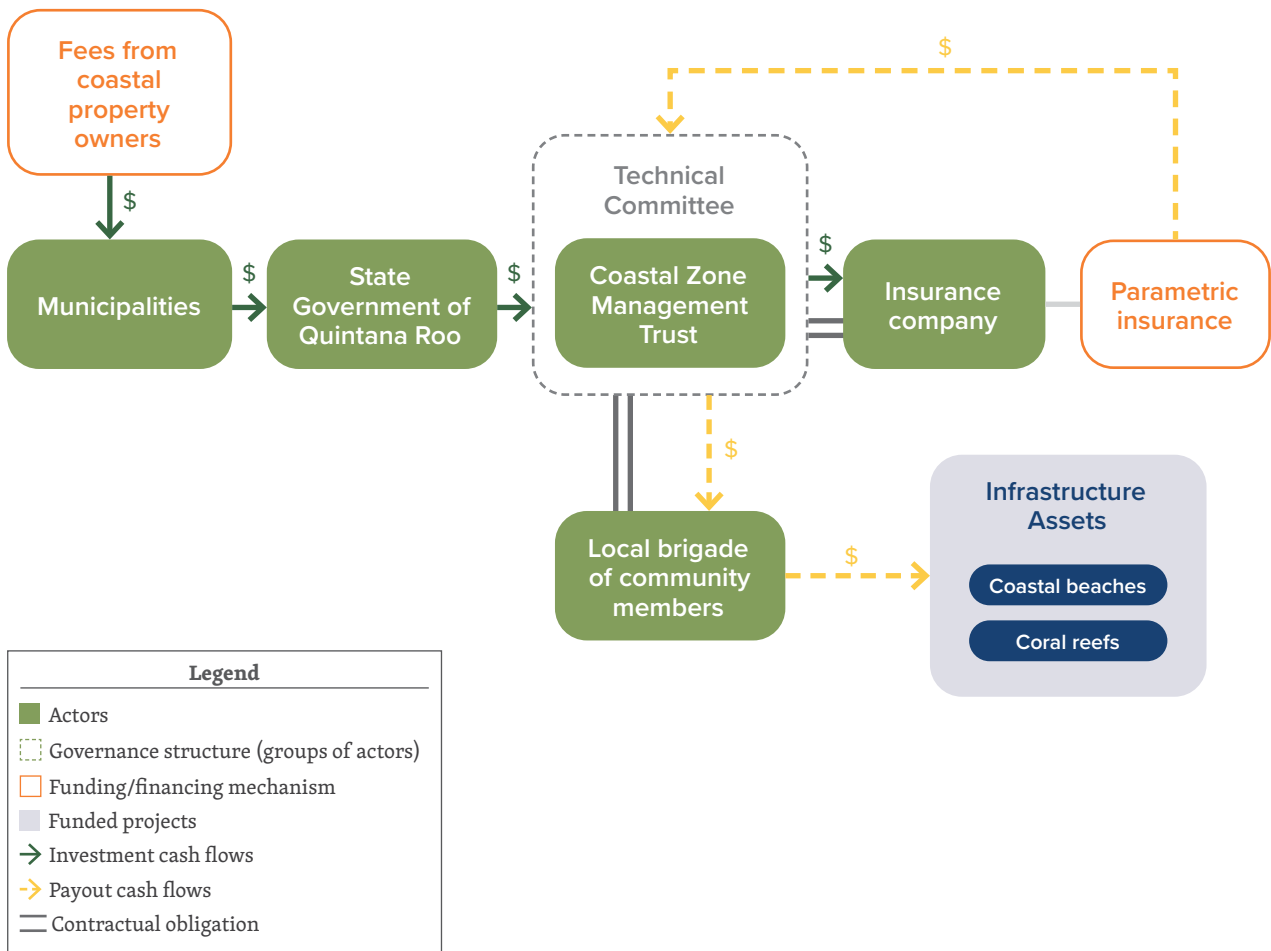
The policy was put to the test in October 2020, when Hurricane Delta's wind speeds between 100 and 130 knots triggered the first payout, estimated at \$850,000 (Einhorn and Flavelle 2020). The payout was delayed by three weeks, and another storm stalled the brigades' repair efforts. But within three months, the brigades had managed to reattach almost 13,500 fragments and stabilize over 2,000 large coral formations (Einhorn and Flavelle 2020). These setbacks can be attributed to two factors: the novelty of the instrument, which with additional issuances can become

**Table 5 | DETAILS ON QUINTANA ROO'S PARAMETRIC INSURANCE POLICY FOR CORAL REEFS**

INVESTMENT DETAILS
<b>Policy purchased by:</b> the Trust for Coastal Premiums paid by the Trust for Coastal Zone Management, Social Development, and Security
<b>Insurance issuer:</b> Seguros Afirme—Swiss Re (2019) and Seguros Banorte / Global Parametrics and Hannover Re (2020)
<b>Policy details:</b> Coverage for 167 kilometers of Quintana Roo coastline
<b>Term:</b> One year
<b>Trigger:</b> Wind speeds in excess of 100 knots
<b>Maximum payout (annual aggregate limit):</b> US\$3.8 million (2019) and \$2.1 million (2020)
<ul style="list-style-type: none"> <li>● Wind speeds between 100 and 130 knots = 40% of payout</li> <li>● Wind speeds between 130 and 160 knots = 80% of payout</li> <li>● Wind speeds in excess of 160 knots = 100% of payout</li> </ul>

Sources: TNC (n.d.a, n.d.b); Way (2020).

**Figure 5 | CASH FLOWS FOR THE COASTAL MANAGEMENT TRUST**



Source: Authors.

routine and perform as designed with speedy payouts, and the unpredictable elements of restoration. The increasing frequency of these storm events reinforces the urgent need to develop new strategies to address the impacts of climate change.

A budget trade-off appears to exist for the CZMT between investing in regular maintenance activities (a strategy to enhance health and mitigation to protect physical assets) and investing in insurance policies (a strategy to fund reef repair and to protect against financial risk). However, both strategies deliver complementary results. The CZMT views the allocation to the insurance policy as an important mechanism to strengthen its ability to repair coral reefs following storm events (Way 2020).

### ENABLING CONDITIONS

Decades of scientific data, economic valuations of the co-benefits of coral reefs (including their value to the tourism industry and as buffers to flood events), and demonstrated performance metrics of intact coastal ecosystems unlocked two levels of cash flows for the CZMT. First, these inputs demonstrated the business rationale to the government, which secured annual contributions for restoration. Second, these inputs were incorporated into the insurance industry's risk models and assessment process, which secured the insurance company's buy-in to underwrite the parametric insurance policy. The partners utilized their robust data and modeling to inform the design of the insurance policy, including the identification of appropriate trigger events and estimates of restoration costs to calculate payout sizes. Finally, the CZMT has boots on the ground to respond swiftly to poststorm events.

### OPPORTUNITIES TO REPLICATE IN LAC

The replication of the Quintana Roo insurance model is already underway for the Mesoamerican Reef (MAR), the world's longest transboundary reef ecosystem, along the coastlines of Belize, Guatemala, Honduras, and Mexico (Gonzalez 2020). These replication efforts will help standardize this type of insurance policy within insurance companies, which should enable quicker payouts and reduce delays. The Ocean Risk and Resilience Action Alliance, the MAR Fund, and the IDB analyzed the value of the MAR to inform at least four pilot parametric insurance policies in the four countries (Gonzalez 2020). This group is also training brigades to restore the coral reefs and beaches, creating jobs that contribute directly to the health and well-being of shoreline communities.

Strides have also been made in mangrove insurance policy research. Mangroves, like coral reefs, slow storm surges and absorb up to 66 percent of wave energy (Beck and Lange 2016). These vibrant ecosystems shield inland assets, nurture fish, and absorb carbon (Beck et al. 2020), suggesting a high potential for blue carbon offsets, referring to the carbon held in marine and coastal ecosystems (Hutchison et al. 2014), strengthening the business case for protecting them.

Using insurance industry risk-modeling tools, a recent cost-benefit analysis of mangrove coastal forests in the Caribbean compared the economic benefits of the flood risk reduction to the cost of mangrove restoration over a 30-year period. When strong market (established insurance markets) and governance forces were included, the study identified six LAC countries (the Bahamas, Belize, Cuba, the Dominican



Brigades preparing to repair damaged coral reefs. Courtesy of The Nature Conservancy. Photo by Jennifer Adler.



Republic, Jamaica, and Mexico) where the cost-benefit ratios were high and an insurance market would be viable (Beck et al. 2020).<sup>2</sup> These results indicate opportunities to cost-effectively insure mangroves for the associated storm-protection and biodiversity benefits they offer to tourism centers and fishing-dependent economies (Beck et al. 2020).

NBS are usually designed and implemented by nongovernmental organizations (NGOs), academia, and public sector actors, who have little standing and connection to financial markets. The insurance industry can help quantify and validate NBS as a business opportunity for investors, governments, and utilities. Additional investment in data collection, monitoring and evaluation, and scientific studies is needed to advance this work to other NBS assets and areas of the world.

## 5. FUNDING DIVERSIFICATION THROUGH AN ENDOWMENT FUND

Annual allocations from public and philanthropic entities alone cannot provide the financing needed to invest adequately in NBS. Unlocking private capital is one strategy for closing this funding gap. Diversifying funding streams is another. One way to diversify funding streams is to create an endowment, an investment trust with a fiduciary responsibility to accumulate wealth on the behalf of a nonprofit. The nonprofit's cash donations go into investment vehicles, like stocks, bonds, or equities, which generate annual returns. Most endowments maintain the principal contributions (the "corpus") and utilize a portion of the annual returns for operating costs or specific projects.

An endowment fund can enhance long-term financial security by reducing an entity's complete dependence on future donor and grant funding and offering uncorrelated (independent) revenue from the nonprofit's work. Endowments provide the flexibility to reach scale or fund research, overhead, or high-impact projects. They can offer a steady, secure source of funding for NGOs, such as conservation trust funds or water funds, organizations designed to support governance and financial mechanisms that contribute

to water security through community, corporate, and government engagement (LAWFP 2020).

The endowment model could offer these organizations critical financial support. There is a trade-off, however, between meeting current annual expenditures and investing in the endowment model, which will create more funding in the future. Endowments are susceptible to the volatility of the capital markets, so how these funds are invested is critical to the success of this strategy.

### CASE STUDY: Quito Water Fund (FONAG) Endowment

#### SUMMARY

With over 20 years of investment growth, the Fondo para la Protección del Agua (FONAG), based in Quito, Ecuador, has a well-established \$21.5 million endowment that offers flexible, uncorrelated funding to support operations and new research.

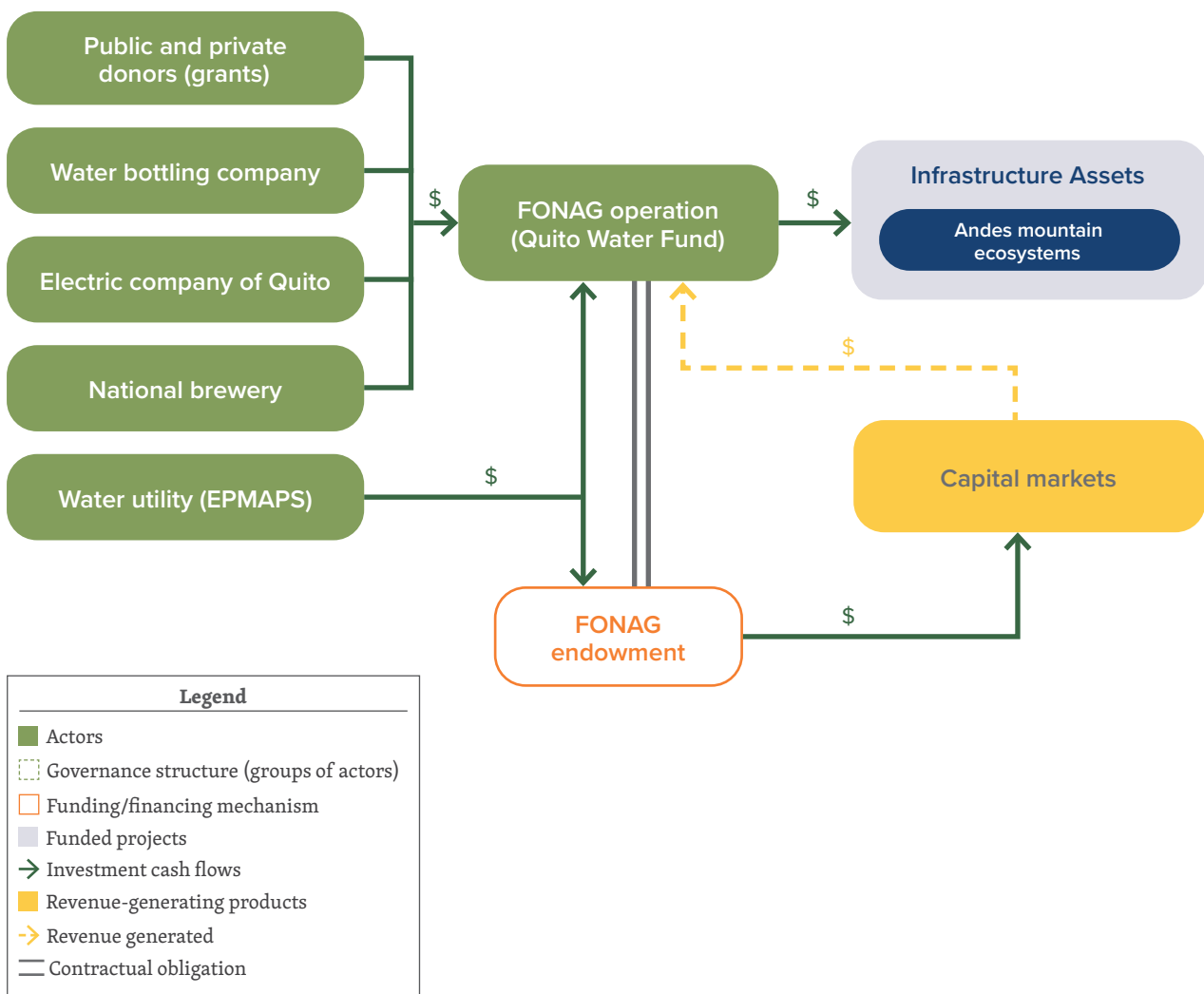
#### BACKGROUND

Quito's 2.4 million residents get their drinking water from the natural Andean páramos, a mountainous ecosystem of sponge-like grasses and cloud forests (FONAG n.d.). Despite government designations as national parks and nature reserves, urban encroachment, overgrazing, and unsustainable farm practices are degrading the ecosystem, threatening downstream water supply and quality (Joslin and Jepson 2018). In response, Quito's water utility (EPMAPS), TNC, and community stakeholders established the first water fund, FONAG, in 2000.

#### ABOUT THE ENDOWMENT FUND

At first, FONAG functioned as an endowment fund. It was capitalized with an initial \$20,000 investment from EPMAPS and \$1,000 from TNC and concentrated on growing its endowment (Joslin and Jepson 2018; Coronel 2019). Over the next seven years, FONAG signed contracts requiring the watershed's diverse beneficiaries to make annual contributions. These beneficiaries include EPMAPS (which contributed 1 percent of its monthly sales income until 2007, when an ordinance was passed requiring it to contribute 2 percent); the electric company of Quito (\$45,000 annually since 2001); the Cervecería Nacional, a national beer company (\$6,000 annually since 2003); and Tesalia Springs, a water bottling company (\$7,000 annually since 2007) (Coronel 2019) (Figure 6).

Figure 6 | FONAG'S DIVERSIFIED FUNDING SOURCES



Source: Authors.

FONAG contracted with partners to perform work on the ground using annual returns from the endowment and grant funding. In 2011, a modified deed allowed FONAG to add 30 percent of EPMAPS’s monthly contributions to help fund these operations (Coronel 2019; de Bièvre 2020).

### ACHIEVING FINANCIAL SECURITY

FONAG’s endowment is now \$21.5 million, and its differentiated funding stream insulates FONAG from the risks and volatility of depending too much on public funding or a single donor. The endowment has strengthened the water fund’s independence and governance structure (Joslin and Jepson 2018), demonstrated its financial longevity, and helped unlock additional funding from international donors and climate funds, tripling FONAG’s internal resources

(Coronel 2019). The combination of endowment returns, land donations, and dedicated contributions has resulted in 35 percent annual average growth of FONAG’s trust fund over the first 18 years of operation (Coronel 2019).

FONAG is required to invest capital from public sources (such as EPMAPS’s contributions) in Ecuadorian public instruments, such as state bonds. FONAG can invest private donations more freely, earning higher returns, but an Ecuadorian 22 percent tax on royalties from abroad makes investing in international capital markets prohibitively expensive (de Bièvre 2020; KPMG Global 2019). Even so, FONAG is able to secure nearly \$1 million (5 percent of the corpus) in annual returns from the endowment, a key contributor to FONAG’s \$2.5 million annual operating budget (Table 6).

**Table 6 | FUNDING SOURCES FOR THE FONDO PARA LA PROTECCIÓN DEL AGUA**

INVESTMENT DETAILS
<b>FONAG operating budget:</b> US\$2.5 million annually
<b>Contributions:</b>
<ul style="list-style-type: none"> <li>● 40% from endowment</li> <li>● 32% from the required 2% contributions from the water utility’s monthly income</li> <li>● 28% from grants from businesses and public and private donors</li> </ul>
<b>Endowment size:</b> \$21.5 million
<b>Average annual returns:</b> \$1 million

Sources: de Bièvre (2020); Coronel (2019).

Dedicated, flexible cash flows from the endowment have allowed FONAG to fund projects that are more risky and provide more social and ecological value than would otherwise be possible—such as protecting over 33,000 hectares from harmful grazing or burning, restoring 2,500 acres with native species, and supporting performance evaluation studies, like the one that recently found the water utility’s return on investment (ROI) provided \$2.15 for every \$1 invested over the past 20 years (FONAG n.d.). FONAG is now exploring the possibility of monetizing the soil carbon benefits of the Andean páramos. If FONAG was solely reliant on inconsistent, undifferentiated funding, this high-risk and potentially high-reward project might never have gotten off the ground.

## ENABLING CONDITIONS

FONAG’s endowment, \$21.5 million and growing, is the result of strong governance policies and regulatory frameworks that secured dedicated funding streams and prioritized growing the trust fund. In addition, professional management of the fund also helped secure strong returns. The revenue generated from the endowment offers uncorrelated income streams to project impacts. This flexible funding allows FONAG to allocate resources into higher-risk and higher-touch projects for which funding would otherwise be difficult to secure, including research or community outreach.

## OPPORTUNITIES TO REPLICATE IN LAC

Recognizing that many NBS projects struggle to fund capital expenditures and ongoing operation and maintenance (O&M) costs, setting aside funds for future use can be challenging, particularly when donor and public funds are limited. This barrier underscores the need to bring new funders into this space, like private sector actors, while at the same time planning for the long term. It is critical, therefore, that donors and funders of water and conservation trust funds increase funding allocations to endowments, setting aside requirements for annual impacts.

In LAC, there are many conservation trust and water funds seeking to establish an endowment. LAC is home to 25 water funds and has another 14 in the pipeline (LAWFP 2020). A review of these water funds revealed that 12 water funds have established endowments and 3 are seeking them (LAWFP 2020).



The Andean páramos restored by FONAG. Photo by WRI.

Endowment sizes range from \$60,000 to \$21.5 million, paying \$14,000 to \$1 million in annual returns to their respective funds' operating budgets (for a list of water funds with an endowment, see Appendix B). The Global Environmental Facility recommends a minimum investment threshold of \$5 million to be an effective instrument (UNDP 2016). Ecuador's FONAG and Tungurahua water funds are currently the only endowments above this threshold. Ecuador's FONAG and Tungurahua water funds are currently the only endowments above this threshold, indicating that there is still substantial room to grow. As these water and conservation trust funds mature in LAC, a focus on financial security will strengthen their ability to explore, design, and implement NBS.

## Key Findings from Case Studies

The six case studies show viable pathways to advance the NBS agenda in LAC. The financing instruments they highlight—bonds, loans, land-based financing mechanisms, insurance policies, and endowments—are not new, but their adoption and application to NBS is rare enough to make these projects distinct. They demonstrate that innovative financing can unlock private sector participation and scale up NBS projects to provide a wide range of benefits. But these projects did not succeed in a vacuum. Enabling conditions, policies, and partners provided proof of concept, showing willing payers and beneficiaries the value of NBS. These case studies revealed the following common enabling conditions:

**Scientific modeling and performance data demonstrated the investment value of nature-based solutions.** NBS proved to be a cost-effective risk mitigation strategy to protect current infrastructure delivery services and assets. For the Forest Resilience Bond, the business case that modeled the economic

value of forest health unlocked steady cash flows from the government and utility to repay four loans to finance the restoration. In Quintana Roo, years of scientific modeling made it possible to appropriately quantify financial costs of storms and benefits of coral reef protection to secure steady cash flows and design an innovative insurance policy. In the case of FONAG, even without the detailed science and performance valuation of NBS, downstream companies and utilities recognized the need to invest in the upstream ecosystem to improve water quality. These projects had the capacity and funding to perform these evaluations.

**Public and grant funding help nature-based solutions reach bankability.** While private sector funding is critical to closing the investment gap, public and grant funding underpin every NBS case study, underscoring their importance in catalyzing innovation. Public funds financed the green-gray approach to flood risk mitigation in the Netherlands. Quintana Roo depended on grant funding to support the scientific research and risk modeling needed for the insurance policy. Central Arkansas Water relied on grant funds to support a utility hire. And Blue Forest Conservation, developer of the Forest Resilience Bond, relies on grants for stakeholder engagement, research, and project due diligence to expand the bond.

**Certainty and consistency of cash flows increased investor confidence.** For the green bonds, investors exhibited confidence in the ability of the Dutch government and Central Arkansas Water to collect future payments from taxpayers and ratepayers. For the Forest Resilience Bond, investors were confident that the utility and state would repay the loans.

**Traditional financial instruments accessed green capital for nature-based solutions.** The success of Central Arkansas Water and the Netherlands green bond aligns with empirical research indicating that investors are most inclined to allocate their earmarked green capital when that opportunity is presented in a traditional financing instrument (Cooper and Trémolet 2019).

**Access to the private markets provided financial stability for nature-based solutions.** The private markets serve not only as a source of capital but also as a mechanism to diversify risk. For FONAG, the endowment's investment in capital markets provided uncorrelated returns to support ongoing operations and research. In Quintana Roo, the insurance market spread the financial risk of the Trust for Coastal Zone Management, Social Development, and Security (CZMT) of paying for poststorm response and recovery. By developing and accessing financial tools that reinvest in NBS, NBS projects benefit from longevity, reduced volatility, and diversified revenue streams.

**New partnerships between public and private sector actors broke down industry silos and accelerated innovative approaches.** For instance, the Quintana Roo insurance policy required both the insurance industry's expertise in disaster risk modeling and the scientific and conservation community's knowledge of coral reef performance and life spans. SAC Tacubaya created a new public-private entity to better incorporate stakeholder engagement and res-

idential buy-in in urban planning and infrastructure investments.

**Funding and capacity building were needed, both to design projects and to implement them.** Implementing projects often requires collaboration with partners who have knowledge, expertise, and organizational assets. In Quintana Roo, for example, rapid poststorm response is critical to coral reef survival, so the CZMT must rely on brigades, composed largely of trained volunteers, to react quickly after storms. The insurance payouts help pay and increase the capacity of brigades. Regardless of how much private capital it raised, the California Forest Resilience Bond was only able to accelerate restoration activities because it partnered with the National Forest Foundation to contract for these services. These positions were integral to advancing NBS project stages from planning to implementation to monitoring and evaluation.

The findings across the six case studies reveal the importance of building cross-sectoral partnerships among governments, NGOs, utilities, investors, and residents. Through collaboration, the projects were able to tap the scientific, policy, and business expertise needed. They built the capacity to design more resilient solutions to climate, social, environmental, and economic challenges. This paper has focused on successful strategies for breaking down barriers, but more research should be conducted into the reasons projects fail.



Tahoe National Forest. Courtesy of Blue Forest Conservation.



Trintelzand nature reserve on the Houtribdijk. Courtesy of the Delta Programme.



# RECOMMENDATIONS FOR REPLICATION

Financing nature-based solutions (NBS) is an emerging field with great promise in LAC. If NBS project developers can increase the pipeline of bankable projects and enhance the financial security of NBS projects, the current 156 projects could be scaled to thousands. To reach such a scale, the value proposition of NBS needs to be demonstrated with additional pilots and more bankable NBS projects. This transformation will require new policies and regulations from public sector actors, expertise and project support from development banks, new skill sets and partnerships from NBS project developers, and increased financial commitments and resources from the private sector.

Recommended actions to mainstream NBS include the following:

- **Incorporate NBS into planning and policies** to make the identification of high-value and feasible NBS a routine part of the infrastructure project preparation process, thereby creating a pipeline of investment-ready NBS projects.
- **Integrate NBS into familiar infrastructure financing models**, like green bonds or land-based financing mechanisms. Given concerns about the performance and economic return profile of nature-based solutions, incorporating NBS into traditional financing pathways alongside gray infrastructure (green-gray approach) can meet the minimum investment thresholds, lower transaction costs through project aggregation, and increase investor acceptance and familiarity with NBS.
- **Increase the ease and efficiency of identifying eligible NBS projects in government budgets for green bond issuances.** Governments can meet the growing private sector demand for green bond issuances, while also showcasing progress on SDGs, nationally determined contributions, and biodiversity targets, by developing a framework and tracking system to swiftly classify eligible projects that meet the green bond standards. With a portfolio of NBS and green-gray infrastructure, governments can issue larger bonds, thus decreasing transaction costs, while boosting investor confidence that the proceeds will be used to deliver the climate and environmental benefits. NBS have the potential to leverage these public funds with private sector investments, resulting in a multiplier effect that benefits the economy, society, and the environment.
- **Increase the certainty and consistency of cash flows to increase investor confidence in repayment.** For the green bonds in this brief,

confidence in the repayment cash flows (ratepayers for Central Arkansas Water and taxpayers for the Dutch government) helped finance the green-gray projects at low interest rates. Increasing certainty around government transfers, public and philanthropic grants, and utility or corporate contributions can further support NBS projects in securing debt finance through loans, like the Forest Resilience Bond, or through green bonds. Quintana Roo's insurance policy also increases certainty around cash flows through poststorm payouts when the Trust for Coastal Zone Management, Social Development, and Security needs urgent funding.

- **Increase monetization of NBS.** Monetizing the value of NBS co-benefits, such as capturing the additionality of carbon sequestration through the carbon offset market and/or selling timber products through the forest product market, can provide additional revenue streams to support the financial (and commercial) viability of NBS. These funds can help to raise up-front capital for project development or support ongoing O&M costs, as they do in the case of Central Arkansas Water. While the Forest Resilience Bond and CAW's green bond did not rely on these cash flows to underwrite debt, they could be used to do so in the future, depending on investor confidence in those markets.
- **Demonstrate performance metrics and proof of concept.** Both NBS project developers and investors express a desire for greater clarity correlating the size of investment to financial, environmental, and social impacts. NBS performance is inherently complex and uncertain, as it depends on varying environmental, social, and climate conditions (Browder et al. 2019), and takes years of data collection to assess. Ongoing performance monitoring and evaluations are needed to verify that expectations are met and provide proof



of concept to investors. Funders for NBS should prioritize performance metrics by providing capital up front and promoting public disclosure of findings to further advance understanding of the benefits of NBS.

Recommended actions for the following four key stakeholder groups are as follows:

- **Governments** need to prioritize NBS in budget planning, new policies and regulations, and procurement tenders, ensuring that nature and its associated ecosystem services underpinning long-term economic growth are included in public expenditures.
- **Infrastructure operators** need to build capacity to incorporate NBS into their plans and investments. They can build these skills in-house or seek partners with the necessary scientific and management skills.
- **NBS project developers** need new skills, capacity, and funding for monitoring and evaluation to prove potential returns. NBS project preparation

support would serve these efforts well, and initiatives like an NBS accelerator or a project preparation facility could positively drive NBS adoption and scaling.

- **Development banks, investors, and private sector actors** need to strengthen commitments to science-based green finance targets and better incorporate natural capital into accounting and decision-making. Science-based green finance targets include commitments to align portfolios with the latest climate science to reduce greenhouse gas emissions and increased transparency in reporting progress on these commitments (Yan et al. 2021). They should also continue to deepen their commitment to sustainability because the long-term viability of many business operations is threatened by increased climate uncertainty, ecosystem degradation, and corresponding economic losses.

As more projects enter the investment pipeline, the opportunity to prove the value proposition of NBS will increase. Capturing the lessons learned through this process will be key to guiding and ushering in the next generation of NBS projects.



# APPENDICES

## APPENDIX A. SNAPSHOTS OF CASE STUDIES

<b>DUTCH SOVEREIGN GREEN BOND</b>	
<b>Key actors</b>	Departments of finance, water, and climate management, and national programs dedicated to water infrastructure (Delta Programme), green bond certification organization (Climate Bonds Initiative), third-party verifier (Sustainalytics).
<b>Investment objective</b>	Fund green-gray projects to prevent coastal and inland flooding and erosion; prevent droughts that threaten freshwater security and supply.
<b>Financing solution</b>	Sovereign green bond
<b>Investment details</b>	<p>Issuer: State of the Netherlands</p> <p>Credit rating: AAA</p> <p>Date issued: May 21, 2019</p> <p>Date to maturity: January 15, 2040</p> <p>Bond size: US\$6.68 billion (€5.985 billion)</p> <p>Interest rate (coupon): 0.50%</p> <p>Rate of return at maturity (issuance yield): 0.557%</p> <p>Party responsible for repayment: Dutch Ministry of Finance</p>
<b>Investment outcome</b>	Established natural reserves that provide flood protection to downstream communities and widening of the river to increase floodplain reconnection. New and improved seawalls, flood defenses, and dikes.
<b>Enabling conditions</b>	<p>A dedicated national program (Delta Programme) to address climate and environmental risks, such as sea level rise, flooding, and freshwater availability, established a pipeline of green-gray interventions.</p> <p>A strong credit rating secured a low-interest rate, which offered the Dutch a cheap way to finance infrastructure investments.</p>
<b>Replication opportunities</b>	<p>Chile has already issued sovereign green bonds.</p> <p>As LAC governments prepare additional financing packages address high infrastructure needs, there is significant opportunity to issue green bonds, thus attracting and unlocking a growing amount of earmarked green capital from financial institutions.</p>

## CENTRAL ARKANSAS WATER GREEN BOND

<b>Key actors</b>	Drinking water utility (Central Arkansas Water), national land management agencies (US Forest Service), green bond certification organization (Climate Bonds Initiative), third-party verifier (Sustainalytics)
<b>Investment objective</b>	Prevent forest fractionation and conversion to development, maintaining the forested watershed to naturally filter drinking water and prevent sedimentation. Upgrade outdated water delivery systems.
<b>Financing solution</b>	Certified green bond
<b>Investment details</b>	<p>Issuer: Central Arkansas Water (CAW)</p> <p>Credit rating: AA2</p> <p>Bond purchaser: Morgan Stanley</p> <p>Date issued: November 24, 2020</p> <p>Date to maturity: October 1, 2042</p> <p>Bond size: \$31.8 million</p> <p>Average interest rate: 2.44%</p> <p>True interest cost: 2.136%</p> <p>Amount allocated to NBS: \$10.6 million (33%)</p> <p>Amount allocated to traditional infrastructure: \$21.2 million (67%)</p> <p>Repayment cash flows: ratepayer and watershed protection fees</p> <p>Future sources of revenue: carbon offset fees and timber harvests</p>
<b>Investment outcome</b>	Future CAW acquisition of 4,000 acres in the watershed, increasing watershed protection to 44%. Updated water delivery services, replaced pipelines and generators, to reduce leakage and increase efficiencies.
<b>Enabling conditions</b>	<p>An established funding stream for watershed protection served as a contributing repayment cash flow for the green bond.</p> <p>Motivated leadership showcases its sustainability commitments through green bond issuance.</p> <p>Strong credit rating (AA2) and low interest rates.</p> <p>Opportunity to leverage green bond proceeds to secure federal funding for forest acquisition.</p>
<b>Replication opportunities</b>	<p>LAC subnational governments and utilities with the legal authority to bond finance can utilize the green bond certification process to secure interest from “green” investors, potentially diversifying their investor base.</p> <p>With some of the world’s largest forests and mangroves, LAC is a prime location to explore how the carbon and timber markets can offer diversified revenue streams to infrastructure operators, like water utilities, water funds, or municipalities.</p>

<b>FOREST RESILIENCE BOND</b>	
<b>Key actors</b>	Impact and market-rate investors (Gordon and Betty Moore Foundation, Rockefeller Foundation, Calvert Impact Capital, and AAA Insurance), water and hydroelectric utility (Yuba Water Agency), national and state governments (California Climate Investment Program), and national foundations (National Forest Foundation)
<b>Investment objective</b>	Reduce catastrophic wildfire risk that threatens residents and firefighters and green and gray infrastructure (catastrophic wildfires hinder the forests' ability to provide beneficial services to water and energy utilities).
<b>Financing solution</b>	Forest Resilience Bond (FRB)
<b>Investment details</b>	<p>Investment size: US\$4 million</p> <p>Investors: Gordon and Betty Moore Foundation, the Rockefeller Foundation, Calvert Impact Capital, and AAA Insurance</p> <p>Return on investment for concessional loans: 1%</p> <p>Return on investment for market-rate loans: 4%</p> <p>Borrower: FRB Yuba Project I, LLC</p> <p>Loan type: senior unsecured</p> <p>Term: January 1, 2018–December 1, 2023</p> <p>Repayment: State of California (principal repayments), Yuba Water Agency (principal + interest repayments)</p>
<b>Investment outcome</b>	Forest restoration treatments across 15,000 acres on public lands, reducing impacts to drinking water quality, water availability, and electricity generation as well as damage to property.
<b>Enabling conditions</b>	<p>An analysis of the cost-saving and revenue-generating opportunities associated with forest restoration activities secured a willing payer (Yuba Water Agency), which helped give investors confidence that they would be repaid with interest.</p> <p>Government grants contributed to consistent repayment cash flows.</p> <p>New partnerships supported on-the-ground implementation, overcoming administrative and capacity constraints.</p>
<b>Replication opportunities</b>	<p>Development banks with concessional capital and access to financial structuring capacity can support the replication of blended transactions crowding-in private capital or pairing concessional capital with public funding for disaster risk mitigation projects in LAC.</p> <p>LAC governments and utilities can provide the committed repayment cash flows to secure the up-front private sector capital.</p>

## TACUBAYA LAND-BASED FINANCING MECHANISMS

<b>Key actors</b>	City departments of urban planning (Urban Development Secretariat and Mexico City officials), developers (adherents), community leaders
<b>Investment objective</b>	Address degrading natural and traditional infrastructure in the Tacubaya neighborhood, which contribute to social inequality, congested traffic, inefficient water delivery systems, and stormwater runoff.
<b>Financing solution</b>	Land-based financing mechanisms (building rights transfers)
<b>Investment details</b>	<p>Number of transferable building rights: 960,257 m<sup>2</sup></p> <p>Cadastral values (as a proxy of building rights value): 2,001–7,290 Mexican pesos (\$105–\$383) per m<sup>2</sup></p> <p>Building rights allocated as of December 2018: 212,500 m<sup>2</sup></p> <p>Value of impact fees: 52–379 pesos (\$2.50–\$18) per m<sup>2</sup></p> <p>Sistema de Actuación por Cooperación (SAC) Tacubaya Trust Fund (estimated): ~425 million pesos (~\$22 million)</p>
<b>Investment outcome</b>	Improved public infrastructure, including new transportation center, additional affordable housing, and future water supply through water catchment and water recycling solutions and pipe reinforcement. Future enhancements to drainage and stormwater capacities in public spaces through implementation of rain gardens, bioswales, and bioretention lagoons.
<b>Enabling conditions</b>	<p>SAC Tacubaya benefited from development demand, urban planning, and a legal framework strong enough to enact and enforce land-based financing policies.</p> <p>A transparent governance structure secured public buy-in and assuaged concerns over misapplication of policies and mismanagement of trust funds.</p> <p>Inclusion of NBS in planning for water infrastructure improvements.</p>
<b>Replication opportunities</b>	<p>Land-based financing instruments are well established in many cities throughout LAC, where they are used to finance traditional infrastructure projects.</p> <p>These instruments could help cities across the LAC region incorporate climate mitigation, adaptation, and/or disaster risk management strategies into urban planning and financing packages.</p> <p>Additional studies and demonstration projects correlating land values with NBS infrastructure would help other cities adopt land-based financing instruments for NBS.</p>

## QUINTANA ROO'S INSURANCE POLICY FOR CORAL REEFS

<b>Key actors</b>	Public and government institutions (state government of Quintana Roo), scientific/conservation partners (The Nature Conservancy), tourism operators, community members (brigades), insurance companies
<b>Investment objective</b>	Restore beaches and coastal reefs, which are degrading due to overfishing, pollution, bleaching, and storm damage.
<b>Financing solution</b>	Parametric insurance policy to protect coral reefs and beaches
<b>Investment details</b>	<p>Premiums paid by the Trust for Coastal Zone Management, Social Development, and Security (CZMT)</p> <p>Insurance issuer: Seguros Afirme—Swiss Re (2019) and Seguros Banorte / Global Parametrics and Hannover Re (2020)</p> <p>Policy details: Coverage for 167 kilometers of Quintana Roo coastline</p> <p>Term: 1 year</p> <p>Trigger: wind speeds in excess of 100 knots</p> <p>Maximum payout (annual aggregate limit): US\$3.8 million (2019) and \$2.1 million (2020)</p> <p>Wind speeds between 100 and 130 knots = 40% of payout</p> <p>Wind speeds between 130 and 160 knots = 80% of payout</p> <p>Wind speeds in excess of 160 knots = 100% of payout</p>
<b>Investment outcome</b>	Rapid payments to the CZMT restored and enhanced coral reefs, which protect people, property, and beaches from future storm events and serve as tourist attractions.
<b>Enabling conditions</b>	<p>Robust scientific data, performance metrics, and a clear business case helped the CZMT secure a dedicated funding stream from the government for coastal reef protection and design the parametric insurance policy.</p> <p>The policy required an appropriate trigger event and estimates of restoration costs to calculate payout sizes. Increased boots-on-the-ground capacity enabled a swift response after the storm.</p>
<b>Replication opportunities</b>	<p>Additional coastal reef insurance policies are being piloted in the Mesoamerican Reef, demonstrating strong potential for replication in LAC.</p> <p>Cost-benefit analyses of mangrove coastal forests reveal significant potential to develop an insurance policy for NBS.</p> <p>Additional investment in data collection, monitoring and evaluation, and scientific studies are needed to advance this work to other NBS and regions.</p> <p>NBS project developers and funders should prioritize and allocate funds for these long-term project expenditures.</p>

## ENDOWMENT OF THE FONDO PARA LA PROTECCIÓN DEL AGUA (WATER FUND)

<b>Key actors</b>	Water fund; water utility; electric, water, and beer companies; conservation organizations; public and private donors
<b>Investment objective</b>	Address urban encroachment and unsustainable agriculture practices that impact water supply and water quality.
<b>Financing solution</b>	Water fund with an endowment
<b>Investment details</b>	<p>Fondo para la Protección del Agua (FONAG) operating budget: US\$2.5 million annually</p> <p>Contributions:</p> <ul style="list-style-type: none"> <li>• 40% from endowment</li> <li>• 32% from the required 2% contributions from the water utility's monthly income</li> <li>• 28% from grants and donations</li> </ul> <p>Endowment size: \$21.5 million</p>
<b>Investment outcome</b>	Improve water quality and availability of supply by increasing precipitation capture through increased native vegetation and improved soil health, increasing long-term retention and slowing release into wetlands and water bodies.
<b>Enabling conditions</b>	<p>Strong governance policies secured dedicated funding streams from downstream beneficiaries. Beneficiaries were committed to growing the trust fund to achieve long-term funding to support conservation efforts upstream.</p> <p>The revenue generated from the endowment offers uncorrelated income streams to project impacts, increasing FONAG's financial security.</p>
<b>Replication opportunities</b>	<p>Current endowed water funds (see Appendix B) and conservation trust funds would benefit by continuing to grow the size of their endowment to reach the recommended \$5 million minimum investment threshold.</p> <p>Increasing nonprofit access to the capital markets can help enhance the financial security of nonprofits throughout LAC, including water funds and conservation trust funds.</p>



## APPENDIX B. WATER FUNDS AND THEIR ENDOWMENTS

Through a combination of desktop research and direct outreach to the water funds, the authors compiled the following table outlining the water funds that are investing in endowments.

WATER FUND	LOCATION	FOUNDING DATE	ENDOWMENT (US\$)	RETURNS	REPORTING DATE
Fondo para la Protección del Agua (FONAG)	Quito, Ecuador	2000	21,500,000	7–10%	Dec 2020
Fondo del Agua para la Conservación de la Cuenca del Río Paute (FONAPA)	Paute River Basin, Ecuador	2008	552,167	NA	Dec 2020
Fondo de Páramos Tungurahua y Lucha contra la Pobreza	Tungurahua, Ecuador	2008	4,157,967	NA	Dec 2020
Agua Somos	Bogotá, Colombia	2009	222,000	NA	Apr 21
Agua por la Vida	Cauca Valley, Colombia	2010	258,431	NA	Dec 2020
AQUAFONDO	Lima, Peru	2010	440,000	NA	Dec 2020
Cuenca Verde	Medellín, Colombia	2013	1,649,989	3.70%	Apr 21
Fondo de Agua Metropolitano de Monterrey (FAMM)	Monterrey, Mexico	2014	434,687	NA	Dec 2019
Fondo para la Conservación del Río Daule (FONDAGUA)	Daule River Basin—Guayaquil, Ecuador	2015	116,354	NA	Dec 2020
Alianza Bio Cuenca	Cúcuta, Colombia	2015	61,382	NA	Dec 2020
Fondo de Agua Santo Domingo	Santo Domingo, Dominican Republic	2015	417,415	NA	Dec 2020
Yaque del Norte	Santiago/Cibao, Dominican Republic	2015	296,805	NA	Dec 2020

Source: Authors, compiled from TNC data and LAWFP (2020). This is not an exhaustive list.

## APPENDIX C. CASE STUDIES AND CONTRIBUTIONS

**Case studies:** Case studies were selected by consulting conservation finance databases, networks, and individual organizations, in addition to contributions from the Regional NBS Project Scan (Ozment et al. 2021). The selection of the case studies sought a diversity of projects supporting different infrastructure sectors, financing mechanisms, geographies, and NBS interventions.

The consulted databases and conservation finance organizations included the following:

- Asian Development Bank's Nature-Based Solutions Building Resilient Cities: <https://development.asia/summary/nature-based-solutions-building-resilient-cities>.
- Caribbean Biodiversity Fund: <https://www.caribbeanbiodiversityfund.org/news/99-overview-of-the-eba-facility-first-call-for-proposals-grantees-and-projects>.
- Coalition for Private Investment in Conservation: <http://cpicfinance.com/blueprints/>.
- Connecting Nature's Financing and Business Models: <https://connectingnature.eu/financing-and-business-models>.
- Conservation Finance Alliance: <https://www.conservationfinancealliance.org/>.
- Conservation Finance Network: <https://www.conservationfinancenetwork.org/>.
- Conservation Finance Network's Conservation Finance Toolkit: <https://conservationfinancenetwork.org/series/conservation-finance-toolkit>.
- Conservation Finance Research: <https://www.conservationfinance.ch/resources/>.
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- Sustainable Finance Infrastructure Finance Portal supported by MAVA Foundation and IISD. <https://infrastructure.iisd.org/research-reports>.
- TNC's NatureVest: <https://www.nature.org/en-us/about-us/who-we-are/how-we-work/finance-investing/naturevest/>.

**Interviews:** WRI and the IDB conducted 18 interviews with institutional investors and NBS project developers to discuss the challenges in their respective fields to financing NBS. The interviews capture perspectives from private equity funds, institutional investors, insurance companies, development banks, foundations, governments, and NGOs. The authors would like to thank the following people for their participation:

- Keith Alger (Green Climate Fund)
- Yolanda Alonso (Mexico City Environmental Development Secretariat)
- Michael S. Bennett (World Bank)
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- Bert de Bièvre (FONAG)
- Laurice Boonman (Ministerie van Financiën [Dutch Ministry of Finance])
- Jongman Brenden (World Bank).
- Carla Chizmar (Corporación Interamericana para el Financiamiento de Infraestructura)
- Naomi Cooney (World Bank)
- Chip Cunliffe (AXA)
- Eger Douglas (Intrinsic Value Exchange)
- Ana Laura Elizondo (FEMSA Foundation)
- Abby Gritter (Blue Forest Conservation)
- Rashmin Gunasekera (Willis Re)
- Joop Hessels (ABN AMRO Bank N.V.)
- Rubem Hofliker (Swiss Re)
- Carlos Hurtado (FEMSA Foundation)
- Eduardo Juárez (Mexico City Urban Development and Housing Secretariat)
- Julie Katzman (Intrinsic Value Exchange)
- Steven King (Campbell Global)
- Zach Knight (Blue Forest Conservation)
- Raven Lawson (Central Arkansas Water)
- Scobie Mackay (Macquarie Group)
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- Rafael Obregón (Mexico City Environmental Development Secretariat)
- Eric Payen (Swiss Re)
- Chiabesa Pensulo (Green Climate Fund)
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- Jamie Rhodes (Refocus Partners)
- Bryan Rupar (Central Arkansas Water)
- Karen Sack (Ocean Risk and Resilience Action Alliance)
- Walter Vergara (20x20 Initiative at World Resources Institute)
- Alberto Voulminot (Global Forest Partners)
- Mark Way (The Nature Conservancy)

## ABBREVIATIONS

<b>BFC</b>	Blue Forest Conservation
<b>CASWM</b>	climate adaptation and sustainable water management
<b>CAW</b>	Central Arkansas Water
<b>CBI</b>	Climate Bonds Initiative
<b>CZMT</b>	Trust for Coastal Zone Management, Social Development, and Security (Coastal Zone Management Trust)
<b>EPMAPS</b>	Empresa Pública Metropolitana de Agua Potable y Saneamiento (Quito, Ecuador, water utility)
<b>FONAG</b>	Fondo para la Protección del Agua (Water Protection Fund)
<b>FRB</b>	Forest Resilience Bond
<b>GBP</b>	Green Bond Principles
<b>ICMA</b>	International Capital Market Association
<b>IDB</b>	Inter-American Development Bank
<b>LAC</b>	Latin America and the Caribbean
<b>MAR</b>	Mesoamerican Reef
<b>NBS</b>	nature-based solutions
<b>NGO</b>	nongovernmental organization
<b>O&amp;M</b>	operation and maintenance
<b>SAC</b>	Sistema de Actuación por Cooperación (Acting by Cooperation System)
<b>SDG</b>	Sustainable Development Goal
<b>SFI</b>	Sustainable Forestry Initiative
<b>TNC</b>	The Nature Conservancy
<b>USFS</b>	US Forest Service

## ENDNOTES

1. They can mitigate disaster risk (Ozment 2019), boost portfolio resilience (Cooper and Trémolet 2019), deliver significant cost savings and/or generate consistent returns (Ozment et al. 2018), spur inclusive economic growth and job creation (Edwards et al. 2013), promote human health and well-being, improve food and water security, and protect biodiversity and habitat (Cohen-Shacham et al. 2016).
2. The cost-benefit analysis of mangrove coastal forests in the Caribbean compared the economic benefits of the flood risk reduction to the cost of mangrove restoration (estimated at \$23,000 per hectare) over 30 years using a 7 percent discount rate. It identified over 3,000 kilometers of coastline in 20 countries and territories, where the cost-benefit ratios showed that the value of mangrove flood protection exceeded the cost of mangrove restoration by 2, 3, and 10 times (Beck et al. 2020).

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