Viva Água Movement: Guanabara bay, Rio de Janeiro, Brazil

Nature-Based Solutions in Latin America and the Caribbean

REGIONAL STATUS AND PRIORITIES FOR GROWTH

ABOUT THE AUTHORS

Suzanne Ozment is Senior Associate with WRI's Cities4Forests and Natural Infrastructure Initiative.

Maggie Gonzalez is an Analyst with WRI's Restoration Initiative.

Anelise Schumacher is an Investment Associate with 12Tree. She was formerly a consultant to the project supported by the Pan-American Development Foundation.

Emmie Oliver is an Analyst with the WRI's Natural Infrastructure Initiative.

Mariana Silva is a Senior Partnerships Specialist at the World Bank. She was previously a Sustainable Infrastructure Specialist in the Climate Change Division of the Inter-American Development Bank.

Alfred Grünwaldt is a Senior Specialist in the Climate Change and Sustainability Sector at the Inter-American Development Bank.

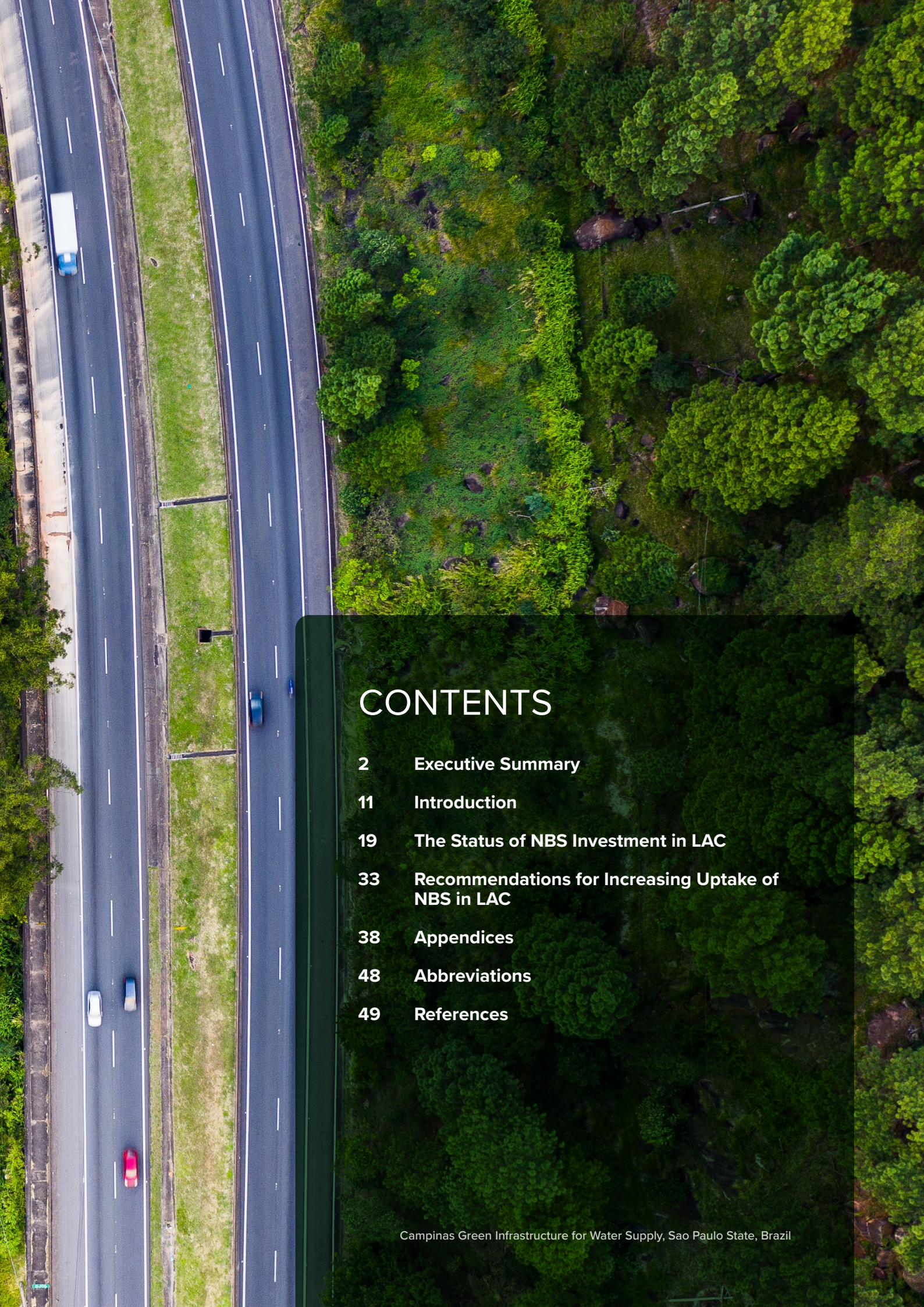
Gregory Watson is a Lead Specialist of the Natural Capital Lab in the Climate Change and Sustainable Development Sector at the Inter-American Development Bank.

Suggested Citation: Ozment, S., M. Gonzalez, A. Schumacher, E. Oliver, G. Morales, T. Gartner, M. Silva, G. Watson, and A. Grünwaldt. 2021. "Nature-Based Solutions in Latin America and The Caribbean: Regional Status and Priorities for Growth." Washington, DC: Inter-American Development Bank and World Resources Institute.

Cataloging-in-Publication data provided by the Inter-American Development Bank Felipe Herrera Library

Nature-based solutions in Latin America and the Caribbean: regional status and priorities for growth / Suzanne Ozment, Anelise Schumacher, Maggie Gonzalez, Emmie Oliver, Gabriela Morales, Todd Gartner, Mariana Silva, Alfred Grunwaldt, Gregory Watson.
p. cm. — (IDB Monograph ; 955)
Includes bibliographic references.
1. Finance-Environmental aspects-Latin America. 2. Finance-Environmental aspects-Caribbean Area. 3. Economic development projects-Environmental aspects-Latin America. 4. Economic development projects-Environmental aspects-Caribbean Area. 5. Investments-Environmental aspects-Latin America. 6. Investments-Environmental aspects-Caribbean Area. I. Ozment, Suzanne. II. Schumacher, Anelise. III. Gonzalez, Maggie. IV. Oliver, Emmie. V. Morales, Gabriela. VI. Gartner, Todd. VII. Silva, Mariana. VIII. Grunwaldt, Alfred. IX. Watson, Gregory. X. Inter-American Development Bank. Climate Change Division. XI. Series.
IDB-MG-955

JEL Codes: O13, O18, O19, O44, Q54, Q56, Q57, R11
Keywords: Nature-based Solutions, Sustainable Infrastructure, Climate Resilience, Green Infrastructure, Natural Disaster Risk Management, Natural Capital, Climate Change Adaptation, Infrastructure Services, Water and Sanitation, Transportation, Energy, Housing and Urban Development, Biodiversity



CONTENTS

Campinas Green Infrastructure for Water Supply, Sao Paulo State, Brazil

Highlights

- Nature-based solutions (NBS) can contribute to equitable and sustainable development across Latin America and the Caribbean (LAC). They represent an important investment opportunity for national and subnational governments, infrastructure service providers, development banks, and corporations.
- Examining the status of NBS efforts and results within the region can shed light on what is required to drive more investment toward NBS projects. To chart a pathway forward, this issue brief provides a regional review of NBS projects, their status, and implications for investment.
- This study identified 156 projects in LAC that utilize NBS, either on their own or in combination with gray infrastructure, to secure water supply, improve water quality, reduce landslide risk, or help manage urban flooding, river flooding, or coastal flooding and erosion.
- The projects utilize a broad range of NBS that help to restore and conserve LAC's forests, grasslands, mangroves, floodplains, riparian ecosystems, coral reefs, urban parks, and bioswales; create permeable pavements; and encourage sustainable farming.
- Most projects identified in this study aim to benefit the water and sanitation sector, and are in Mexico, Colombia, Peru, or Brazil. There is still much room for further adoption of NBS.
- While many projects are being implemented, over half are still in the preparation stage, and most are still seeking funding or financing to ensure they can reach the scale that delivers the benefits they envision.

EXECUTIVE SUMMARY

The Role of Nature in Closing LAC's Development Investment Gap

As the world recovers from the global recession and pandemic, investment in development projects and infrastructure is poised to surge (World Bank 2020)**.** But channeling that investment into traditional infrastructure, often built with concrete and steel, risks accelerating greenhouse gas emissions, climate change, environmental degradation, and biodiversity loss. This means that many proposed carbon-intensive recovery investments are more likely to deepen inequality and undermine future economic growth (OECD 2021). Yesterday's infrastructure strategies cannot protect communities and economies from today's multiplying threats (Browder et al. 2019).

Governments, investors, and infrastructure service providers have other options: nature-based solutions, or investments in the strategic restoration, protection, or management of ecosystems. Unmet infrastructure needs, and the coming wave of investments, offer an unprecedented opportunity to drive finance to these new strategies and programs.

Thinking beyond shovel-ready concrete "gray" infrastructure projects, and embracing the rapid groundswell of NBS, will foster both economic development and healthy ecosystems. NBS can build stability and resilience to future shocks by providing a buffer against natural disasters and other impacts of climate change. They can help ensure access to water, power, and mobility. For example, restoring watersheds can improve water quality, urban green spaces can reduce stormwater pollution, and protecting mangroves and coral reefs can reduce coastal flood risk. By safeguarding traditional infrastructure from damage and wear and tear, NBS can also save money for infrastructure service providers and their investors. They can reduce both up-front investment and operations, maintenance, and long-term costs. By directly benefiting communities and meeting their infrastructure needs, NBS can also help countries reach their climate commitments and Sustainable Development Goals (SDGs).

An NBS investment can often benefit multiple sectors and communities simultaneously. A project that restores mangroves, for instance, can generate many of these co-benefits. It not only reduces the risk of flood and storm surge for coastal communities but also can improve water quality, increase fish populations for food security, provide habitat for many species, and sequester carbon. Plus, restoring and sustainably managing mangroves can create jobs and improve livelihoods for local communities.

This brief focuses on NBS that target specific infrastructure goals such as protecting or enhancing water supplies and reducing the risks of floods and landslides. NBS may be implemented on their own or integrated into traditional "built" infrastructure systems, which is often referred to as green-gray infrastructure. Green-gray infrastructure is a subset of NBS that strategically preserves, enhances, or restores elements of a natural system to deliver infrastructure services that are better, more resilient, and less expensive (Browder et al. 2019).

Unlocking investment in NBS is critical to accelerating progress. It widens the options and enhances the appeal and feasibility of NBS for governments and infrastructure service providers. Widespread infrastructure investment creates ample opportunity for scaling NBS. Between 2008 and 2017, LAC poured about US$125 billion per year into infrastructure, or roughly 2.8 percent of regional gross domestic product (GDP) per year (Cavallo et al. 2020). That rivals what the entire world spends annually on biodiversity conservation (Paulson Institute 2020). Routing even a small share of LAC infrastructure spending to NBS would represent a major new funding source for environmental sustainability.

Despite their proven potential and cost-effectiveness in isolated cases, NBS are still underutilized in development and infrastructure planning and investment. Policy and regulatory frameworks are one reason why. Most were developed without considering NBS. Planners often lack the data they need to make a business case for NBS. Governments, utilities, or others may not have financing instruments that recognize NBS value or may lack the knowledge, tools, and know-how they need (Watkins et al. 2019; Browder et al. 2019). But the knowledge gap is closing. New guidance has come from the Inter-American Development Bank (IDB) (Silva et al. 2020), the World Bank, World Resources Institute (WRI) (Browder et al. 2019), the International Union for Conservation of Nature (IUCN) (Cohen-Shacham et al. 2019), Conservation International (2020), and several other institutions highlighted throughout this report. These explanations of how to incorporate NBS into project planning and execution make scaling possible. The problem is that these tools are rarely used by those driving infrastructure and development decisions on the ground.

About This Issue Brief and the Series

To help chart a pathway forward, this issue brief examines the status of NBS efforts and results in the region to shed light on obstacles to progress and ways to overcome them. It is the first regional review of NBS projects, their status, and implications for investment. The review examines key sectors (i.e., water and sanitation, housing and urban development, energy, and transportation) and investment objectives (improved water quality and supply, flood risk mitigation, and landslide risk and erosion). It presents the current baseline of NBS adoption in LAC, drawing on a dataset of 156 projects identified in 2020. Sources include publicly available information, email correspondence, and semistructured interviews over several months. This study's scope is limited and surely more, perhaps many more, NBS projects in LAC are not captured.

The intended audience includes a broad range of stakeholders key to advancing NBS, among them national and subnational governments, infrastructure service providers, donors, development banks, other financial institutions, and civil society. It explores and explains why and where to invest in NBS, and how to set enabling conditions for scaling. It covers various NBS strategies, intended benefits, targeted sectors, and which stakeholder groups are developing and leading these projects. It also describes financing and financial instruments project planners are using or seeking to implement NBS.

This brief is one in a three-part series of knowledge products that aims to set an agenda for key decision-makers and investors for why and where in LAC to invest in NBS and to provide guidance on how to set enabling conditions for scaling. It offers a baseline analysis of the status and trends of NBS

activities—both broadly throughout LAC and specifically in IDB operations. It explores the institutional, economic, and financial conditions required to scale up NBS investment and outlines strategies to apply them to the LAC context that decision-makers can build upon to drive increased support for NBS. The series also includes two companion briefs:

- "Nature-Based Solutions in Latin America and the Caribbean: Financing Mechanisms for Replication" reviews innovative financing models worldwide that are advancing NBS to cost-effectively meet SDGs and mitigate the negative impacts of climate change. This issue brief aims to connect unmet NBS investment needs with underutilized financial resources, by sharing evidence of what is working well, identifying opportunities to adapt and transfer to the LAC context, and highlighting five proven strategies that leverage private capital to finance NBS. These include green bonds, land-based financing strategies, blended market-rate and concessional loans, endowments, and insurance policies.
- "Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank" reviews 28 green-gray and NBS projects in the Infrastructure and Energy Sector and the Climate Change and Sustainable Development Sector at the IDB, 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.


Forestación de Zonas de Recarga Hídrica y Protección de Fuentes de Agua, Río Rocha Basin, Bolivia

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. It is produced by the Inter-American Development Bank and World Resources Institute with support from Cities4Forests, the FEMSA Foundation, and the Pan-American Development Foundation.

The Growing Wave of NBS Projects

The study identified 156 NBS projects across the region, at different stages of development and with varying records of success in securing funding or finance. Figure ES-1 highlights a few representative projects from across the region. Some of these models have excelled at securing funding to achieve bankability (i.e., ability to access external financing) or financial viability (i.e., sufficient resources to fully implement and sustain operations into the future through a long-term financial strategy). For example, in 2014 Peru passed a national law that requires water utilities to invest between 3 and 5 percent of their revenues in NBS, which has resulted in the creation of 40 conservation funds, each developing or implementing NBS projects that generate direct benefits for the water utilities (Acosta 2021). The Quito Water Fund has established a $21.5 million endowment to fund conservation activities in water-critical parts of its source watershed (de Bièvre 2020). And the Bahamas Ministry of Works and Urban Development obtained a $35 million loan from the IDB to build coastal resilience through green-gray infrastructure that combines seawalls and levees with coastal ecosystem management to optimize protection of coastal infrastructure and communities (IDB 2020a).

Many more projects are in the pipeline, with the potential to enhance the performance of infrastructure services and to stimulate green development. Most projects studied (53 percent) are still in preparation and not yet implemented. Luckily, robust guidance exists to help these efficiently reach investment-readiness (e.g., Browder et al. 2019; Silva et al. 2020). An impressive 69 NBS projects have already moved beyond the initial pilot phase. With the right support, these projects have the potential to become success stories and generate lessons that will help and encourage others. Even so, support must be ramped up to prepare these projects for investment and effective implementation, as well as to adopt NBS where uptake is currently lacking.

Figure ES-1 | GEOGRAPHIC DISTRIBUTION OF 156 PROJECTS AND EXAMPLES

Sources:

[1] *miPáramo (2020).*

[2] *Clever Cities (2020).*

[3] *Aquafondo (2020).*

[4] *Bolio Acero and Chuc (2020).*

[5] *GFDRR (2020).*

[6] *Barbieri (2020).*

Table ES-1 | MOST COMMON TYPES OF LEADING ENTITIES IN NATURE-BASED SOLUTIONS PROJECTS

TYPE OF PROJECT LEAD	NUMBER OF PROJECTS
Local or national nongovernmental organization (NGO)	40
National government	37
Local government	30
International NGO or international organization	20
Infrastructure service provider	11
Private company or private foundation	9
Academic and/or research institution	5
Other	4

Source: Authors.

NBS Can Deliver Critical Services to LAC's Population

This review of projects found that many projects focus on tackling critical water quality and quantity challenges. Over half aim to generate co-benefits in terms of job creation and livelihood enhancement, and over half seek to protect or promote biodiversity, while many projects also aim to address local food security and human health needs.

NBS are most successful when they meet the needs of local communities (Browder et al. 2019; Cities-4Forests 2020). Community engagement is critical to ensuring community buy-in. Most projects (78 percent) emphasize the importance of community engagement from the earliest stages of planning through implementation. Interviews and project documents identified an explicit gender focus in 28 percent of the projects. These projects' collective track record on gender equity and community engagement is not yet clear, and further research is needed to determine their effectiveness.

Investing in robust monitoring and evaluation and sharing results is critical to proving the concepts behind NBS. This, in turn, builds financial and political support for these types of projects. Sixty reviewed projects already have plans in place to monitor and evaluate their biophysical and/or socioeconomic impacts, and 23 aim to develop these plans. However, only 9 of them provided results, and so far most results seem inconclusive. This collection of projects represents an untapped network of experiments that could deliver meaningful and robust findings to support effective NBS design and adaptive management across the region.

Who Has Championed NBS

While diverse stakeholder groups are key to advancing NBS in LAC, civil society and government are leading the development of most projects (Table ES-1). Nongovernmental organizations (NGOs) are leading 60 (38 percent) of the NBS projects, while governments (national or subnational) are leading 67 (43 percent) of the projects. Governments' roles vary from project developers or leads to implementing partners, project funders, and approving bodies that ensure NBS compliance with regulation. Sometimes multiple levels of government are involved. National governments were mentioned as partners in 105 of the 156 projects; subnational governments are partners in 111 of the projects. This is commensurate with the high level of support governments provide to traditional infrastructure (Serebrisky et al. 2018). About

half of the projects rely on domestic public funding, while for 19 percent of the projects the government is the primary source of funding. (This is similar to how traditional infrastructure is financed.) The level of support of government partners varies from case to case, however, and increased government involvement is still necessary in most situations.

Seventy-two percent of projects aim to benefit the water and sanitation sector. These projects are also most advanced at engaging infrastructure service providers, primarily water utilities. Other infrastructure service providers, such as road and transportation agencies, port authorities, and power companies, are much less frequently involved in NBS projects. Infrastructure service providers can benefit directly from NBS through improved water quality, flood risk reduction, and so on, and may be willing and able to pay for these benefits through dedicated fees, tariffs, or taxes, if they perceive the benefits to be sufficiently secure and valuable. A total of 47 projects list infrastructure service providers as partners (and 19 of these projects actually receive financial support from an infrastructure entity). Of these, 40 projects focus primarily on improving water quality or quantity. Many of the NBS projects reviewed demonstrate that the housing, transportation, and energy sectors also stand to benefit significantly from NBS. There is room for expanded support of NBS across all infrastructure sectors examined in this study, including water and sanitation, transportation, energy, as well as housing and urban development.

More government leadership is key to unlocking private investment in NBS. When governments are in leadership positions on these projects, they can tap relationships with investors like development banks or companies to overcome funding challenges. Currently, government-led NBS efforts are supported mainly through grants, but because grant funding is limited and inconsistent, other forms of financing are needed. Infrastructure lending instruments offer a promising opportunity to finance NBS and green-gray infrastructure. NBS should be eligible for this type of finance because integrating green and gray infrastructure can generate cost savings and enhance the performance of infrastructure projects (Browder et al. 2019; discussed further below). The review revealed a few cases where country governments are willing to borrow for NBS projects and development banks are willing to offer technical assistance grants as well as loans (Oliver et al. 2021). Blended finance is also on the rise, opening up additional opportunities for the public sector to obtain additional capital and scale its role as an NBS champion.

Restoration plots in the Corredor de Conservacion Chingaza-Sumapaz project, Bogota, Colombia

Coordination among sectors is vital. NBS can achieve multiple infrastructure objectives simultaneously, potentially contributing benefits to multiple sectors. Despite this potential, about half of the projects focused on providing benefits for just one sector. Cross-sector coordination and joint investment will help diversify and increase funding sources, ultimately helping to achieve the full range of benefits and long-term sustainability that make these projects work (Browder et al. 2019).

There Is an Unseized Investment Opportunity in NBS

Many NBS projects are grant-based and may lack financial security, whereas others draw on ample up-front investment and stable cash flows for long-term operation and scale. Nearly three-quarters of the projects currently rely on grants as a core part of their funding model, while 45 percent are solely grant-based at this time (this includes a third of the operational projects). A quarter of the projects that mainly rely on grants have also leveraged economic or return-based financing instruments such as tax revenue, loans, utility surcharges, or fiscal transfers to fund their activities, in combination with the grants.

About 60 percent of all projects are actively seeking funding or investment finance (of these, 75 percent are under preparation and 25 percent are at an operational stage). Approximately one-quarter of projects are currently considering the adoption of a new financing strategy beyond grants that provides better financial security. Several of these projects aim to leverage grants with other financing instruments. Many aspire to secure dedicated funds from infrastructure utility rates or surcharges. And a rare few are attempting to tap into private investment and sustainable business models to fund their work.

Integrating NBS into traditional infrastructure (often referred to as green-gray infrastructure) is key for optimizing benefits and unlocking investment, but the integration still needs to be put into practice. Eighty-two projects are strictly green (i.e., the interventions are solely focused on protecting or enhancing natural ecosystems, such as forests, wetlands, and mangroves). Seventy-four are deemed green-gray (i.e., solutions that implement NBS alongside traditional infrastructure, such as urban drainage systems that incorporate bioretention and other natural components to enhance stormwater management). Urban flooding is the only investment objective for which green-gray is used more than green alone. The level of integration of green-gray components varies. While many projects have pursued green and gray as thematically related components, in practice the components operate separately and are not monitored or managed as an integrated unit. Moreover, few project developers have conceived of integrated green-gray infrastructure early enough in planning to optimize system performance.

Restoration in the Extrema Water Fund, Brazil. Photo by WRI Brazil.

More project preparation support is crucial. While the broad benefits of NBS are substantial, the projects must be designed with monetizable benefits in mind. This can enable them to tap into the funding and financing they need to reach full operational scale. NBS benefits can include cost savings to infrastructure service providers (e.g., water treatment cost reductions, avoided costs of repairs due to fewer landslides) or revenue-generating opportunities (e.g., sale of sustainable forest products from lands being managed for NBS benefits). In the former case, NBS benefits to infrastructure services take time to materialize and the economic value often hinges on an appreciation of future savings from mitigating risk and avoiding costly damage. Integrating the monetary valuation of benefits during the early stages is key to translating the complex biophysical reality into economic terms that inspire greater confidence in funders. This, in turn, can unlock additional resources to implement and scale projects (Altamirano et al. 2021). Technical assistance aimed at transitioning projects into more financially secure models and increasing their engagement with infrastructure service providers will be critical to ushering in the next wave of NBS projects across the region.

The region is on the verge of a transition from experimenting with NBS to adopting it on a much wider scale that can transform infrastructure planning and investments. The adoption of NBS will make better use of public resources and generate multiple benefits that align with SDGs.

Making this leap will require action from all key stakeholder groups, particularly governments, infrastructure service providers, civil society, the private sector, and financial institutions such as development banks. Strengthening cross-sector collaboration will cultivate an enabling environment that supports NBS, unlocks new forms of finance, and helps NBS projects flourish. A key to cross-sector collaboration will be monetizing and demonstrating the cash flow advantages to the various sectors that stand to benefit.

To move beyond the 156 projects and mainstream NBS into infrastructure investments, governments, infrastructure service providers, and their development partners need to routinely consider NBS during project preparation and operations.

Screening for opportunities to integrate NBS into infrastructure projects as early as possible during planning and project identification is ideal; however, NBS considerations can be made at any stage of project preparation or even during implementation. Efforts to support capacity building, partnership building, and project preparation (evaluating and designing the financial, legal, and social arrangements, etc.) are critical to helping NBS scale. To do this well, it is important to capture lessons learned and apply them to future projects.

Restoration in Costa Rica. Photo by Aaron Minnick/WRI.

Green corridors line roads in Campinas, Brazil. Photo by WRI Brasil/Flickr

INTRODUCTION

Latin America and the Caribbean (LAC) face gaps in infrastructure service provision. Much more investment is needed to meet rising demand, especially considering the threats climate change poses to water and sanitation, energy, transportation, and urban centers. Only 31 percent of LAC's total population has access to safely managed sanitation services (World Bank 2017). LAC is expected to require roughly US$55 billion in new investments in ports by 2040 (Quiroz 2016). Electricity demand in LAC is expected to jump 72 percent between 2016 and 2030 (Paredes 2017).

Between 2008 and 2017, LAC invested about $125 billion per year in its infrastructure (equivalent to 2.8 percent of regional GDP per year), but projections are that the region needs to invest $179 billion to $313 billion annually (Cavallo et al. 2020). The impacts of climate change heighten the need for new infrastructure: protecting coastal areas from sea level rise and storm surge, tapping new water sources as hydrological regimes shift, and greening urban areas to alleviate extreme heat are just a few examples. Climate change also increases costs of maintaining existing infrastructure—the IDB estimates additional resources equivalent to 5 percent of investments are needed to make the region's existing infrastructure resilient to climate change (Cavallo et al. 2020). Using traditional "gray" infrastructure structures (dams, seawalls, roads, pipes, water treatment plants, etc.) alone would push costs toward the higher end of these estimated spectrums and may fail to withstand the stresses of a changing climate and sustainably meet infrastructure needs.

LAC remains one of the most biodiversity-rich regions on the planet, but its natural resources continue to be exploited. In 2019 LAC lost more tropical primary forest than any other region on Earth (Weisse and Goldman 2020). Brazil, Bolivia, Colombia, and Peru all ranked among the top 10 tropical countries suffering the most primary forest loss worldwide that year (Weisse and Goldman 2020). More than 75 percent of the Caribbean's coral reefs are in jeopardy as well (Waite et al. 2014).

Ecosystem degradation heightens vulnerability to natural hazards, raises operating costs, disrupts service delivery, threatens populations, and increases the risk of infrastructure damage and system failure.

- Together, LAC's cities gain half a million new residents each month (IDB n.d.). Informal settlements are spreading and encroaching into areas vulnerable to natural hazards, such as landslide-prone slopes or river floodplains (UN Habitat 2015). An estimated 160 million people across 70 major cities in LAC are exposed to urban flood risk (Tellman et al. 2018).
- The deforestation of the Amazon is impacting hydrological patterns across the region and threatening water supplies for Brazil's major metropolises (Lovejoy and Nobre 2018).
- Andean hydropower plants representing 732 megawatts (MW) of installed capacity rely heavily on now-retreating glaciers for inflow during dry seasons (Buytaert et al. 2017).
- Vanishing mangrove forests in the Caribbean lead to increased erosion and flooding, directly threatening critical transportation assets (i.e., airports, seaports, and road networks) on which the region's economy relies (GFDRR 2020). Estimates from the UN Environment Programme (UNEP) indicate that continued degradation trends of the Mesoamerican Reef will result in an average annual economic loss of $3 billion (UNEP 2018).

The need is clear for a new generation of infrastructure that unifies the management of built infrastructure and of the natural systems it relies on (Browder et al. 2019). Interventions to protect and revitalize ecosystems can complement, enhance, and safeguard built infrastructure.

Nature-Based Solutions for LAC

Nature-based solutions (NBS) can help achieve tangible development objectives such as water security, flood and landslide risk reduction, climate change mitigation, and human health enhancement. NBS, on their own or in the form of green-gray infrastructure, provide a variety of valuable benefits to society (Box 1), many of which directly help to meet countries' commitments to the Sustainable Development Goals (SDGs) and the Paris Climate Agreement (UNEP 2019), underpin community well-being, and cost-effectively improve infrastructure service delivery. The contributions of NBS to specific SDGs can be seen in Table 1 (Conservation International 2020).

Often, the most tangible and measurable benefits of NBS accrue to infrastructure sectors, such as water and sanitation, transportation, energy, as well as housing and urban development. Integrating nature into mainstream infrastructure systems can produce lower-cost and more-resilient services (Browder et al. 2019). In LAC, examples of significant benefits abound:

Urban water management: NBS can enhance water security for cities through improved water supply as well as flood risk reduction. For instance, Tellman et al. (2018) estimated the hydrological benefits of NBS for 70 major cities in LAC and found that the greatest opportunity is for improved water quality (72 million people in 27 cities), followed by stormwater flood mitigation (44 million people in 14 cities), and riverine flood risk mitigation (5 million people in 13 cities). (Refer to Figure 1.)

By enhancing urban water management, NBS applied in cities can also help protect urban mobility infrastructure and housing from floods, storm surges, and landslides.

Box 1 | BENEFITS OF NATURE-BASED SOLUTIONS

The widely acknowledged benefits of nature-based solutions (NBS) directly help to meet countries' commitments to the Sustainable Development Goals (SDGs) (WWAP/UN-Water 2018) and the Paris Climate Agreement (UNEP 2019), including the following objectives:

- **Securing water resources (SDGs 6, 14):** Research (McDonald and Shemie 2014) on cities' water supplies shows that by conserving and restoring upstream forests, water utilities in the world's 534 largest cities could better regulate water flows and collectively save $890 million in treatment costs each year.
- **Mitigating disaster risk (SDG 11):** NBS often have a primary purpose of mitigating flooding, enhancing water quality, or securing water flows in ways that reduce the costs needed to fill service gaps (Browder et al. 2019; WWAP/UN-Water 2018). NBS can also help mitigate the risk of disasters, including catastrophic wildfires, landslides, and coastal and riverine flooding.
- **Creating jobs and alleviating poverty (SDGs 1, 8, 10):** NBS investments typically create low-skill and fast-implementing jobs (Edwards et al. 2013)—on average, NBS projects such as restoring floodplains or managing forests in the United States created between 7 and 40 jobs per $1 million invested (BenDor et al. 2014). When properly designed, NBS help poor communities develop more sustainable, productive economies and land use practices (UNEP 2016).
- **Acting on the climate crisis (SDG 13):** Whereas about 8 percent of global carbon emissions are due to cement production, the backbone of most cities, NBS advance key mitigation goals (Chatham House 2018). By capturing and storing carbon, NBS can deliver up to a third of the emissions reductions needed by 2030 (Griscom et al. 2017). The Global Commission on Adaptation has called for scaling up of NBS as a key pathway to adapting to climate change, highlighting these solutions for cities in particular (GCA 2019).
- **Enhancing human health (SDG 3):** NBS can provide clean water and air, reduce extreme heat in cities (Bowler et al. 2010), and benefit mental health (Bratman et al. 2019). In the United States alone, air pollution removal by urban trees is worth $5.4 billion annually in avoided health care costs and lost productivity (Nowak and Greenfield 2018). A rapidly growing body of research suggests that exposure to nature is important for psychological well-being (Bratman et al. 2019). Forest conservation in biodiversity hotspots can also mitigate the risk of new zoonotic pathogens leaping from wildlife like bats to human hosts (as the novel coronavirus likely did) (Afelt et al. 2018).
- **Supporting sustainable cities and communities (SDGs 9 and 11):** Because well-planned NBS necessitate community involvement and empowerment (Browder et al. 2019), NBS can advance inclusive urbanization and social equity. NBS also boost community resilience by helping to reduce the risk of severe damage from disasters such as floods, landslides, and sea level rise.
- **Protecting biodiversity (SDGs 14 and 15):** Through the conservation and restoration of natural and seminatural ecosystems, NBS provide crucial habitat for the nearly 1 million species facing extinction (IPBES 2019), including many species that could be used for future medicines (Robinson and Zhang 2011).

The Municipality of Mérida Green Stormwater Management project, Mexico

Table 1 | GREEN-GRAY INFRASTRUCTURE'S RELEVANCE TO THE SUSTAINABLE DEVELOPMENT GOALS

SDG	TARGET	GREEN-GRAY RELEVANCE TO THE SDGS
1 NO POVERTY	1-5: By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.	Green-gray projects improve the resilience of highly vulnerable communities and have the potential to catalyze local, regional, and international implementation of green-gray infrastructure projects that conserve and restore natural ecosystems.
6 CLEAN WATER AND SANITATION	6-6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.	By design, green-gray infrastructure projects restore and conserve water-related ecosystems.
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. (specifically 9-1 and 9-A)	The goal of integrating green and gray tools and techniques is to produce innovative and resilient infrastructure. The Global Green-Gray Community of Practice fosters inclusion to further innovation, adoption, and adaptation.
11 SUSTAINABLE CITIES AND COMMUNITIES	Make cities and human settlements inclusive, safe, resilient and sustainable. (specifically 11-5, 11-7, 11-B)	Green-gray projects work to make vulnerable communities safer and more resilient while also promoting the adoption of policy that maximizes the efficiency of sustainable natural resource restoration and conservation.
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	12-8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.	The purpose of *The Green-Gray Infrastructure Practical Guide* is to raise awareness about a nature-based solution that conserves and restores natural systems to achieve sustainable development and climate adaptation outcomes.
13 CLIMATE ACTION	Take urgent action to combat climate change and its impacts. (specifically 13-1, 13-2, 13-3, and 13-B)	Green-gray projects strengthen community resilience and adaptive capacity, with opportunities to promote and raise awareness for broader integration of green-gray infrastructure, as a strategic policy to combat climate change and its impacts, with opportunities to lead to action in small island developing states.
14 LIFE BELOW WATER	14-2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.	Green-gray infrastructure projects restore coastal and marine ecosystems to make oceans healthier and more productive.
15 LIFE ON LAND	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. (specifically 15-2 and 15-9)	Green-gray projects restore and protect ecosystems, such as forests. Distribution and training about *The Green-Gray Infrastructure Practical Guide* will support integrating ecosystem and biodiversity values into national and local planning and development processes.
17 PARTNERSHIPS FOR THE GOALS	Strengthen the means of implementation and revitalize the global partnership for sustainable development. (specifically 17-3, 17-6, 17-7, 17-9, 17-14, 17-16, and 17-17)	The Global Green-Gray Community of Practice and *The Green-Gray Infrastructure Practical Guide* will promote the dissemination and diffusion of environmentally sound technologies to enhance sustainable development. We are mobilizing a global network to enhance international support and partnerships for effective implementation of green-gray infrastructure strategies.

Source: Reproduced from Conservation International (2020).

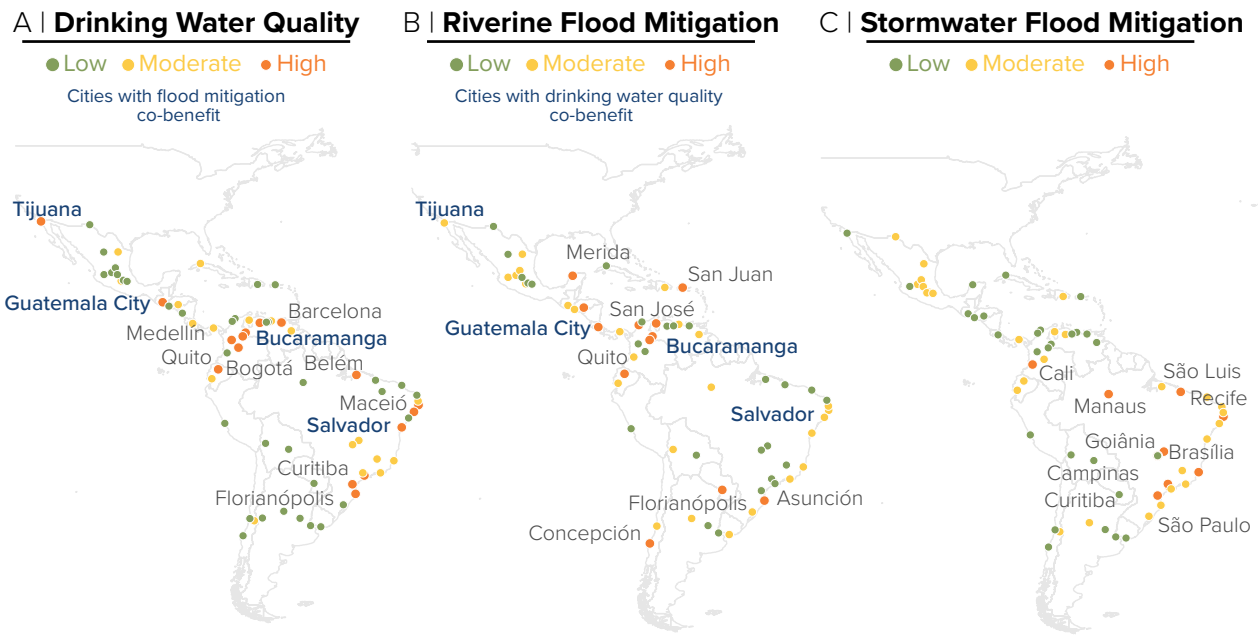
Coastal protection: Coastal ecosystems can protect communities and infrastructure by reducing storm surge and wave energy that erodes and destabilizes coastlines. These benefits are often measured as nonstorm wave height. By one estimate, coral reefs reduce nonstorm wave heights by 70 percent, salt marshes can reduce nonstorm wave heights by an average of 72 percent, and mangroves by 31 percent (Beck et al. 2016).

More than 20 coastal valuation studies in the Caribbean have positively influenced decision-making by making the case for investing in coastal ecosystems (Waite et al. 2014; Silver et al. 2019; Arkema et al. 2015). Some of these studies resulted in the establishment of protected areas through user fees and development of coastal zone management plans to safeguard these valuable ecosystems. For instance, the Mesoamerican Reef Fund was established in 2004 to conserve and restore the marine ecosystem along the coast of Belize, Guatemala, Honduras, and Mexico (MAR Fund 2021). More recently, a study estimated that coral reefs off the coast of the Mexican state of Quintana Roo provide flood protection for 4,600 people and $42 million in reduced flood damages annually (Reguero et al. 2018).

Safeguarding transportation and energy infrastructure: NBS are "no-regrets" solutions for the transportation and energy sectors, offering protection from natural hazards while also mitigating and offsetting the negative environmental impacts of transportation and energy projects (Oliver et al. 2021; Mandle et al. 2016). The cost-effectiveness of integrating NBS into such projects in LAC is less studied, but findings are still compelling:

- A study in Colombia found that creating forested buffer zones near roadways at risk of landslides was about 16 times more cost-effective than repairing damages (Grima et al. 2020).
- The same study also found that creating forested buffer zones around power lines to reduce landslide risk costs less than half as much as replacing power lines (Grima et al. 2020).
- Another study found that an NBS project aimed at revegetation to reduce siltation in the Panama Canal could be nearly five times more cost-effective than dredging (Adamowicz et al. 2019).
- The Itaipú Preserves program in Brazil and Paraguay protects 101,000 hectares of land upstream of the Itaipú Dam, reducing sediment loads and generating an estimated net present value of $45 million in direct financial benefits for the dam (Rycerz et al. 2020; Silva et al. 2020).

Figure 1 | CITIES RANKED BY OPPORTUNITY TO BENEFIT FROM NATURAL INFRASTRUCTURE



Note: The scale from lowest to highest refers to the opportunity for generating benefits and is based on the following indicators: (a) phosphorus loads, (b) population exposed to flood risk, and (c) precipitation intensity and soil permeability. Each indicator is ranked based on the degree of effectiveness of NBS interventions, as well as the extent to which it can be implemented in each location (i.e., available space and other biophysical conditions). Various models were used for each indicator, and each was informed by literature and expert consultations.
Source: Reproduced from Tellman et al. (2018).

Linking the Growing Movement for NBS to Investments on the Ground

A growing number of global stakeholders recognize that the protection of nature is central to sustainable and cost-effective infrastructure development. They are promoting NBS as a pragmatic way to capture nature's value. The World Economic Forum estimates that $44 trillion in economic value generation depends on nature and its ecosystem services (World Economic Forum 2020), and at the 2019 UN Climate Action Summit the UN secretary-general identified NBS as a priority.

Multinational development banks have begun championing integrated green-gray infrastructure in their investment projects. One of the companion issue briefs in this series, "Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank," points out that the Inter-American Development Bank (IDB) has championed the Latin American Water Funds Partnership, the Natural Capital Lab initiative, and other efforts to build NBS into its country support and lending operations (Oliver et al. 2021). The IDB's 2020 Mainstreaming Action Plan for Environmental and Social Sustainability provides institutional commitment to proactive support and trailblazing on natural capital and biodiversity, including NBS (IDB 2020b). Similarly, the World Bank's NBS program has supported an increasing number of projects since 2018 (Browder et al. 2019). The Asian Development Bank has launched a Natural Capital Lab and commissioned an analysis of NBS support within the bank's operations (Matthews and Cruz 2020).

Numerous private equity funds have committed billions to natural capital in efforts to meet both sustainability commitments and generate investment returns, such as HSBC Pollination Asset Management Group's $1 billion fund for nature (Chasan 2020), Lombard Odier's $400 million natural capital fund (Marsh 2020), and Credit Suisse's $212 million ocean engagement fund (Figueira 2020).

Despite these encouraging movements, NBS have not been widely deployed in infrastructure projects in LAC (Watkins et al. 2019). Commonly cited bottlenecks to NBS expansion are policies ill-designed to support NBS; lack of data underpinning a business case for investment; too few financing instruments that recognize NBS value; and lack of knowledge, tools, replicable examples, and know-how (Watkins et al. 2019; Browder et al. 2019). While a wealth of NBS knowledge and guidance is now available, these materials are rarely being used on the ground. Planners and decision-makers often lack the necessary capacity and quality data to assist in design and implementation. Breaking through these bottlenecks and scaling up NBS requires understanding the NBS state of play across the region.

This issue brief takes stock of NBS projects across LAC, analyzing current practices and performance. The next section, "The Status of NBS Investment in LAC," explores which stakeholder groups have spearheaded NBS in the region. It investigates current practices and performance measured in benefits to infrastructure and community well-being and explains strategies for recruiting sufficient financial resources to reach scale. The final section, "Recommendations for Increasing Uptake of NBS in LAC," highlights steps needed to overcome key challenges, and opportunities for strengthening investment going forward. These recommendations are aimed at the wide variety of stakeholders who play a role in advancing NBS in LAC. This joint publication is part of a new series from the IDB and World Resources Institute on scaling investment for NBS in LAC. It aims to help key decision-makers and investors set an agenda, understand why and where to invest in NBS, and how to set enabling conditions for scaling.

Research Method

The authors contacted over 400 people for contributions through multiple channels and reviewed 11 databases of relevant projects (described in Appendix A). Seventy-one project developers shared project information, and 27 participated in semistructured interviews with the authors. Ultimately, 156 discrete projects across 129 broader initiatives were included in the analysis (i.e., some larger initiatives with multiple discrete geographic or thematic foci were split into subprojects).

The analysis is limited to projects in LAC that

- are implementing or planning to implement the types of NBS described in Table 2 on their own or alongside gray infrastructure (i.e., green-gray infrastructure projects);
- are from four priority sectors (water and sanitation, energy, transportation, and housing and urban development) that directly benefit from investing in NBS;
- are focused exclusively on a subset of the four most critical challenges that these sectors face (flooding and erosion [coastal, urban, and riparian], landslide risk, risks to water supply, and deteriorating water quality, all of which can often be addressed cost-effectively with one or more NBS;
- have obtained at least $100,000 in funding and/or finance; or

- are active, in the process of being developed, or completed no more than five years ago.

Table 2 includes the list of NBS that were used to categorize and analyze all projects (i.e., primary, secondary and, if applicable, tertiary investment objectives were determined per project, as well as up to three of the specific NBS implemented). The table is organized in a way that qualitatively indicates the degree of applicability of each NBS option as it relates to the priority challenges that each of the sectors may face (based on findings from Browder et al. 2019 and Watkins et al. 2019).

This rapid regional scan for projects is not exhaustive. Other NBS project inventories, such as the Peru Ministry of Environment Green Finance Project (Marino 2020), and the ecosystem-based adaptation project inventory for Mesoamerica by the International Union for Conservation of Nature (IUCN 2019), have conducted more fine-scale analyses on parts of the region.

Despite its abbreviated nature, this work represents the first search and review of NBS projects across LAC with findings relevant for the water and sanitation, transportation, energy, and housing and urban development sectors. It builds a foundation for future stocktaking, monitoring and evaluation, and networking and exchange of lessons learned.

Table 2 | TYPES OF NATURE-BASED SOLUTIONS FOR PRIORITY INVESTMENT OBJECTIVES IN LATIN AMERICA AND THE CARIBBEAN

Common NBS applications | NBS are sometimes used to address the objective | NBS do not apply to the corresponding objective

	INVESTMENT OBJECTIVES					
NBS are the strategic restoration, protection, or management of ecosystems to achieve the resilient delivery of infrastructure services.	Water quantity	Water quality	Urban flooding	Coastal flooding and erosion	Landslide risk	River flooding
Forest						
Agroforestry and silvopasture						
Farmland best practices						
Floodplains and bypasses						
Riverbeds and riparian areas						
Grassland						
Inland wetlands						
Distributed bioretention						
Constructed wetlands						
Urban parks						
Bioswales						
Permeable pavements						
Green roofs						
Sand dams						
Mangroves						
Coastal wetlands						
Coral and oyster reefs						
Seagrasses						
Sandy beaches and dunes						

Notes: Dark green denotes common NBS applications, while light green indicates that NBS are sometimes used to address the objective, and white indicates that the given NBS do not apply to the corresponding objective. The assignment of categories is informed by the frequency of occurrence in this study's NBS project review. See Browder et al. (2019) and Ozment (2019) for examples of these NBS or investment objective applications in practice.
Source: Authors, adapted from Browder et al. (2019) and Watkins et al. (2019).

Photo by Mark Yokoyama/Flickr

THE STATUS OF NBS INVESTMENT IN LAC

A robust foundation of NBS projects is emerging in LAC. However, there is still ample room for support both in guiding concept-stage projects to implementation and in scaling well-established projects.

This chapter highlights trends emerging in NBS projects across LAC and key areas for growth. The chapter provides an overview of key characteristics across 156 NBS projects in LAC, including project maturity, types of strategies, financing mechanisms, and more.

This section reviews some of the key characteristics that were examined across the 156 NBS projects. The main topics are summarized below, answering the following questions:

- **Project maturity:** How close are the projects to full-scale implementation and/or large-scale investment-readiness?
- **NBS strategies**: What are the most prominent types of NBS being implemented or planned, and are projects using just one NBS approach or mixing strategies? (The main categories of NBS used are listed in Table 2.)
- **NBS benefits:** Which infrastructure sectors (water, transportation, energy, or urban development) are the projects targeting? What financial benefits do projects expect to provide to these sectors? What benefits have been documented?
- **Co-benefits:** Are the projects in the region delivering on the frequent claim that NBS is good for communities and social well-being? Are these projects creating jobs and enhancing livelihoods?
- **Community engagement and gender:** What approaches are used to ensure community benefits?
- **NBS project developers and financial supporters:** Which stakeholder groups are taking the lead on NBS project development? Who are the main stakeholder groups funding or financing the projects?
- **Financing instruments**: Do NBS projects in the region rely on grants and donations, economic instruments, return-based instruments, risk management instruments, and/or a mixture to fund their programming? Which financing instruments are projects attempting to tap in order to access sufficient financing?

Project Maturity

NBS project developers must shepherd their projects on sometimes long and complex journeys from concept to full-scale operation. Understanding the stage of maturity the 156 projects in this study have reached sheds light on what type of support project developers need to advance. It also identifies which types of projects are most likely to be ready for larger-scale investment.

This study found that fewer than half (74 projects) are operational and the majority (82 projects) are in preparation. Those in the pipeline need grant funding to support feasibility studies, stakeholder engagement, business plans, and similar activities (Figure 2). Projects in early to mid-stages of preparation (35 percent of total) primarily need funding to develop their concepts into plans, while projects in late stages of preparation (17 percent of total) are already piloting NBS on a small scale and exploring options for securing long-term financial resources. While the majority of the projects being designed and prepared are currently grant-funded, some have already tapped into economic instruments such as tax funds or utility fees, and return-based instruments such as loans (discussed later).

Projects deemed "operational" have commenced with implementation beyond an initial pilot stage and now aspire to reach full-scale operation. This designation does not necessarily mean they have reached their full-scale potential to generate intended outcomes. Many of these projects have secured significant resources, such as sustained funds from tax revenue, utility fees, corporate donations, or fiscal transfers, but at least one-third are still actively seeking capital to reach full-scale operation. Some projects in this cohort may be ripe for investments beyond grant funding.

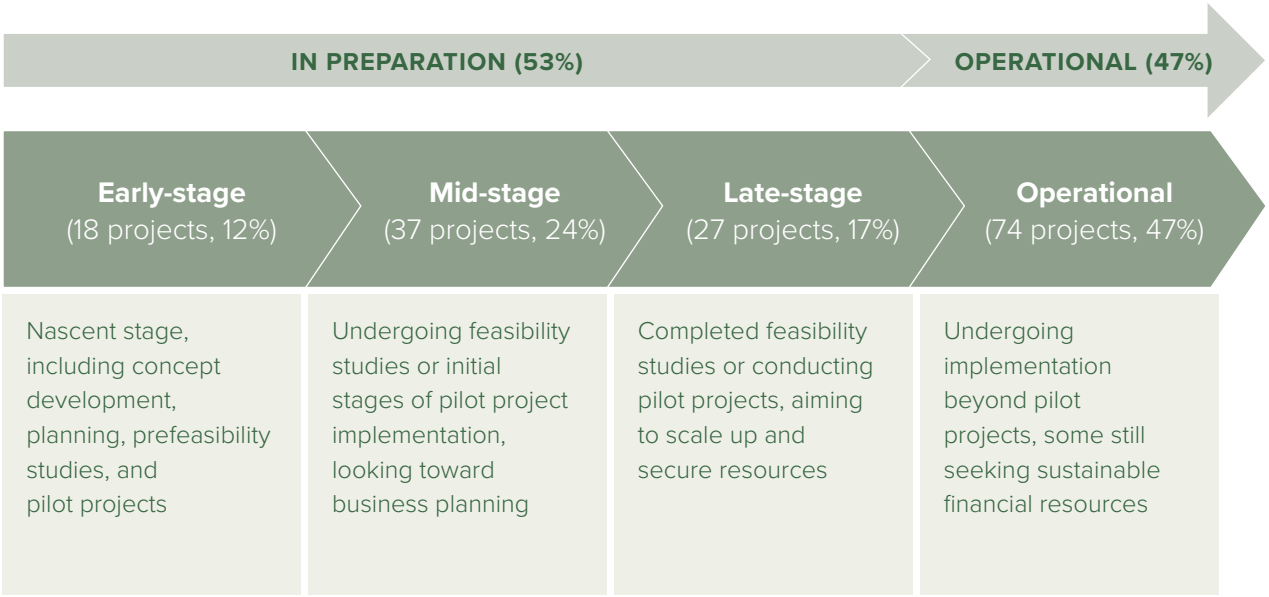
The countries with the greatest number of projects are Mexico (31), Colombia (21), and Brazil and Peru (17 each). These are among the region's five biggest countries, in land area and population, so it is not surprising that they also host the most projects. Projects are listed by country in Appendix B.

NBS Strategies

Among the NBS strategies project developers and investors utilize most often, the conservation and/or restoration of forests is far and away the most popular. This includes terrestrial forests as well as mangroves. Appendix C provides a snapshot of the most commonly used NBS strategies for each investment objective.

Nearly half of the projects (74 projects) are green-gray, meaning they utilize both NBS and built infrastructure. However, the level of integration of green-gray components varies. Some have designed green and gray infrastructure components in parallel, in which case the green and gray operate separately. Many projects, however, have pursued green and gray components in tandem, integrating NBS considerations early on in planning to optimize system performance. Some common practices in the integration of green and gray infrastructure are discussed below.

Figure 2 | STAGES OF MATURITY ACROSS THE NATURE-BASED SOLUTIONS PROJECT PIPELINE IN LATIN AMERICA AND THE CARIBBEAN



Source: Authors.

Water and sanitation: Water utilities can pair the installation of new reservoirs and/or water treatment plant upgrades with restoration of water-critical zones in source watersheds. For example, in the Brazilian state of Espírito Santo, a 2021 study produced for the state government shows that pairing installation of a water storage reservoir with targeted reforestation of water-critical upstream areas could generate an estimated return on investment of about 31 percent over 20 years due to reduced sediment pollution and consequently reduced water treatment costs (Feltran-Barbieri et al. 2021).

Transportation: Investing in natural ecosystems on slopes adjacent to newly constructed roads can reduce the risk of landslides. For example, a pilot project in Haiti is planning to revegetate and restore ecosystems uphill of National Road #2 in Les Zanglais, Sud Department. This project aims to safeguard large investments in road infrastructure that are at a high risk of damage from landslides. This project helps ensure road quality, coverage, and connectivity (Becoulet et al. 2021).

Energy: Upstream watershed management can improve a hydroelectric power plant's operational efficiency by securing the required water flow and quality. Reducing erosion cuts down on siltation of reservoirs, increasing the capacity for energy production while limiting the wear and tear sediment causes to the infrastructure. The National Electric Power Company of Honduras recently executed a project to combine infrastructure and equipment renovations with reforestation of the watershed upstream of the country's most important hydropower facility, the Francisco Morazán Hydroelectric Power Station. Reforesting 3 percent of the watershed can boost annual energy generation by an estimated 5 percent, as well as helping the facility adapt to climate change. Without adaptation, dwindling precipitation and rising temperatures could jeopardize hydropower production (IDB–Republic of Honduras 2019; Esquivel et al. 2016).

Urban development: Cities and urban centers can enhance flood mitigation and stormwater management by incorporating interconnected green space alongside, within, and even on top of the built urban landscape. Villa Soldati, an impoverished neighborhood in southwestern Buenos Aires, is bordered by the Riachuelo River. Pollution from nearby industrial activity and effluent from livestock markets make this one of Argentina's most contaminated rivers. The neighborhood is also extremely vulnerable to riverine flooding. In response, the City of Buenos Aires created the 36-acre Lugano National Park. It harnessed plants' ability to purify water, and constructed 350 rafts of native species to restore the floodplain, mitigate flooding, and improve the neighborhood's quality of life (Buenos Aires 2021).

Even in cases where projects have both green and gray components, many of these NBS projects seem to be planned independently of traditional infrastructure

investments, which could potentially miss opportunities to enhance service delivery and improve efficiency. Guidance on harmonizing green and gray infrastructure is available to support projects that further integrate these strategies in ways that optimize performance (see, e.g., Browder et al. 2019; Silva et al. 2020; and Conservation International 2020). Geospatial analysis tools such as InVEST can help identify suitable NBS strategies for specific investment objectives. Additional and more specific guidance for engineers, and tools for planning, are likely needed as well.

NBS Benefits

More than half of all projects focus on the water sector, especially improving water quantity and quality. Housing and urban development is the second-most common sector, with goals such as reducing risks of landslides and coastal, river, and urban flooding. The energy and transportation sectors have attracted the fewest NBS (Figure 3). Energy NBS projects mainly deal with water supply and erosion control for hydropower. Transportation projects chiefly target flood, erosion, and landslide risks to roads and ports.

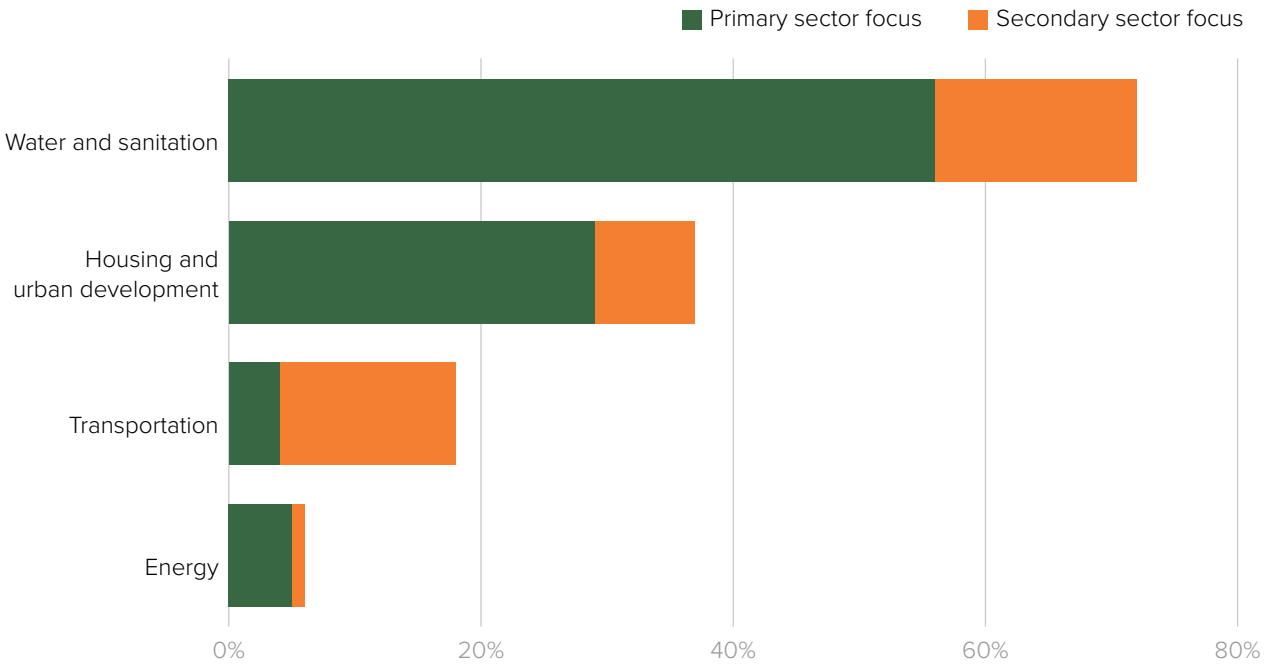
As shown in Table 1, NBS can yield wide-ranging benefits and accomplish multiple infrastructure objectives simultaneously, across sectors. The Bahamas, for example, developed a national cross-sectoral planning framework to implement sustainable infrastructure services, including green-gray infrastructure to shield coastal communities from climatic events (Alpizar and Madrigal 2020). In Antigua and Barbuda's Ministry of Works and Housing, the Road Division and Buildings Division are collaborating on NBS pilots for flood risk mitigation to protect both roads and about 4,000 at-risk homes. Despite the potential for co-benefits across sectors, about half of the projects covered in this brief focused on providing benefits for just one sector.

FINANCIAL VALUE OF BENEFITS

Advocates of NBS often argue that the benefits can translate into cost savings or revenue-generating opportunities for infrastructure service providers, governments, or companies. Capturing evidence to make the financial case to these project beneficiaries is important for recruiting financial and political support, and for designing projects to maximize the value they provide. This study was not comprehensive in collecting business cases from the projects, but it did uncover projects that have estimated economic or financial benefits. Several site-based studies have found that NBS are likely to produce significant financial returns for water supply utilities:

- For the São Paulo Water Fund (Brazil), restoring 4,000 hectares of water-critical forest could reduce sediment pollution by 36 percent within 30 years, cutting turbidity almost in half and potentially boosting water supply when it is most scarce (Ozment et al. 2018).

Figure 3 | PERCENTAGE OF NATURE-BASED SOLUTIONS PROJECTS TARGETING EACH SECTOR



Source: Authors.

- For the Guandu Water Fund (Rio de Janeiro, Brazil), restoring forests around the city could avoid $79 million in costs for water treatment over 30 years and reduce the use of chemical products by as much as 4 million tons (Feltran-Barbieri et al. 2021).
- For the Camboriú Water Fund (Brazil), restoration of the watershed is estimated to produce a positive return on investment for the municipal water utility in year 44, well within common drinking water infrastructure planning horizons (Kroeger et al. 2017).
- For the Quito Water Fund (Ecuador), managing 20,000 hectares of conservation land over 20 years is expected to have a positive return on investment of $2.15 for each $1 invested, due to the savings generated in water treatment costs (FONAG 2018).
- In São Bento do Sul (Brazil), a project supported by the Boticario Group Foundation involving the local water utility found that conserving and restoring forest in the water supply area could reduce water treatment costs by 13 percent and dredging costs by 46 percent (Guimarães et al. 2018).
- For the Bogotá Water Fund (Colombia), preliminary estimates suggest that NBS could help save around $3.5 million per year in treatment costs (Encourage Capital 2015).
- In Medellín (Colombia), Encourage Capital (2015) estimated that investing $1.75 million in NBS for water could improve crop production by roughly $36.8 million yearly after eight years.

These studies are primarily predictive in nature, estimating potential impacts of future investments, rather than retrospective studies based on observed data. Whether these hydrological or financial benefits will accrue is not yet clear. The deep uncertainty surrounding climate change impacts on ecosystems, and the inherent dynamic nature of these systems, makes predicting exact NBS outcomes challenging. In addition, while NBS has shown promising results, a dearth of long-term monitoring of NBS projects has undermined development of a robust evidence base proving their effectiveness. This can leave NBS project developers without sufficient information on where and how to apply the appropriate type of NBS for their local context.

The scientific consensus about forest-water availability linkages is still lacking—and in some cases, forests sometimes soak up water, thereby reducing total water availability, despite positive outcomes for water quality (Filoso et al. 2017). This study identified 37 NBS projects in the region that are using forests as NBS to improve water quantity, both highlighting the need for research on this topic and providing ample ground for data collection.

MONITORING AND EVALUATION

The good news is that many NBS projects in LAC aspire to monitor their progress. Over time, the results of their monitoring activities will help close knowledge gaps and better inform project design and adaptive management and increase investor confidence in NBS and green-gray projects. At least 60 projects state that they have monitoring plans in place, while 23 projects have such plans under development.

Well Monitoring at Dialogos de Agua, La Paz, Baja, Mexico

Twenty-four projects under preparation have already established monitoring systems and will benefit from collecting data from the start. In some cases, they are tracking impacts in pilot sites with the aim to scale up, and in other cases they are establishing baselines that will help them track progress over time. One example is miPáramo in Colombia, which aims to restore high-altitude natural wetlands called *páramos* to secure water supply downstream. Through a partnership with a university, the project has studied watersheds in the project area using isotopic samples to determine that downstream water supply originates in the *páramos*. Their findings allowed them to estimate that implementing miPáramo's activities could increase water infiltration.

This study found 35 projects that say they are tracking, or will track, their project's biophysical outcomes, using observed data, to draw a connection between NBS interventions and benefits such as improved water quality and reduced risk of flooding and landslides.

Nine of these projects provided information on their hydrological results to date. Many of these projects are new, and it appears it is too soon to determine their impacts. It can take several years for NBS to establish and start generating benefits on a measurable and predictable scale. Even so, some projects show encouraging findings. For example, the Lima and Callao Water Fund in Peru recently started tracking the water flows in three of its project sites. It has already ascertained that water infiltration rates at these sites have significantly increased, which help both to sustain biodiversity and make water more plentiful in the dry season.

Thirty-three projects include socioeconomic indicators in their monitoring plans. Given the strong role that communities play in NBS, with 78 percent of reviewed projects engaging directly with communities, measuring socioeconomic outcomes is crucial to better understanding effective strategies for community engagement and social inclusion.

For projects that have not yet set up a monitoring system, or plan to do this but need support, guidance is available. The European Union's NBS Impact Evaluation Handbook (Directorate-General for Research and Innovation 2021) and The Nature Conservancy Water Funds Toolbox (TNC n.d.) provide blueprints for collecting and generating actionable and reliable results from NBS project data.

Co-benefits

Co-benefits are ancillary benefits that these projects can provide across sectors and to multiple stakeholders. NBS are often touted as able to generate multiple benefits for communities, the environment, and different segments of society. Therefore, NBS can attract a diverse set of stakeholders with different priorities to mobilize coinvestment, which can boost the financial viability of these projects. As Browder et al. (2019) point out, however, these co-benefits need to be intentionally designed into projects.

An encouraging finding is that all the studied projects have clearly specified goals around generating multiple benefits beyond water quality and quantity and flood and landslide risk reduction. More than half of the projects aimed to benefit biodiversity, 22 percent recreation and ecotourism, 20 percent public health, and 16 percent of projects food security.

JOBS AND LIVELIHOODS

Of particular relevance to LAC countries struggling to recover economically from the pandemic, 46 percent of the NBS projects strive to improve live-

lihoods. This is very encouraging, because green infrastructure is most successful when it meets local communities' direct needs and is implemented with their support (e.g., regenerating landscapes that communities depend upon for their livelihoods) (Browder et al. 2019).

An example is the Fund for the Tungurahua Páramos and Fight against Poverty in Ecuador. This project aims to conserve and restore over 4,000 hectares of *páramos* for water security, while supporting sustainable silvopasture activities in delimited areas. Over 200 families are participating in the restoration work in return for technical assistance focused on improving agricultural production, and better positioning their products in the local and regional markets (Fondo Tungurahua 2020).

At least 10 percent of projects are committed to income diversification and alternative livelihoods that generate socioeconomic benefits. For instance, a marine conservation and climate adaptation project in Belize developed initiatives to promote economically viable and alternative livelihoods for approximately 1,500 fishers and households (World Bank 2021). Several projects that also promote innovative socioenvironmental enterprises, such as the Climate-Resilient Livestock project in Argentina, which created a sustainable beef certification to open up new market opportunities for farmers (BirdLife International n.d.); sustainable coastal tourism initiatives around mangrove restoration in Grenada (Welsh 2017); and the gourmet food corridor in Bogotá, Colombia, which positions produce from farmers who participate in the Corredor de Conservación Chingaza project (Acero 2020).

NBS projects are also generating employment. At least 30 projects (19 percent) were identified as actively aiming to create jobs (Olivares Zapiain 2021). One example is Ciudad Bicentenario, designed to mitigate landslides and reduce urban sprawl into high-risk areas by restoring a 2,000-hectare forest belt between the lower urban area of Lima and the surrounding coast. Implementation began in 2021 and is expected to create 450–600 nonskilled full-time jobs to carry out the restoration activities, including land preparation, tree planting, and maintenance, over a period of three years.

In this project, the Ministry of the Environment will select a company to manage the hiring and oversight of the work through a competitive bidding process, giving priority to those that commit to engaging with and hiring community members from the intervention area. In the long term, the operation and maintenance phase of the project will create permanent jobs in the communities through agriculture and agroforestry interventions that require the management of greenhouses, crop production, as well as harvesting and processing (Olivares Zapiain 2021).

Community Engagement and Gender

Beyond generating co-benefits for communities, the projects studied illustrate the importance of engaging communities in the earliest stages of planning. Seventy-eight percent of the projects stated that they have community engagement plans, a critical step for ensuring community buy-in. An example of a project setting a high bar for community engagement is Conservation International's project "Adaptation to Climate Impacts in Water Regulation and Supply for the Area Chingaza-Sumapaz-Guerrero" in and around Bogotá, Colombia. To mitigate the degradation of high-elevation *páramos* and cloud forest, Conservation International consults communities to understand their challenges and aspirations related to land use and management, and then works with them to create agreements that chart a path for community-led ecosystem restoration. These agreements are aligned with the interests and vision of communities, and promote shifts to low-impact productive activities

such as beekeeping and certified milk, which fetch higher value in the market. The project currently involves 70 families and aims to scale to over 100,000 across 25 municipalities (Acero 2020; Conservation International 2020; UNFCCC 2011).

Notably, only 28 percent of projects specified a gender equity focus in the interviews or reviewed project documentation. Among these projects, the Guyana Mangrove Restoration Project (GMRP) provides a good example of what is possible when gender is at the forefront of project design. The GMRP offered women training in operating small businesses and restoring mangroves. This economic empowerment strategy led to the planting of 500,000 seedlings, the restoration of 142 hectares of mangrove forests, and women being able to reap the economic benefits of the byproducts (such as mangrove honey and increased fish stocks, making the overall initiative sustainable into the future (Panorama Solutions 2015; Panorama Solutions 2020).

Given the immense potential of NBS to deliver community well-being, an inclusive approach to project design and implementation is paramount. Guidance is available to help projects to plan and implement socially inclusive NBS. The Cities4Forests "Social Equity Learning Guide" (Cities4Forests 2020) and the "Guidelines for Integrating Gender and Social Equity into Conservation Planning" (Conservation International 2019) are potentially useful resources for NBS stakeholders to increase their awareness of social equity considerations for their project, and to plan socially inclusive NBS projects.

NBS Project Developers and Financial Supporters

Government and civil society spearhead most NBS projects, with each stakeholder group leading about 40 percent of the projects. Local nongovernmental organizations (NGOs) are leading 26 percent, national governments 24 percent, and local governments (including municipalities, cities, and states) 19 percent. In terms of broad participation, 94 percent of the projects have some form of government partnership—national, local, or mixed (Figure 4).

Projects led by national governments are mainly funded by loans or technical cooperation with international finance institutions or through grants with multilateral donors. A few have leveraged tax revenue and fiscal transfers to fund NBS on the ground.

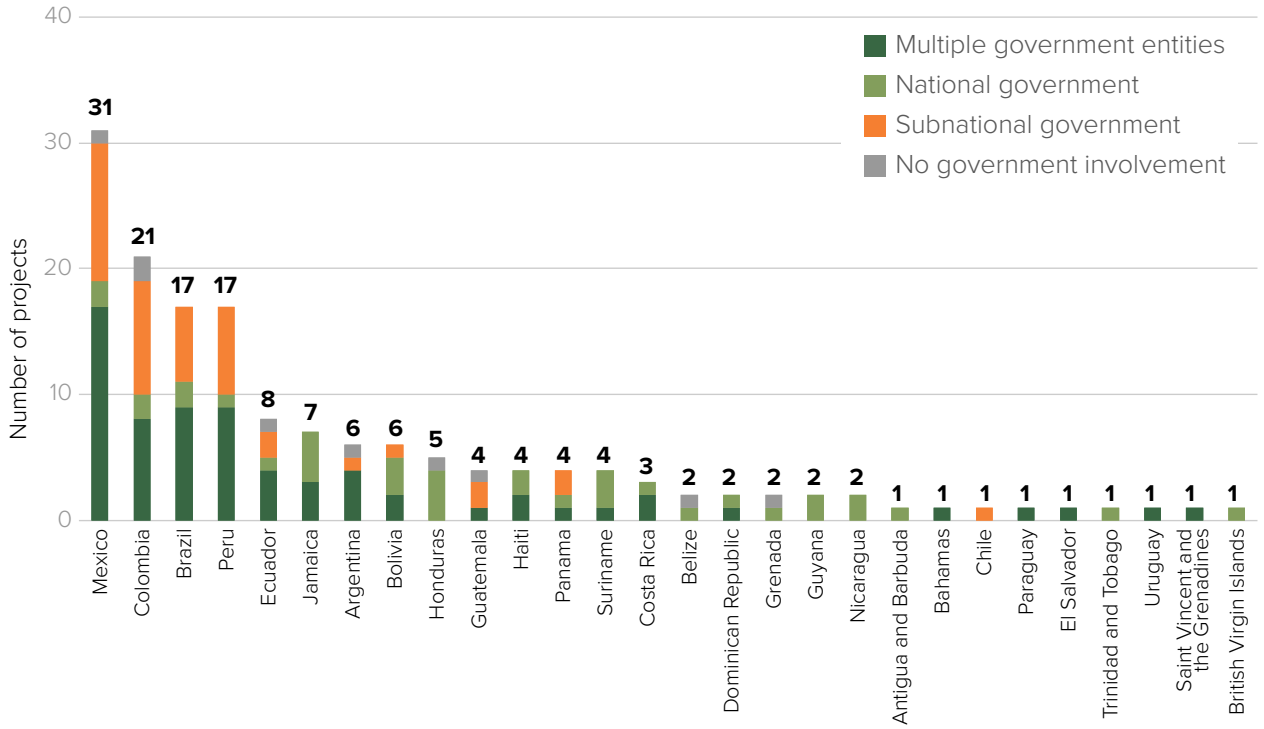
Of the 30 projects (19 percent of total) that are led by local governments, nearly half are self-funded (i.e., through local tax revenues), while multilateral donors (e.g., Global Environment Facility [GEF], UNEP) or bilateral donors (e.g., US Agency for International Development) fund 20 percent and development banks fund 17 percent. For example, the Cities of Cali, Panama City, Buenos Aires, Campinas, and several others are leveraging state or municipal tax revenue and/or revenues from environmental damage fees or compensation programs to implement NBS targeted at urban water management (both water supply and flood risk reduction).

Projects led by local NGOs engage the widest variety of funders: conservation trust funds, national and local government sources, corporations, private foundations, and infrastructure service providers all contribute funds to NGO-led projects on the ground. Even so, these projects are actively seeking more capital in order to reach their intended scale. Notably, most projects led by local NGOs focus on green infrastructure alone, not green-gray. This may be because NGOs are not at the table during infrastructure planning. Strengthening partnerships between government and local NGOs, which are adept at implementing NBS with communities and sourcing various financial contributions, could add value.

Bilateral and multilateral donors fund the highest number of NBS projects, a total of 50 (32 percent), followed by national and local governments with 30 projects (19 percent), development banks with 22 projects (14 percent), infrastructure service providers (10 percent), and the remaining 25 percent funded by others (i.e., private companies and project developers, private foundations and NGOs). Notably, none of the identified projects have tapped into private investment such as impact investment.

Among donors, GEF and the German government (i.e., through the International Climate Initiative [IKI], the Ministry for Environment, Nature Conservation, and Nuclear Safety [BMU], and the German development agency [GIZ]) play a particularly important role, with each supporting approximately 15 projects. An array

Figure 4 | GOVERNMENT PARTICIPATION IN NATURE-BASED SOLUTIONS PROJECTS BY COUNTRY



Source: Authors.

Forestación de Zonas de Recarga Hídrica y protección de fuentes de Agua, Rio Rocha River Basin, Bolivia

of other multilateral and bilateral donors have also supported at least one or two projects in this field. These donors are already playing an important role by offering project preparation support to design projects in ways that unlock larger-scale investment, and concessionary and risk capital to support piloting of new approaches to financing NBS.

Development banks also support NBS by offering technical cooperation grants for project preparation, ordinary and concessionary loans to bankable NBS and green-gray projects, and management of donor funds (such as GEF and GCF funds) for NBS projects.

As described earlier, mainstreaming NBS and securing investment at scale will require participation and financial buy-in from infrastructure service providers. Yet this review uncovered only 11 projects that infrastructure service providers are leading. These are all in the water and sanitation sector and the energy sector. These projects leverage utility rates and surcharges to fund NBS that protect or restore watersheds supplying water to the infrastructure service provider. The majority of these projects are in Peru, where a law requires utilities to support NBS. In some cases (44 projects), infrastructure service providers have also committed funds to NGO-led NBS.

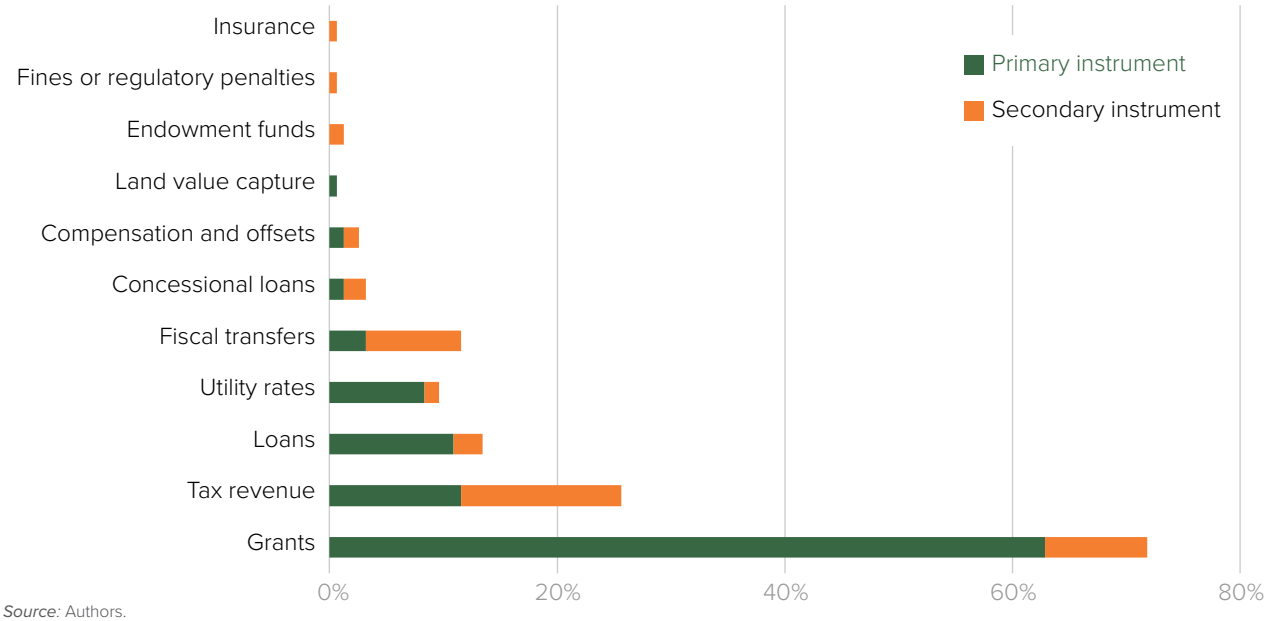
Financing Instruments

Because restoring ecosystems sometimes takes decades, it is important for NBS projects to quickly access the funding they need to begin delivering valuable benefits. To facilitate this scaling, sufficient funding must be available when the project launches to support initial investment needs in protection, restoration, and management and to cover the transaction costs of forming new partnerships across sectors and with communities. Funds are also needed over the long term to maintain projects into the future, as NBS benefits can appreciate in value for decades if the projects are well maintained.

Securing sufficient funding for project implementation and long-term operations and maintenance is often a barrier to projects' reaching their intended scale (Watkins et al. 2019; Marsters et al. 2021). Investors cite as deterrents to investment a lack of bankable projects, limited performance data for how nature will deliver impacts and/or returns, and high transaction costs associated with project preparation.

In an encouraging sign, this review documents the beginning of a transition from grant-based projects that lack financial security toward scaled and operational NBS that draw on ample up-front investment and stable cash flows for long-term operation. While the majority of projects (63 percent) are primarily grant-based at this time, some have blended in other forms of funding and finance. More than one-quarter of the projects have tapped into either tax revenue, loans, utility surcharges, or fiscal transfers (Figure 5). In addition, most of these grant-dependent projects are exploring options to transition to new self-sustaining financing models, as discussed below.

Figure 5 | PERCENT OF NATURE-BASED SOLUTIONS PROJECTS UTILIZING FINANCING INSTRUMENTS



Source: Authors.

Grants and donations. Grants are the main source of funding for the majority of projects, especially those under preparation. Much grant funding is being directed to project preparation, including to the development of business cases for NBS and the creation of more self-sustaining funding sources. For example, the Mexican Fund for the Conservation of Nature supports a network of 13 civil society groups across Mexico to establish programs to protect sources of urban water supplies (FMCN 2020). Among other forms of support, it provides funding and capacity building for civil society organizations to scope out funding sources from the beneficiaries of their projects, including municipalities, water utilities, agricultural producers, and water-dependent industries.

Grants are also used in about 70 percent of operational projects, often as the sole source of project funds, but sometimes mixed with other sources. In some cases, projects are pooling grants and donations from project beneficiaries. For example, Conservation International, at the request of the Government of Ecuador, is leading an effort to recognize the important benefits mangroves provide to ports and shrimp farmers by preventing siltation of navigable waterways and reducing saltwater intrusion and coastal protections (GCF 2018). It is formulating a financing mechanism that would allow port authorities, shrimp farmers, and others dependent on these services to make voluntary contributions to a fund managed by Ecuador's conservation trust fund, Socio Bosque, which would then deploy grant funds for mangrove restoration (Alban 2020; Ministerio del Ambiente y Agua 2020). This is similar to a common model employed by many of the Latin American Water Funds, which draw donations from water-dependent companies to fund watershed restoration activities.

Economic instruments. Thirty-nine projects (25 percent) primarily rely on funding generated through economic instruments such as utility rates and surcharges, tax revenue, fiscal transfers, or compensation and offset program revenues (funds raised from programs where companies must offset their environmental impacts or financially compensate for them).

As mentioned earlier, 12 programs have secured funds from water utility rates, surcharges, or fees. These are particularly prevalent in Peru, where a 2015 law requires water utilities to contribute up to 5 percent of their revenues to NBS, and the Environmental Ministry is currently inventorying NBS projects across the country to inform its policy agenda and further scale NBS (IWA 2017; Acosta 2021).

Tax revenue at the national and subnational level has been instrumental in advancing NBS, including urban green infrastructure programs. For example, the municipal government of Buenos Aires has a reurbanization initiative that is funded through tax revenues from the housing sector. It seeks to integrate natural spaces into planned development projects to mitigate flooding and improve the quality of life (Groissman 2020). And Colombia's national Ministry of Housing requires that a conservation surcharge be attached to property taxes. Decentralized regional environmental agencies (i.e., CAR) use this revenue to implement conservation projects, some of which are NBS projects such as the large-scale Green Corridor in the City of Cali (Gobierno de Colombia 2021; Alcaldía de Cali 2021).

Compensation and offset programs are regulatory programs that require companies to mitigate and compensate for natural ecosystems destroyed or degraded through corporate activities. Experts from the region have highlighted the powerful potential of these programs to fund NBS (e.g., Victurine 2020). However, very few NBS projects have tapped into this source. One exception is the Programa Nascentes in Brazil, which houses an online portal that matches companies in need of offsets for environmental degradation with landowners willing to restore (São Paulo 2020). Credits are based on estimated hydrological impacts of the landowner's proposed activities, ensuring that the program enhances water-related benefits. Over the past six years, the program has resulted in the restoration of 21,000 hectares. At the national level, Mexico's Payment for Environmental Services Program is funded through monetary compensation when companies cause land use change with negative environmental impacts. In 2016, the program mobilized $28.2 million (OECD 2018).

Return-based instruments such as loans, green bonds, and equity investments are the least common financing models employed for NBS, though 16 projects are funded as part of loan-based infrastructure projects from development banks. In these cases, NBS components are integrated into larger-scale

traditional infrastructure projects—often designed to complement, enhance, or safeguard the built infrastructure. While these projects range from $14 million to $325 million, the NBS components typically comprise a small sliver of project expenses.

The loan repayment is often tied to overall projects performance, or to the budget of the state, rather than to the performance of NBS components alone. In this way, the NBS is derisked by being folded into the larger project. Development banks have also utilized grants and concessional capital to fund the NBS components of larger infrastructure or development projects, which can encourage risk-averse clients to adopt NBS. Notably, the IDB has issued ordinary capital loans exclusively to NBS projects—to El Salvador's Ministry of Agriculture and Ranching, and to the Bolivian Ministry of Water and the Environment (Oliver et al. 2021). This shows that some clients are willing to borrow for NBS projects, although this type of arrangement is not yet the norm.

Risk management instruments. Only one project was identified as currently using an insurance policy. It was in Quintana Roo, Mexico, where a first-of-its-kind insurance policy was established to restore coastal reefs after storm events (TNC 2020). These NBS assets protect tourism-related infrastructure from coastal flooding and storms by reducing a storm's wave energy by up to 97 percent (Ferrario et al. 2014). In 2018, to protect Quintana Roo's $9 billion tourist industry and avoid damages to inland coastal infrastructure, the State of Quintana Roo, with support from tourist operators and The Nature Conservancy, established the Trust for Coastal Zone Management, Social Development, and Security (Coastal Zone Management Trust), which restores and protects the coral reef and beach ecosystems. These ecosystems are damaged and degraded by storms and can require rapid restoration efforts to enable the reef to survive and recover. When a storm strikes, an insurance policy pays out the funds needed for rapid repairs and restoration. The Coastal Zone Management Trust pays for that policy by tapping a portion of state tourism taxes. Further details about this insurance-financed NBS can be found in Marsters et al. (2021).


Viva Água Movement, Guanabara Bay, Rio de Janeiro, Brazil
Photo by Sinal do Vale (Duque de Caxias)

Prospective financing strategies. Sixty percent of projects are currently seeking additional funding or financing. The geographic spread of these projects appears in Figure 6. Half of these (48 projects) are considering adopting a new financial strategy. This could include a combination of grants, compensation and offset funds, and tax revenue or dedicated utility surcharges. Very few projects are considering accessing return-based strategies such as loans, green bonds, or equity. Seven NBS projects are contributing to endowment funds that could serve as a key funding source in the future. Figure 6 showcases a handful of projects that are attempting to create new financing models that do not rely on grants.

The private sector could step in to dramatically increase the funding available. Green investment now represents trillions of dollars, far exceeding the amount of grant funding available for environmental projects. As noted in Marsters et al. (2021) and Swann et al. (2021), tapping into the growing private investment funds earmarked for "green" projects could enable NBS projects to graduate out of grant-based models and seek larger-scale resources. In addition to providing socioenvironmental benefits important to green investors, NBS offer multiple other benefits that can be monetized as cash flows because they can save infrastructure service providers money and generate new revenue streams from sustainable products. These cash flows could be used to secure contributions from service providers, securing the money needed to repay the loans the private sector could offer to fund NBS. **However, no projects identified through**

the study have tapped into private investment. This may reflect how few projects have yet identified potential monetized benefits to infrastructure service providers. Some projects aim to break this cycle:

- The Cloud Forest Blue Energy Mechanism in Colombia, led by Conservation International and The Nature Conservancy, aims to mobilize commercial finance to reforest and conserve cloud forests in Latin America that provide water to the hydropower industry. The project is developing a pay-for-success financing model where impact investors will pay up front for communities to restore ecosystems upstream of the hydropower facility, and the hydropower company will pay back the investment over time as the hydrological benefits are achieved (The Lab 2020).
- The Viva Água Movement in Brazil, led by the Boticario Group Foundation, is creating a plan to conserve and restore natural areas in the Guanabara Bay's watershed in Rio de Janeiro. They will support sustainable enterprises to restore degraded lands and transition land cultivation to agroforestry and organic agriculture in parts of the watershed that will have a positive impact on water quality. As these businesses reach investment-readiness, the movement will help broker deals with private investors so the businesses can continue to grow and expand (Baladelli and Piazzetta 2021).

To unlock private investment in NBS, projects need to better document how NBS deliver value by cutting service providers' costs, improving service delivery, reducing risks, bolstering resilience, and providing co-benefits. Making this case is essential to convincing project beneficiaries to pay into the projects, and/or to secure repayment streams for investment. Expanding the use of traditional infrastructure investment instruments to cover NBS costs within the broader project is another option. It can build confidence that investment in NBS will be repaid with an acceptable return.

Altamirano et al. (2021), Browder et al. (2019), Gray et al. (2019), and the Water Funds Toolbox (TNC n.d.) offer guidance on developing financing strategies for NBS.

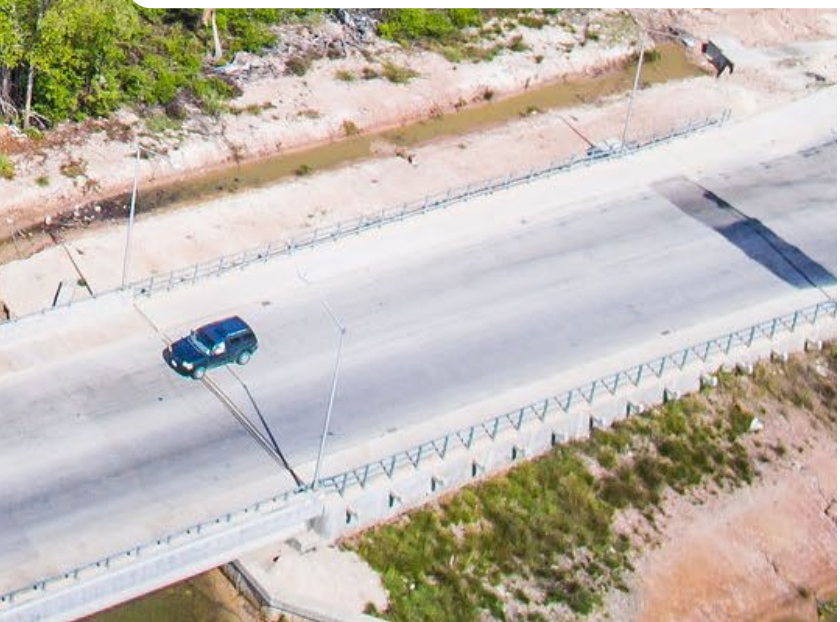
Figure 6 | GEOGRAPHIC DISTRIBUTION OF PROJECTS SEEKING CAPITAL AND EXAMPLES OF FINANCING MODELS

Sources: Authors.
[1] *SEDUVI (2020).*
[2] *The Lab (2020); Skurtis (2020).*
[3] *Alban (2020); Conservation International (2020).*
[4] *Llosa (2020).*

Belize. Photo by BID Ciudades Sostenibles.

RECOMMENDATIONS FOR INCREASING UPTAKE OF NBS IN LAC

Now is the time to invest in project preparation and setting policy conditions in place to enable governments and infrastructure service providers, and their financial partners, to direct more resources toward green-gray infrastructure.



NBS projects in the region have generated tremendously useful insights on NBS design and implementation, but investment in this space, and progress in merging green and gray infrastructure, is lagging. Three reasons for this are evident:

- A majority of NBS projects have yet to reach operational scale and begin implementation. Impediments presumably include insufficient resources, technical confidence and readiness, and business plans. Cities, infrastructure service providers, civil society, and development banks lack the capacity and resources to integrate NBS into their capital planning processes and projects. These projects therefore fail to make it into the investment pipelines of development and private finance.
- Many NBS projects are community-led initiatives that provide ample socioeconomic and environmental benefits but are small-scale. They do not have the cash flows or credit worthy project partners they would need to become ready for large-scale investment in their current form. New partnerships among community-led organizations, infrastructure providers, and city governments are needed to help NBS projects gain access to capital and credit-worthiness.
- Notwithstanding from some bright spots of innovation, the structuring of NBS financial transactions is underdeveloped as most projects rely on grant funding. Developing, derisking, and advancing blended financing packages structured to meet the needs of NBS projects is critically important.

A range of actors, many of whom may already support NBS, must help overcome these challenges in order to mainstream and scale NBS in the region.

National governments: National governments need to promote NBS through policies, laws, and regulations (as discussed in Browder et al. 2019). They must recognize the role NBS can play in infrastructure operations and develop country strategies with their development partners to advance NBS planning and implementation. They can do this through their nationally determined contributions (NDCs) to the Paris Agreement (UNDP 2019), national adaptation plans, and strategies for achieving the SDGs (IIED 2018). Governments can also pass investment regulations requiring or incentivizing NBS for private sector project developers.

NBS efforts need access to up-front investment capital, and the backing of national governments can help provide this. These government entities can provide sovereign guarantees to investors. Unless national governments provide this backstop, NBS will not scale. Incorporating NBS considerations into country planning is an ideal starting place. National governments also need to leverage their relationships with development banks and others to make NBS funding a priority.

Subnational governments: Subnational governments should work closely with NBS experts at local and international NGOs to champion investment-ready projects, while also investing in designing and scaling NBS projects from scratch.

Climate change and other environmental degradation are confronting cities and regions with mounting challenges: more extreme precipitation and droughts, fluvial flooding from the upstream deforestation and unregulated land conversion, heat-island effects in the face of rising temperatures, and sea level rise and floods that menace communities along coastlines and rivers. With pressing infrastructure needs, ambitious climate targets, and local accountability, cities in particular are poised to lead in generating bankable green-gray infrastructure. Cities have levers that can contribute to the bankability of NBS: tax and fee programs, the ability to provide incentives and create policies to make NBS durable, and the capacity to encourage private sector participation. In these ways, public capital can be leveraged to provide grants and catalytic funding (Marsters et al. 2021).

Infrastructure service providers: Infrastructure service providers are key to the integration of green-gray infrastructure and should increase their efforts to tap into their rate-paying structures, asset monetization, and access to national stimulus funds to fund projects. With the unpredictability of climatic change and its impact on the resilience of infrastructure services, providers could benefit directly from scaling NBS.

Infrastructure service providers should increase collaboration with NGOs and regional governments that are championing NBS to take on a more central role in developing these projects. A critical first step is to build the capacity of their teams to incorporate NBS considerations in strategic and infrastructure

improvement planning. They should engage in NBS project design and even initiate NBS project concepts to align these projects' outcomes with their overarching infrastructure service delivery goals. The more NBS projects are routinely considered and designed with infrastructure authorities at the table, the easier it will be for NBS to secure consistent cash flows.

Many infrastructure service providers may come to the table voluntarily. However, policies and regulations that require consideration of NBS in infrastructure planning and investments may be needed as well. Peru and Colombia are leading the way with national policies that require utilities to set aside funds for NBS.

Civil society: As champions of the NBS concept and experts in its implementation, NGOs, community-based organizations, and other local stakeholder groups are essential partners for advancing NBS on the ground. They can respond to community needs, integrate local knowledge, and close data gaps to ensure appropriate site-specific implementation of NBS. Civil society champions of NBS should share and disseminate more information about successfully implemented projects among themselves to strengthen the knowledge base and continue building local capacities for NBS integration. Further, civil society should continue to sharpen its messaging on the potential of NBS to address critical environmental challenges. It should especially target stakeholders with resources and power, such as regional governments and development banks, to motivate increased buy-in, leverage existing funding, and position themselves to have a seat at the table during infrastructure planning. Civil society can also play a convening role, facilitating peer exchanges and collaboratives to learn how to conduct NBS in the best ways possible, and develop tools, resources, and best practices to support decision-makers in identifying, planning, and implementing NBS.

Development banks: Development banks are already playing a role in supporting NBS regionally. They are providing grant funding and technical assistance for project preparation, lending ordinary and concessionary capital to bankable green-gray projects, and managing external donor funds toward NBS projects.

Guandu Water Fund, Brazil. Photo by WRI Brasil.

Perhaps the greatest contribution development banks can make to mainstreaming NBS in LAC is to build on their experiences with it, to encourage and help their clients to consider incorporating NBS into the infrastructure projects they help to plan or finance. They can also help transfer successful financing approaches to new locations (Marsters et al. 2021). As some first steps toward this vision, development banks should build the capacity of their own staff and engage their clients early on in planning to think about NBS, extending the menu of options and unveiling cost-effective opportunities to unite green and gray infrastructure. Development banks must also augment the standard project preparation process for infrastructure so that green infrastructure can routinely be as rigorously evaluated and carefully designed as conventional built infrastructure projects are (Browder et al. 2019). Setting targets and tracking investment in NBS is an important institutional signal to begin operationalizing these recommendations.

Donors: Grants and donations play a vital role in funding NBS and anchoring blended finance instruments to leverage private capital. Given the volume of projects currently in preparation, and the importance of unlocking more resources from benefiting sectors, donors need to ramp up efforts to bring worthy projects and adequate financing together. They can do this by offering technical assistance, including resources to cover project preparation costs such as feasibility studies that estimate potential cost savings or return on investment from NBS integration and that help unlock larger-scale investment and concessionary and risk capital.

Project preparation facilities (PPFs): PPFs that help infrastructure projects garner investment should place more emphasis on enabling promising projects to develop the business plan and financial rationale for tapping into new forms of finance. Development banks can utilize their PPFs to signal their interest in supporting NBS to infrastructure service providers.

Private sector: This study did not uncover significant private sector contributions to NBS in LAC, and private investors in NBS were notably absent from the collection of projects reviewed. Even so, the private sector has various important roles to play in helping to scale up NBS in LAC, and it should be further engaged to be part of the process. For example, consulting firms that provide infrastructure solutions should gain competency in integrating green and gray infrastructure. Companies and investors could increase demand for NBS by raising the ambition of their commitments to support water security and climate resilience through landscape-level action. And private sector banking should become more familiar with NBS opportunities. This will help banks match

Colombia
Photo by BID Ciudades Sostenibles

investment with suitable projects and inform the NBS supporters and practitioners about which risk-return profiles are acceptable for this field.

CROSS-SECTOR RECOMMENDATIONS

Across these stakeholder groups, more cross-sector and interagency collaboration is needed. The study points out that many (but not most) NBS projects have secured participation from important stakeholders across multiple levels of government and across key sectors. However, more participation and better collaboration is vital because no single stakeholder group can move forward without the others. For example, infrastructure service providers are essential to planning, implementing, and investing in green-gray infrastructure—but they often lack the capacity or legal authority to engage communities in NBS efforts or to address land tenure issues. Likewise, because NBS can deliver multiple benefits, pooled investments and shared project outcomes among multiple sectors or agencies will likely optimize benefits. However, such models of collaboration for NBS are very rare globally, and perhaps nonexistent in LAC today. Utility partnerships with government and civil society can address this by enacting new NBS-supportive policies, better engaging communities, and even creating new government authorities. Arranging collaborations across the energy, water, and transportation sectors and with communities may seem complex and daunting, but doing it successfully can both reduce planning and investment costs and maximize benefits.

Experiences and lessons learned globally also need to be transferred to the LAC region, and vice versa. As Marsters et al. (2021) show, worldwide experiences with leveraging private finance, and developing institutional agreements, provide useful insights into enabling coinvestment and facilitating cross-sector collaboration. Central to effective transference of NBS models will be improved monitoring and evaluation of project impacts. This needs to be a core focus for project donors, developers, beneficiaries, and investors if these strategies are to be proved out.

Aligning projects to contribute to national climate commitments and plans is potentially a tremendous advantage, regardless of whether the project is led by civil society, subnational governments, or others. It can help project developers assess climate vulnerability and priorities, gain access to climate finance, and hone strategies to optimize mitigation, adaptation, and other benefits.

NBS projects in LAC can provide insights needed to shape an action agenda for mainstreaming NBS. Not all 156 examples are necessarily fit for governments or infrastructure service providers to adopt. Nor do all require these sectors' involvement. But these projects do demonstrate what is possible. Hopefully, they can inform and inspire larger and more successful NBS project investments. As next steps in understanding the state of play for NBS in LAC, further research could examine how best to

- form effective NBS partnerships and strengthen beneficiary engagement;
- collect and monitor data to present a business case for NBS;
- generate cash flows in order to secure sufficient financial resources; and
- apply lessons learned to chart a policy agenda.

APPENDICES

Brazil. Itaipu dam.
Photo by Deni Williams/Flickr

APPENDIX A. CONTRIBUTIONS

Projects were identified by consulting infrastructure project databases, networks, and individual organizations.

Consulted databases

CAF (Corporación Andina de Fomento) Development Bank. 2020. "CAF Projects." Database. https://www.caf.com/en/projects/.

Caribbean Development Bank. 2020. "Project Map." Database. https://www.caribank.org/our-work/projects-map.

Forest Trends. 2020. "Map/Projects Page: Forest Trends." Database. Project List. https://www.forest-trends.org/project-list/.

Global Environment Facility. 2020. "Projects." Database. https://www.thegef.org/projects.

Green Climate Fund. 2020. "Projects." Database. https://www.greenclimate.fund/projects.

IKI (International Climate Initiative). 2020. "Projects." Database. https://www.international-climate-initiative.com/en/projects.

International Development Bank. 2020. "IDB Projects." Database. https://www.iadb.org/en/projects.

IUCN. 2019. "Visor de proyectos AbE: Soluciones AbE." Database. https://solucionesabe.org/visor-de-proyectos-abe/.

NbS.org. 2020. "Nature-Based Solutions Initiative: University of Oxford." Database. Our In-Country NbS Work. https://www.naturebasedsolutionsinitiative.org/our-in-country-nbs-work/.

PANORAMA. 2020. "Explorer Solutions." Database. https://panorama.solutions/en/explorer.

World Bank. 2020. "Projects and Operations." Database. https://projects.worldbank.org/en/projects-operations/projects-home.

Consulted networks

Alliance for Global Water Adaptation: https://www.alliance-4water.org/about.

Cities4Forests: https://www.wri.org/our-work/project/cities4forests.

Cities with Nature: https://citieswithnature.org/.

TheCityFix Labs, Mexico: http://thecityfixlabsmexico.org/.

Conservation Finance Alliance: https://www.conservationfinancealliance.org/.

Cuencas y Ciudades, Mexico: https://fmcn.org/es/proyectos/cuencas-y-ciudades.

Forest and Water Network: https://dgroups.org/fao/forestwaternetwork.

Global Green-Gray Community of Practice: https://www.conservation.org/projects/global-green-gray-community-of-practice.

Global Partnership for Sustainable Cities: https://sustainabledevelopment.un.org/partnership/?p=11236.

Initiative 20x20: https://www.wri.org/our-work/project/initiative-20x20.

Latin America Water Funds Partnership: https://www.fondosdeagua.org/en/.

NDC Partnership: https://ndcpartnership.org/.

PACTO, Brazil: https://www.pactomataatlantica.org.br/the-atlantic-forest.

APPENDIX B. NBS PROJECTS IN LAC

COUNTRY	PROJECT NAME	PROJECT LEAD
Antigua and Barbuda	Building Climate Resilience through Innovative Financing Mechanisms for Climate Change Adaptation	National Government of Antigua and Barbuda Department of the Environment, and Ministry of Health, Wellness and the Environment
Argentina	Buenos Aires Urban Ecosystems Regeneration Programme	City of Buenos Aires
Argentina	Climate-Resilient Livestock Farming	BirdLife International
Argentina	Paseo Ambiental del Sur	Environmental Protection Agency of Buenos Aires (Agencia de Protección Ambiental de la Ciudad de Buenos Aires)
Argentina	Proyecto de Re-urbanización de la Villa Rodrigo Bueno	City of Buenos Aires, Housing Institute
Argentina	Santa Fe, Stormwater Management Project	City of Santa Fe
Argentina	Villavicencio Reserve	Danone
Bahamas	Climate-Resilient Coastal Management and Infrastructure Program	Commonwealth of the Bahamas, Ministry of Works and Urban Development
Belize	BZ Marine Conservation and Climate Adaptation	National Government of Belize, Ministry of Forestry, Fisheries and Sustainable Development, Dedicated Project Implementing Agency Group
Belize	Increasing Resilience to Extreme Climate Events through Restoration of Degraded Landscapes (Nature-Based Solution) in the Atlantic Region of Central America	Tropical Agricultural Center for Research and Higher Education (CATIE) and WRI
Bolivia	Bolivia Resilient to Climate Risks	National Government of Bolivia, Ministry of Water and the National Productive and Social Investment Fund
Bolivia	Bolivia Urban Resilience	National Government of Bolivia
Bolivia	Forestación de Zonas de Recarga Hídrica y Protección de Fuentes de Agua	Water for People
Bolivia	Lake Titicaca Cleanup Program	National Government of Bolivia, Ministry of Water and the Environment
Bolivia	Multipurpose Water Supply and Irrigation Program for the Municipios of Batallas, Pucarani, and El Alto	National Government of Bolivia, Ministry of Water and the Environment
Bolivia	Pilot Action Plan for Adaptation to Climate Change in Highland Areas	National Government of Bolivia, Environment and Water Executing Agency
Brazil	BR Dedicated Grant Mechanism for Indigenous People and Traditional Communities	National Government of Brazil
Brazil	BR Sergipe Water	State of Sergipe, Secretariat of Environment and Water Resources
Brazil	Espírito Santo Integrated Sustainable Water Management Project: Watershed Management and Restoration of Forest Cover	State of Espírito Santo, Secretariat of Government
Brazil	Implementation of Linear Parks in the Municipality of Campinas	Municipality of Campinas, Department of Green, Environmental, and Sustainable Development
Brazil	Jucu Green Infrastructure	Espírito Santo Ministry of Environment—Programa Reflorestar team
Brazil	Pipiripau-DF [Distrito Federal] Water Fund (Brasília Water Fund)	Brasília Water Fund
Brazil	Produtor de Água do Rio Camboriú (Camboriú Water Fund)	Empresa Municipal de Águas e Saneamento (Balneário Camboriú water company)
Brazil	Produtores de Água e Floresta Guandu (Rio de Janeiro Water Fund)	Produtores de Água e Floresta Guandu

COUNTRY	PROJECT NAME	PROJECT LEAD
Brazil	São Paulo Water Fund	São Paulo Water Fund
Brazil	Setting the Foundations for Zero Net Loss of the Mangroves That Underpin Human Well-Being in the North Brazil Shelf Large Marine Ecosystem	Conservation International and IUCN
Brazil	Programa Nascentes	São Paulo Ministry of Environment
Brazil	São Bento do Sul Natural Infrastructure Initiative	*Fundação* Grupo Boticário
Brazil	Teresina Enhancing Municipal Governance and Quality of Life Project, Component 2: Integrated Urban-Environmental Development in Lagoas do Norte	Municipality of Teresina
Brazil	Utility-Led NBS for Campinas Water Supply	Sociedade de Abastecimento de Água e Saneamento (Campinas water company)
Brazil	Viva Água Movement: Guanabara Bay	*Fundação* Grupo Boticário
Brazil	Viva Água Movement: Miringuava Bay	*Fundação* Grupo Boticário
Brazil	Watershed Forest Restoration to Support Functioning of the Itaipú Dam	Itaipú Binacional
British Virgin Islands	Establishing Flood-Resilient Smart Communities through Non-governmental Organization Partnerships	Department of Disaster Management
Chile	Santiago-Maipo Water Fund	Santiago Water Fund
Colombia	Adaptation to Climate Impacts in Water Regulation and Supply for the Area of Chingaza-Sumapaz-Guerrero	Republic of Colombia, Ministry of Environment and Sustainable Development
Colombia	Barranquilla Wetlands and Mangroves Restoration Project	Municipal Government of Barranquilla, Conservation International
Colombia	Bogotá Green Infrastructure for Water Supply Project	Conservation International and WRI
Colombia	Cloud Forest Blue Energy Mechanism	Conservation International and TNC
Colombia	Corredor Ambiental Río Cali	City of Cali
Colombia	Corredor Ambiental Río Cañaveralejo	City of Cali
Colombia	Corredor Ambiental Río Meléndez	City of Cali
Colombia	Corredor de Conservación Chingaza-Sumapaz	Conservation International
Colombia	Green Infrastructure for Highway Expansion in Santa Marta	Departamento de Magdalena and National Infrastructure Agency partnership
Colombia	Iniciativas y Mecanismos Prioritarios de Protección del Recurso Hídrico en la Región de Urabá	Grupo EPM (Empresas Públicas de Medellín)
Colombia	Agua Somos (Bogotá Water Fund)	Agua Somos
Colombia	Alianza BioCuenca (Cúcuta, Santander, Water Fund)	Alianza BioCuenca
Colombia	Cuenca Verde (Medellín Water Fund)	Cuenca Verde: Medellín Water Fund
Colombia	Fundación Fondo Agua por la Vida y la Sostenibilidad	Water for Life and Sustainability Fund Foundation: Valle del Cauca Water Fund
Colombia	Santa Marta: Ciénaga Water Fund	Santa Marta: Ciénaga Water Fund
Colombia	miPáramo	Alianza BioCuenca: Norte de Santander Water Fund
Colombia	NBS Hydropower in Bogotá	Conservation International
Colombia	Participatory Planning for Climate Resilience: Flood Risk, Landslide Erosion Mitigation in Dosquebradas, Colombia	IIED Latin America, Center for Urban Disaster Risk Reduction, and Wageningen Environmental Research
Colombia	Recuperación Integral Canales Pluviales de la Estructura Ecológica de Santiago de Cali	City of Cali
Colombia	ReverdeC	Celsia (energy division of Grupo Argos, a private infrastructure conglomerate)
Colombia	Río Bogotá Environmental Recuperation and Flood Control Project	Corporación Autónoma Regional de Cundinamarca (CAR)

COUNTRY	PROJECT NAME	PROJECT LEAD
Costa Rica	Biodiver_City: Establishment of Interurban Corridors	National Government of Costa Rica, Ministry of Environment and Energy, and GIZ
Costa Rica	Agua Tica (San José Water Fund)	Agua Tica: San Jose Water Fund
Costa Rica	Oxigeno Human Playground	Cuestamoras Construction Company
Dominican Republic	Fondo de Agua Santo Domingo (Santo Domingo Water Fund)	Santo Domingo Water Fund
Dominican Republic	Fondo de Agua Yaque del Norte (Santiago/Ciabo Water Fund)	Yaque del Norte Water Fund
Ecuador	Border Integration Project: Axis Road No. 4, Bellavista–Zumba–La Balza Zamora–Chinchipe Province	National Government of Ecuador, Ministry of Transport and Public Works
Ecuador	Clever Cities: Quito	Municipality of Quito
Ecuador	Improving Flood Resilience in Guayaquil	Municipality of Guayaquil
Ecuador	Intervenciones de Infraestructura Natural para Proteger a las Comunidades Locales y los Ecosistemas Costeros de la Sedimentación Excesiva, las Sequías, las Inundaciones y los Daños Causados por las Olas, así como los Efectos del Aumento del Nivel del Mar	Amazon Cooperation Treaty Organization (OTCA) and UNEP
Ecuador	Fondo de Agua de Guayaquil para la Conservación de la Cuenca del Río Daule (FONDAGUA: Guayaquil Water Fund)	FONDAGUA: Guayaquil Water Fund
Ecuador	Fondo para la Protección del Agua (Quito Water Fund)	FONAG: Quito Water Fund
Ecuador	Páramos Tungurahua Fund (Tungurahua Water Fund)	Fondo de Páramos Tungurahua and Lucha contra la Pobreza
Ecuador	Transformative Public-Private Partnerships for Adaptation and Mitigation of Climate Change through the Protection of Mangroves and Other Coastal Wetlands	Conservation International
El Salvador	Building Climate Resilience of Urban Systems through Ecosystem-Based Adaptation (EbA) in Latin America and the Caribbean	National Government of El Salvador, Ministry of Environment and Natural Resources
Grenada	At the Water's Edge: Enhancing Coastal Resilience	TNC
Grenada	Restoration and Community Co-management of Mangroves	GIZ
Guatemala	Altiplano Resiliente	IUCN
Guatemala	Increasing Resilience to Extreme Climate Events through Restoration of Degraded Landscapes (Nature-Based Solution) in the Atlantic Region of Central America	Tropical Agricultural Center for Research and Higher Education (CATIE) and WRI
Guatemala	FUNCAGUA (Guatemala City Water Fund)	FUNCAGUA
Guatemala	Seguridad Hídrica de la Región Metropolitana de Guatemala	IUCN
Guyana	Green-Gray Coastal Resilience in Guyana	Conservation International and IUCN
Guyana	Guyana Mangrove Restoration Project	Federal Government of Guyana, National Agricultural Research and Extension Institute
Haiti	Cap-Haïtien Urban Development Project	National Government of Haiti
Haiti	Component 1: Ridge Coastal Partners: Applying Ecosystem-Based Disaster Risk Reduction through a Ridge-to-Reef Approach	UNEP, European Commission
Haiti	Component 2: Reef Coastal Partners: Applying Ecosystem-Based Disaster Risk Reduction through a Ridge-to-Reef Approach in Port Salut, Haiti	UNEP, European Commission
Haiti	Introducing Ecosystem-Based Solutions as a Layer of Protection for Resilient Transport Infrastructure Assets	National Government of Haiti

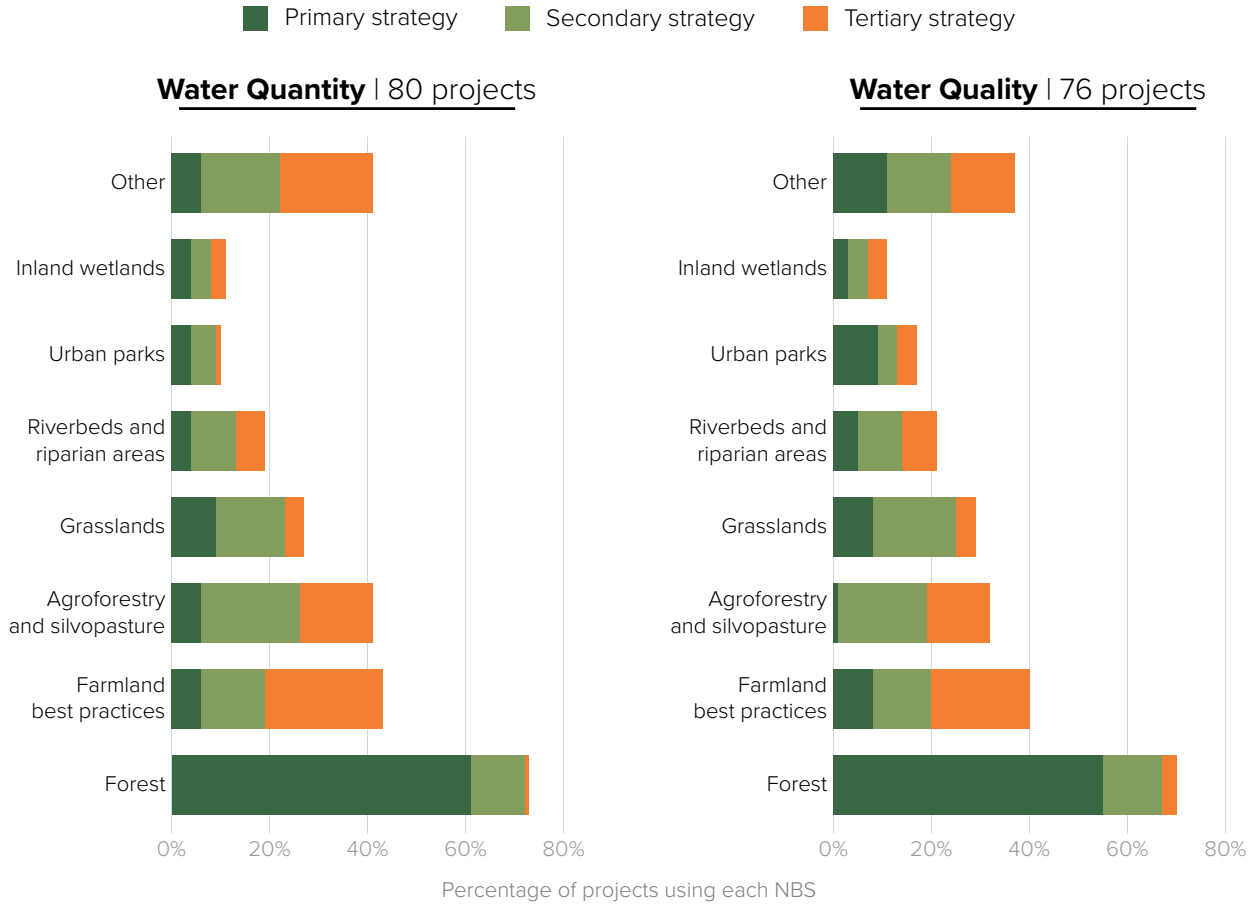
COUNTRY	PROJECT NAME	PROJECT LEAD
Honduras	Canaveral–Río Lindo Hydropower Complex Rehabilitation and Uprating Project: Comprehensive Management Plan of Lake Yojoa	National Government of Honduras: Empresa Nacional de Energía Eléctrica (National Electric Energy Company)
Honduras	Increasing Resilience to Extreme Climate Events through Restoration of Degraded Landscapes (Nature-Based Solution) in the Atlantic Region of Central America	Tropical Agricultural Center for Research and Higher Education (CATIE) and WRI
Honduras	Program for the Restoration of Climate-Resilient Forests and Forestry for Sustainable Water-Related Ecosystem Services	National Government of Honduras
Honduras	Renovation of the Francisco Morazán Hydropower Plant to Facilitate the Integration of Renewable Energy	National Government of Honduras
Honduras	Sustainable Forest Management	National Government of Honduras
Jamaica	Blue Carbon Restoration in Southern Clarendon, Jamaica	University of the West Indies
Jamaica	Building Climate Resilience of Urban Systems through Ecosystem-Based Adaptation (EbA) in Latin America and the Caribbean	National Government of Jamaica: Ministry of Water, Land, Environment and Climate Change
Jamaica	Building Resilience and Adaptation to Climate Change and Reducing Disaster Risk in Peckham and Surrounding Communities, Clarendon	Environmental Health Foundation
Jamaica	Climate Change Adaptation and Risk Reduction Technology and Strategies to Improve Community Resilience (CARTS) Project, Westmoreland	Westmoreland Municipal Corporation
Jamaica	Component 2.3, Disaster Vulnerability Reduction: Risk Reduction, Landslide Reduction	National Government of Jamaica: Ministry of Finance and Planning
Jamaica	Component 2.4, Disaster Vulnerability Reduction: Risk Reduction, Coastal Protection	National Government of Jamaica: Ministry of Finance and Planning
Jamaica	Trinityville Area Integrated Land Management and Disaster Risk Reduction Project, St. Thomas	Trinityville Area Development Committee Benevolent Society
Mexico	Agua para Colima	Fondo Noroeste (FONNOR) AC (Civil Association)
Mexico	Agua para el Futuro en San Miguel de Allende	Municipality of San Miguel de Allende
Mexico	The Border Impact Bond	4Walls International
Mexico	Building Climate Resilience of Urban Systems through Ecosystem-Based Adaptation (EbA) in Latin America and the Caribbean	National Government of Mexico: Ministry of Planning and Environmental Policy (SEMARNAT)
Mexico	Cerro de la Estrella	Mexico City, Environmental Agency
Mexico	Coastal Communities Reforestation Project	Ecoculture
Mexico	Coastal Zone Management Trust	State Government of Quintana Roo
Mexico	Conservando los Volcanes de Agua: Manejo Integral de la Cuenca del Valle del Jovel	Pronatura Sur
Mexico	Conservation, Reforestation and Community Development in the Biological Corridor in the Ahuisculco Mountains/La Primavera Forest	Selva Negra Foundation
Mexico	Desarrollo de una Estrategia para la Gestión Integral de la Microcuenca Anillo de Cenotes de Yucatán	Niños y Crías, AC (part of Programa Cuencas y Ciudades), and Dirección de Desarrollo Sustentable del Ayuntamiento de Mérida
Mexico	Diálogos de Agua: Promoviendo una Perspectiva Integrada para el Manejo y Uso del Agua en La Paz, Baja California	Sociedad de Historia Natural, Niparaja, AC
Mexico	Estrategia Gestión Hídrica Río Magdalena	Laboratorio de Ecosistemas de Montaña de la Facultad de Ciencias de la UNAM (UNAM Mountain Ecosystem Research Center)

COUNTRY	PROJECT NAME	PROJECT LEAD
Mexico	Estrategia Sustentable Delegación Miguel Hidalgo, 2015–2018	Municipality of Miguel Hidalgo
Mexico	Fortalecimiento a la Captación y Recarga del Acuífero Zapalinamé-Arteaga	Protección de la Fauna Mexicana (Profauna), AC
Mexico	Aguasfirmes: Fondo de Agua para el Desarrollo de Zacatecas	Fondo de Agua para el Desarrollo de Zacatecas (Zacatecas Water Fund)
Mexico	Cauce Bajío Fondo de Agua (Guanajuato Water Fund)/ Monetizing Water Savings: Guanajuato	FEMSA Foundation and Latin America Water Funds Partnership
Mexico	Fondo de Agua Metropolitano de Monterrey (FAMM) (Monterrey Water Fund)	FAMM
Mexico	Agua Capital (Mexico City Water Fund)	Agua Capital: Mexico City Water Fund
Mexico	Parque Biocultural Cerro de la Campana	National Government of Mexico, Ministry of Agrarian, Territorial, and Urban Development (SEDATU), and Municipal Government of Hermosillo, Institute of Municipal Planning (IMPLAN)
Mexico	Parque Ecológico Lago de Texcoco	National Government of Mexico, CONAGUA and SEMARNAT
Mexico	Parque El Represo	National Government of Mexico, Ministry of Agrarian, Territorial, and Urban Development (SEDATU)
Mexico	Programa Bosques+Agua+Gente para Chapala	Instituto Corazón de la Tierra
Mexico	Programa para el Manejo Integral para la Cuenca del Alto y Medio Grijalva: Conservación, Saneamiento y Educación	Fondo de Conservación El Triunfo (FONCET) (El Triunfo Conservation Fund, Mexico)
Mexico	Securing Water Supply through Reforestation: Volkswagen	Volkswagen
Mexico	La Sierra de Santa Marta y las Ciudades	Desarrollo Comunitario de Los Tuxtlas, AC
Mexico	Stormwater Management: Propuesta de Drenaje Pluvial Sostenible	Municipality of Mérida, Institute of Municipal Planning (Instituto Municipal de Planeación [IMPLAN])
Mexico	Tacubaya Green-Gray Infrastructure for Water Project	Mexico City, Secretariat of Urban Development and Housing (SEDUVI)
Mexico	Toluca Mex	Danone
Mexico	Water Security Sinaloa: Fondo para la Seguridad Hídrica del Sur de Sinaloa	Conselva, Costas y Comunidades, AC
Mexico	Xalapa Resiliente: Hacia la Gestión Compartida de la Subcuenca del Río Pixquiac como Parte de las Acciones de Gestión en la Cuenca Alta del Río Antigua	SENDAS, AC
Nicaragua	Component 1: Adaptation of Nicaragua's Water Supplies to Climate Change	Government of Nicaragua, Ministry of the Environment and Natural Resources (MARENA)
Nicaragua	Component 2: Adaptation of Nicaragua's Water Supplies to Climate Change	Government of Nicaragua, Ministry of the Environment and Natural Resources (MARENA)
Panama	Incorporating Mangrove Ecosystems into the Urban Resilience Strategy for Panama City	Panama City
Panama	Micro-infraestructura Verde-Azul	Panama Municipality
Panama	Panama City Waterfront Redevelopment and Resilience Program	Panama City
Panama	Valuing, Protecting, and Enhancing Coastal Natural Capital	National Audubon Society
Paraguay	Housing and Rehabilitation Program for Bañado Sur in Asunción	Republic of Paraguay, Ministry of Public Works and Communications
Peru	AMUNAS: Herencia ancestral para volver a lo natural	Aquafondo
Peru	Ciudad Bicentenario	Multi-institutional

COUNTRY	PROJECT NAME	PROJECT LEAD
Peru	Comprehensive Storm Drainage Program in Priority Cities in Peru	Republic of Peru, Ministry of Housing, Construction, and Sanitation
Peru	EbA Montaña	Instituto de Montaña and IUCN
Peru	Escalando la Adaptación Basada en Ecosistemas de Montaña: Construyendo Evidencia, Replicando Éxitos e Informando Políticas	Instituto de Montaña and IUCN
Peru	Independencia, Ciudad Sostenible y Resiliente: Recuperación de los Servicios Ecosistémicos de Regulación Hídrica y Control de la Erosión de Suelos en el Distrito de la Independencia-Lima	Municipality of Independencia
Peru	Aquafondo (Lima and Callao Water Fund)	Aquafondo
Peru	FORASAN Piura (Piura Water Fund)	FORASAN
Peru	Managing Water Supply for Hydroelectric Power through Restoration in Nor-Yauyos-Cochas Landscape Reserve	Compañía Eléctrica El Platanal, SA
Peru	Mecanismo de Retribución por Servicios Ecosistémicos en la Microcuenca de Rontoccocha, Localidades de Atumpata y Micaela Bastidas	EPS EMUSAP Abancay, SA (part of SUNASS)
Peru	Mejoramiento y Recuperación de los Servicios Ecosistémicos con Especies Forestales en la Comunidad Campesina de Pongobamba para la Regulación de la Microcuenca de Piuray-Corimarca Comunidad de Pongobamba, Distrito de Chinchero Cusco	EPS Seda Cusco SA (part of SUNASS)
Peru	Mejoramiento, Conservación y Recuperación de las Nacientes y Fajas Marginales de las Quebradas de Rumiyacu, Mishquiyacu y Almendra, Fuentes de Agua Destinadas a la Provisión Continúa de Agua Potable a la Población de la Ciudad de Moyobamba	EPS Moyoba MBA SRL (part of SUNASS)
Peru	Natural Infrastructure for Water Security in Peru	Forest Trends, Consorcio para el Desarrollo de la Ecoregión Andina, Sociedad Peruana de Derecho Ambiental, EcoDecisión, and Imperial College London
Peru	Promoviendo Inversión de Impacto para la Protección y Restauración de los Servicios Ecosistémicos de la Regulación Hídrica en el Departamento de Piura	Fondo de Agua Quiroz Chira and Naturaleza y Cultura Internacional Perú
Peru	Recuperación de la Zona de Amortiguamiento de la Microcuenca Tilacancha, Distrito de Levanto-Chachapoyas-Amazonas	EMUSAP SRL (part of SUNASS)
Peru	Recuperación de los Servicios Ecosistémicos para la Regulación Hídrica en el Sector de Can Can y Monitoreo en el Sector Millpu en el Distrito de Chinchero, Provincia de Urubamba, Región Cusco	EPS Seda Cusco SA (part of SUNASS)
Peru	Recuperación del Servicio Ecosistémico de Regulación Hídrica en el Ámbito de las Microcuencas de Quichcahuasi y Challhuamayo, Cuenca del Río Cachi, Provincia de Cangallo, Departamento de Ayacucho	SEDA Ayacucho (part of SUNASS)
Saint Vincent and the Grenadines	Coastal Protection for Climate Change Adaptation for Small Island States in the Caribbean Project	Caribbean Community Climate Change Centre
Suriname	Greater Paramaribo Flood Risk Management Program: Coastal Resilience Assessment	Government of Suriname, Ministry of Public Works
Suriname	Intervenciones de Infraestructura Natural para Proteger a las Comunidades Locales y los Ecosistemas Costeros de la Sedimentación Excesiva, las Sequías, las Inundaciones y los Daños Causados por las Olas, así como los Efectos del Aumento del Nivel del Mar	Amazon Cooperation Treaty Organization (OTCA) and UNEP

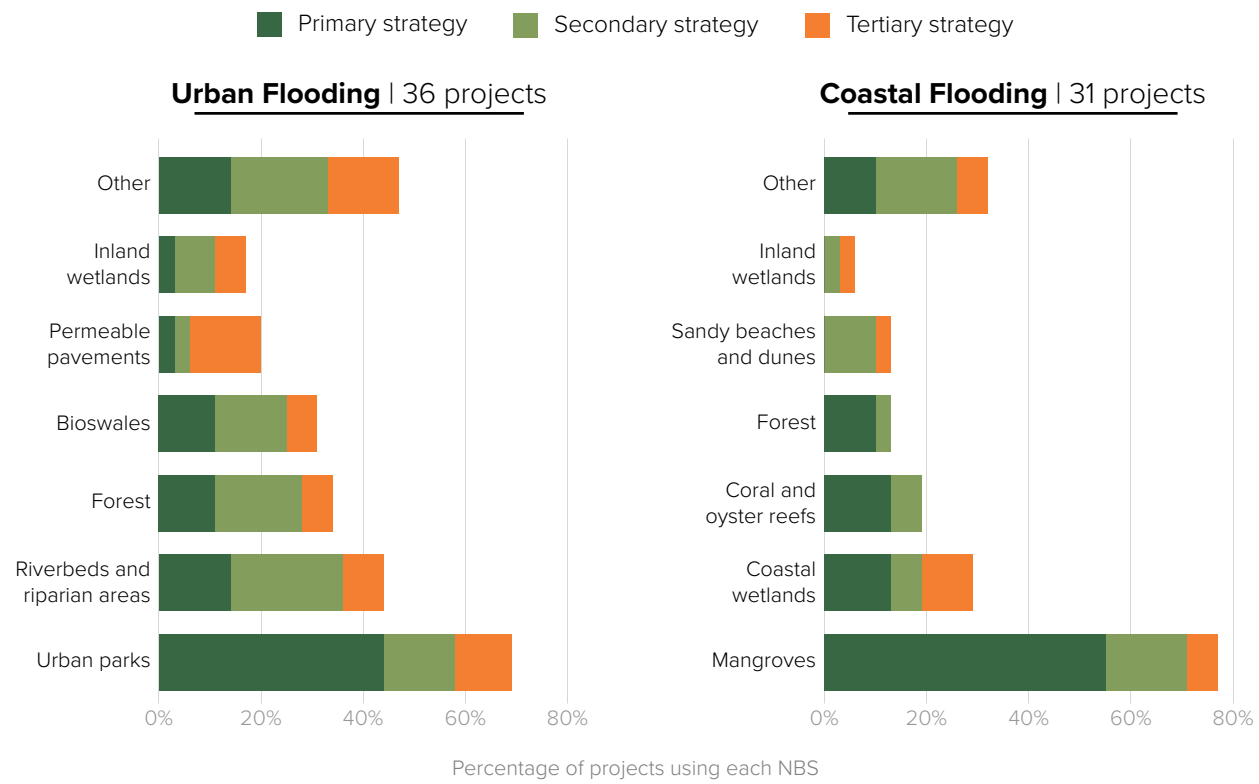
COUNTRY	PROJECT NAME	PROJECT LEAD
Suriname	NBS Mangrove Project (Setting the Foundations for Zero Net Loss of the Mangroves That Underpin Human Well-Being in the North Brazil Shelf Large Marine Ecosystem)	Conservation International and IUCN
Suriname	Saramacca Canal System Rehabilitation Project	National Government of Suriname
Trinidad and Tobago	Rehabilitation of Quarries	Environmental Management Authority and IAMovement
Uruguay	NBS component for Proyecto de Mejoramiento de Barrios in Parque Cauceglia	Intendencia de Montevideo

APPENDIX C. TYPES OF NATURE-BASED SOLUTION FOR EACH INVESTMENT OBJECTIVE



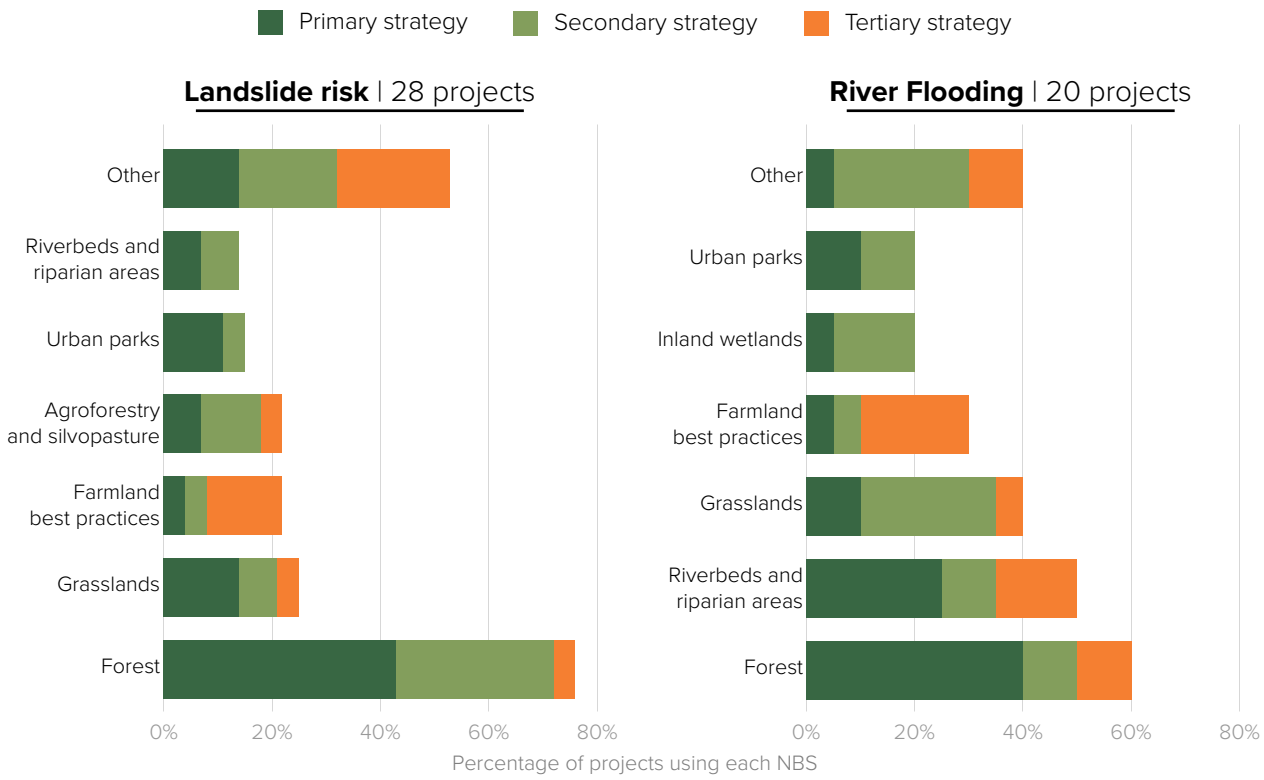
Other include: Bioswales, Constructed wetlands, Distributed bioretention, Mangroves, Permeable pavements, and Floodplains and bypasses.

Other include: Constructed wetlands, Mangroves, Bioswales, Coastal wetlands, Distributed bioretention, Floodplains and bypasses, Permeable pavements.



Other include: Constructed wetlands, Agroforestry and silvopasture, Mangroves, Coastal wetlands, Floodplains and bypasses, Grasslands, Green roofs.

Other include: Urban parks, Constructed wetlands, Grasslands, Permeable pavements, River beds and riparian areas, Seagrass.



Other include: Mangroves, Constructed wetlands, Bioswales, Green roofs, Inland wetlands, Sandy beaches and dunes.

Other include: Agroforestry and silvopasture, Bioswales, Floodplains and bypasses, Constructed wetlands.

ABBREVIATIONS

AC	asociación civil (nonprofit civil association)
AGWA	Alliance for Global Water Adaptation
BMU	Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (Federal Ministry for Environment, Nature Conservation, and Nuclear Safety, Germany)
CAF	Corporación Andina de Fomento (Andean Development Corporation)
CAR	Corporación Autónoma Regional (Autonomous Regional Corporation, Colombia)
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agricultural Center for Research and Higher Education)
CONAGUA	Comisión Nacional del Agua (National Water Commission, Mexico)
FONCET	Fondo de Conservación El Triunfo (El Triunfo Conservation Fund, Mexico)
FORASAN	Fondo Regional del Agua (Regional Water Fund, Peru)
GDP	gross domestic product
GIZ	Gesellschaft für Internationale Zusammenarbeit (German development agency)
GMRP	Guyana Mangrove Restoration Project
HSBC	Hongkong and Shanghai Banking Corporation Limited
IDB	Inter-American Development Bank
IKI	Internationale Klimaschutzinitiative (International Climate Initiative)
IUCN	International Union for Conservation of Nature
LAC	Latin America and the Caribbean
MARENA	Ministerio del Ambiente y los Recursos Naturales (Ministry of Environment and Natural Resources, Nicaragua)
MINAM	Ministerio del Ambiente (Ministry of the Environment, Peru)
NBS	nature-based solution(s)
NDC	nationally determined contribution
NGO	nongovernmental organization
OTCA	Organización del Tratado de Cooperación Amazónica (Amazon Cooperation Treaty Organization)
PPF	project preparation facility
SA	sociedad anónima (corporation)
SDG	Sustainable Development Goal
SEDATU	Secretaría de Desarrollo Agrario, Territorial y Urbano (Ministry of Agrarian, Territorial, and Urban Development, Mexico)
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales (Ministry of Environment and Natural Resources, Mexico)
SUNASS	Superintendencia Nacional de Servicios de Saneamiento (National Superintendency of Sanitation Services, Peru)
TNC	The Nature Conservancy
UNAM	Universidad Nacional Autónoma de México (National Autonomous University of Mexico)
UNEP	UN Environment Programme

REFERENCES

Acero, N. 2020. Correspondence between the authors and Natalia Acero, Water and Cities Manager, Conservation International, April 14.

Acosta, L. 2021. Personal correspondence between Luis Acosta, Superintendencia Nacional de Servicios de Saneamiento (SUNASS), Peru's water and sanitation regulator, and Maggie Gonzalez regarding six NBS projects led by Peruvian water utilities, July 22.

Adamowicz, W., L. Calderon-Etter, A. Entem, E.P. Fenichel, J.S. Hall, P. Lloyd-Smith, F.L. Ogden, et al. 2019. "Assessing Ecological Infrastructure Investments." *Proceedings of the National Academy of Sciences* 116 (12): 5254–61. doi:10.1073/pnas.1802883116.

Afelt, A., R. Frutos, and C. Devaux. 2018. "Bats, Coronaviruses, and Deforestation: Toward the Emergence of Novel Infectious Diseases?" *Frontiers in Microbiology* 9. doi:10.3389/fmicb.2018.00702.

Alban, M. 2020. Correspondence between the authors and Montserrat Alban, Conservation International, Ecuador, September 9.

Alcaldía de Cali. 2021. "Corredor Verde." https://www.cali.gov.co/documentos/2990/corredor-verde/.

Alpizar, F., and R. Madrigal. 2020. "Mainstreaming of Natural Capital and Biodiversity into Planning and Decision-Making: Selected Cases from Latin American and the Caribbean: Inputs to Dasgupta Review on the Economics of Biodiversity." Inter-American Development Bank.

Altamirano, M.A., H. de Rijke, L. Basco Carrera, and J. Arellano. n.d. "Handbook for the Implementation of Nature-Based Solutions for Water Security: Guidelines for Designing an Implementation and Financing Arrangement." Operationalising the Insurance Value of Ecosystems Grant Agreement no. 730497. Deliverable 7.3. Deltares. http://cpicfinance.com/wp-content/uploads/2021/04/D7.3REV.pdf.

Aquafondo. 2020. "Aquafondo: Fondo de Agua para Lima y Callao." https://aquafondo.org.pe/.

Arkema, K.K., G.M. Verutes, S.A. Wood, C. Clarke-Samuels, S. Rosado, M. Canto, A. Rosenthal, et al. 2015. "Embedding Ecosystem Services in Coastal Planning Leads to Better Outcomes for People and Nature." *Proceedings of the National Academy of Sciences* 112 (24): 7390. doi:10.1073/pnas.1406483112.

Baladelli, J., and T. Piazzetta. 2021. Personal correspondence between Juliana Baladelli and Thiago Piazzetta, Grupo Boticário, and Maggie Gonzalez regarding the following projects: Viva Água Movement—Guanabara Bay, Miringuava Bay, São Bento do Sul, April 27.

Barbieri, R. 2020. Correspondence between the authors and Rafael Barbieri, Senior Economist, WRI Brasil, April 6.

Beck, M.W., N. Heck, S. Narayan, P. Menéndez, S. Torres-Ortega, I.J. Losada, M. Way, et al. 2016. "Reducing Caribbean Risk: Opportunities for Cost-Effective Mangrove Restoration and Insurance." The Nature Conservancy. https://www-axa-com.cdn.axa-contento-118412.eu/www-axa-com percent2Ff83724d2-fcd0-4a41-bde9-e0330a501d07_tnc_mangrove+insurance_final+hi.pdf.

Becoulet, M., X. Espinet, J. Chan, and A. Nguitone Dia. 2021. "Resilient Recovery: How Can Nature-Based Solutions Improve Transport Infrastructure Resilience? Lessons from Haiti." World Bank (blog), April 21. https://blogs.worldbank.org/transport/resilient-recovery-how-can-nature-based-solutions-improve-transport-infrastructure.

BenDor, T.K., T.W. Lester, and A. Livengood. 2014. "Exploring and Understanding the Restoration Economy." https://curs.unc.edu/wp-content/uploads/sites/400/2014/01/RestorationEconomy.pdf.

BirdLife International. n.d. "Southern Cone Grasslands Alliance Yields 'Green' Beef." https://www.iucn.org/sites/dev/files/import/downloads/factsheet3_alianza_de_pastizal_rev.pdf.

Bolio Acero, E., and S.A. Chuc. 2020. Correspondence between the authors and Edgardo Bolio Acero (Director) and Said Andrés Chuc Yam (Coordinator) Municipality of Mérida's Institute of Municipal Planning (IMPLAN), Mexico, April 27.

Bowler, D.E., L. Buyung-Ali, T.M. Knight, and A.S. Pullin. 2010. "Urban Greening to Cool Towns and Cities: A Systematic Review of the Empirical Evidence." *Landscape and Urban Planning* 97 (3): 147–55. doi:10.1016/j.landurbplan.2010.05.006.

Bratman, G.N., C.B. Anderson, M.G. Berman, B. Cochran, and S. de Vries. 2019. "Nature and Mental Health: An Ecosystem Service Perspective." *Science Advances* 5 (7). https://advances.sciencemag.org/content/5/7/eaax0903.

Browder, G., S. Ozment, I.R. Bescos, T. Gartner, and G.-M. Lange. 2019. "Integrating Green and Gray: Creating Next Generation Infrastructure." World Resources Institute. https://www.wri.org/publication/integrating-green-gray.

Buenos Aires. 2021. "Programa de Regeneración de Ecosistemas Urbanos." Gobierno de la Ciudad Autónoma de Buenos Aires. https://www.buenosaires.gob.ar/agenciaambiental/programa-de-regeneracion-de-ecosistemas-urbanos.

Buytaert, W., S. Moulds, L. Acosta, B.D. Bièvre, C. Olmos, M. Villacis, C. Tovar, and K.M.J. Verbist. 2017. "Glacial Melt Content of Water Use in the Tropical Andes." *Environmental Research Letters* 12 (11). doi:10.1088/1748-9326/aa926c.

Cavallo, E., A. Powell, and T. Serebrisky. 2020. "From Structures to Services: The Path to Better Infrastructure in Latin America and the Caribbean (Executive Summary)." https://publications.iadb.org/publications/english/document/From-Structures-to-Services-The-Path-to-Better-Infrastructure-in-Latin-America-and-the-Caribbean-Executive-Summary.pdf.

Chasan, E. 2020. "HSBC, Pollination Are Planning Series of 'Natural Capital' Funds." Bloomberg, August 26. https://www.bloomberg.com/news/articles/2020-08-26/hsbc-pollination-are-planning-series-of-natural-capital-funds.

Chatham House. 2018. "Making Concrete Change: Innovation in Low-Carbon Cement and Concrete." Chatham House—International Affairs Think Tank. https://www.chathamhouse.org/2018/06/making-concrete-change-innovation-low-carbon-cement-and-concrete.

Cities4Forests. 2020. "C4F-Social Equity Learning Guide." https://cities4forests.com/wp-content/uploads/2020/07/C4F-SocialEquity_LearningGuide.pdf.

Clever Cities. 2020. "CleverCities: Quito." https://clevercities.eu/quito/.

Cohen-Shacham, E., A. Andrade, J. Dalton, N. Dudley, M. Jones, C. Kumar, S. Maginnis, et al. 2019. "Core Principles for Successfully Implementing and Upscaling Nature-Based Solutions." *Environmental Science & Policy* 98 (August): 20–29. doi:10.1016/j.envsci.2019.04.014.

Conservation International. 2019. "Guidelines for Integrating Gender and Social Equity into Conservation Planning." https://www.conservation.org/docs/default-source/publication-pdfs/integrating-gender-and-social-equity-into-conservation-programming-2019.pdf?sfvrsn=6b8e5c33_2.

Conservation International. 2020. "Adaptación de los impactos climáticos en regulación y suministro de agua en el área Chingaza, Sumapaz y Guerrero." http://www.conservation.org.co/programas/Aguas-y-ciudades/articulos-rios-lagunas/adaptacion-de-los-impactos-climaticos-en-regulacion-y-suministro-de-agua.

de Bièvre, B. 2020. Correspondence between the authors and Bert de Bièvre, Executive Director of FONAG, October 14.

Directorate-General for Research and Innovation. *Evaluating the Impact of Nature-Based Solutions: A Handbook for Practitioners*. Luxembourg: European Commission.

Encourage Capital. 2015. "Water Funds Business Case: Conservation as a Source of Competitive Advantage." http://encouragecapital.com/wp-content/uploads/2015/09/water_funds_business_case.pdf.

Edwards, P.E.T., A.E. Sutton-Grier, and G.E. Coyle. 2013. "Investing in Nature: Restoring Coastal Habitat Blue Infrastructure and Green Job Creation." *Marine Policy* 38: 65–71. doi:10.1016/j.marpol.2012.05.020.

Esquivel, M., A. Grünwaldt, J.R. Paredes, and E. Rodriguez-Flores. 2016. "Vulnerability to Climate Change of Hydroelectric Production Systems in Central America and Their Adaptation Options: Executive Summary." Washington, DC: Inter-American Development Bank.

Feltran-Barbieri, R., S. Ozment, M.M. Matsumoto, E. Gray, T. Belote Silva, and M. Oliveira. 2021. "Investing in Natural Infrastructure for Water in Vitoria Metropolitan Region, Espírito Santo."

Ferrario, F., M.W. Beck, C.D. Storlazzi, F. Micheli, C.C. Shepard, and L. Airoldi. 2014. "The Effectiveness of Coral Reefs for Coastal Hazard Risk Reduction and Adaptation." *Nature Communications* 5 (1): 3794. doi:10.1038/ncomms4794.

Figueira, J.C. 2020. "Credit Suisse Launches Ocean Engagement Fund to Accelerate the Blue Economy." Climate Action, September 10. https://www.climateaction.org/news/credit-suisse-launches-ocean-engagement-fund-to-accelerate-the-blue-economy.

Filoso, S., M. Ometto Bezerra, K. Weiss, and M. Palmer. 2017. "Impacts of Forest Restoration on Water Yield: A Systematic Review." *PLOS ONE* 12 (August): e0183210. doi:10.1371/journal.pone.0183210.

FMCN (Fondo Mexicano para la Conservación de la Naturaleza). 2020. "Cuencas y ciudades." https://fmcn.org/es/proyectos/cuencas-y-ciudades.

FONAG (Alianza Latinoamericana de Fondos de Agua). 2018. "Fondo para la Protección del Agua." https://www.fondosdeagua.org/content/dam/tnc/nature/en/documents/latin-america/wfquito.pdf.

Fondo Tungurahua. 2020. "Fondo de Páramos Tungurahua y Lucha contra la Pobreza." Fondo Páramos Tungurahua. https://fondotungurahua.org.ec/.

GCA (Global Commission on Adaptation). 2019. *GlobalCommission Report*. https://files.wri.org/s3fs-public/uploads/GlobalCommission_Report_FINAL.pdf.

GCF (Green Climate Fund). 2018. "PPF Application: Transformative Public and Private Partnerships for Climate Change Adaptation and Mitigation through the Protection of Mangroves and Wetlands along Ecuador's Coast." https://www.greenclimate.fund/sites/default/files/document/ppf-application-transformative-public-and-private-partnerships-climate-change-adaptation-and.pdf.

GFDRR (Global Facility for Disaster Reduction and Recovery). 2020. "Introducing Ecosystem-Based Solutions as a Layer of Protection for Resilient Transport Infrastructure Assets in Haiti." https://www.gfdrr.org/en/introducing-ecosystem-based-solutions-layer-protection-resilient-transport-infrastructure-assets.

Gobierno de Colombia. 2021. "Ley 99 de 1993—EVA—Función Pública." https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=297.

Gray, E., S. Ozment, J.C. Altamirano, R. Feltran-Barbieri, and G. Morales. 2019. "Green-Gray Assessment: How to Assess the Costs and Benefits of Green Infrastructure for Water Supply Systems." World Resources Institute. https://www.wri.org/research/green-gray-assessment-how-assess-costs-and-benefits-green-infrastructure-water-supply.

Grima, N., D. Edwards, F. Edwards, D. Petley, and B. Fisher. 2020. "Landslides in the Andes: Forests Can Provide Cost-Effective Landslide Regulation Services." *Science of the Total Environment* 745 (November): 141128. doi:10.1016/j.scitotenv.2020.141128.

Griscom, B.W., J. Adams, P.W. Ellis, R.A. Houghton, G. Lomax, D.A. Miteva, W.H. Schlesinger, et al. 2017. "Natural Climate Solutions." *Proceedings of the National Academy of Sciences* 114 (44): 11645–50. doi:10.1073/pnas.1710465114.

Groissman, D. 2020. Correspondence between the authors and David Groissman, Director of Urban Resilience of Buenos Aires, Argentina, October 5.

Guimarães, J.L.B., D. Tha, and S.I. Saad. 2018. "Soluciones basadas en naturaleza para aumento de resiliencia hídrica: Cuantificación y valoración de beneficios de infraestructura natural, Municipio de São Bento do Sul (SC)." Fundación Boticario.

IDB (Inter-American Development Bank). 2020a. "BH-L1043: Climate Resilient Coastal Management and Infrastructure Program." https://www.iadb.org/en/project/BH-L1043.

IDB. 2020b. "Mainstreaming Action Plan for Environmental and Social Sustainability, 2021–2022." Revised Version. https://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-1646886943-1944.

IDB. n.d. "Housing and Urban Development Sector." https://www.iadb.org/en/urban-development-and-housing/housing-and-urban-development. Accessed December 9, 2020.

IDB–Republic of Honduras. 2019. "Honduras. Loan Proposal for the Project Renovation of Francisco Morazán Hydroelectric Power Plant to Facilitate the Integration of Renewable Energies." https://www.iadb.org/projects/document/EZSHARE-1038346716-83?project=HO-L1203.

IIED (International Institute for Environment and Development). 2018. "IIED Briefing: Nature-Based Solutions: Delivering National-Level Adaptation and Global Goals." https://www.naturebasedsolutionsinitiative.org/wp-content/uploads/2018/11/17484IIED_NBSBrief.pdf.

IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). 2019. "Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services."

IUCN (International Union for Conservation of Nature). 2019. "Visor de proyectos AbE: Soluciones AbE." Database. https://solucionesabe.org/visor-de-proyectos-abe/.

IWA (International Water Association). 2017. "Mechanisms of Rewards for Ecosystem Services (MRSE)." https://iwa-network.org/mechanisms-of-rewards-for-ecosystem-services-mrse/.

Kroeger, T., C. Klemz, D. Shemie, T. Boucher, J. Fisher, E. Acosta Porras, P. Dennedy-Frank, et al. 2017. *Assessing the Return on Investment in Watershed Conservation: Best Practices Approach and Case Study for the Rio Camboriú PWS Program, Santa Catarina, Brazil*. https://www.nature.org/content/dam/tnc/nature/en/documents/BrazilWaterROI_2.pdf.

The Lab. 2020. "Cloud Forest Blue Energy Mechanism." Global Innovation Lab for Climate Finance. https://www.climatefinancelab.org/project/cloud-forest-blue-energy-mechanism/.

Llosa, G. 2020. Correspondence between the authors and Gonzalo Llosa, Technical Coordinator, Ministry of the Environment (MINAM), Peru, September 30.

Lovejoy, T.E., and C. Nobre. 2018. "Amazon Tipping Point." *Science Advances* 4 (2): eaat2340. doi:10.1126/sciadv.aat2340.

Mandle, L., R. Griffin, and J. Goldstein. 2016. "Natural Capital and Roads: Managing Dependencies and Impacts on Ecosystem Services for Sustainable Road Investments." Washington, DC: Inter-American Development Bank. https://publications.iadb.org/publications/english/document/Natural-Capital-and-Roads-Managing-Dependencies-and-Impacts-on-Ecosystem-Services-for-Sustainable-Road-Investments.pdf.

MAR Fund. 2021. "MAR Fund: Protecting the Mesoamerican Reef." https://marfund.org/en/.

Marino, L. 2020. Correspondence between the authors and Luis Marino, Director, Department of Environmental Economics and Finance, Ministry of the Environment (MINAM), Peru. September 18.

Marsh, A. 2020. "Lombard Odier Launches $400 Million Natural Capital Equity Fund." *Bloomberg*, November 15. https://www.bloomberg.com/news/articles/2020-11-16/lombard-odier-launches-400-million-natural-capital-equity-fund.

Marsters, L., G. Morales, S. Ozment, M. Silva, G. Watson, M. Netto, and G.L. Frisari. 2021. "Nature-Based Solutions in Latin America and the Caribbean: Financing Mechanisms for Replication." Washington, DC: Inter-American Development Bank and World Resources Institute.

Matthews, J., and E.O. Cruz. 2020. "Protecting and Investing in Natural Capital in Asia and the Pacific." Asian Development Bank.

McDonald, R.I., and D. Shemie. 2014. "Urban Water Blueprint: Mapping Conservation Solutions to the Global Water Challenge." Washington, DC: The Nature Conservancy. http://water.nature.org/waterblueprint/#/section=overview&c=3:6.40265:-37.17773.

Ministerio del Ambiente y Agua. 2020. "Programa Socio Bosque." https://www.ambiente.gob.ec/programa-socio-bosque/.

miPáramo. 2020. https://miparamo.org/somos/.

Nowak, D.J., and E.J. Greenfield. 2018. "US Urban Forest Statistics, Values, and Projections." *Journal of Forestry* 116 (2): 164–77. doi:10.1093/jofore/fvx004.

OECD (Organisation for Economic Co-operation and Development). 2018. "Tracking Economic Instruments and Finance for Biodiversity." Paris: OECD.

OECD. 2021. "The OECD Green Recovery Database: Examining the Environmental Implications of COVID-19 Recovery Policies." Paris: OECD. https://www.oecd.org/coronavirus/en/themes/green-recovery.

Olivares Zapiain, E. 2021. Personal correspondence between Elisabet Olivares Zapiain, Peru's Ministry of the Environment (MINAM), and Maggie Gonzalez regarding the Ciudad Bicentenario project, July 22.

Oliver, E., S. Ozment, A. Grünwaldt, M. Silva, and G. Watkins. 2021. "Nature-Based Solutions in Latin America and the Caribbean: Support from the Inter-American Development Bank." Washington, DC: Inter-American Development Bank and World Resources Institute.

Ozment, S. 2019. "Nature-Based Solutions for Disaster Risk Management." World Bank and World Resources Institute. https://wriorg.s3.amazonaws.com/s3fs-public/NBS_for_DRM_brochure.pdf.

Ozment, S., R. Feltran-Barbieri, E. Gray, P. Hamel, J. Baladelli Ribeiro, S. Roiphe Barrêto, A. Padovezi, and T. Piazzetta Valente. 2018. "Natural Infrastructure in São Paulo's Water System." https://www.wri.org/research/natural-infrastructure-sao-paulos-water-system.

Panorama Solutions. 2015. "Guyana Mangrove Restoration Project: Empowering Women to Take Action through Mangrove Restoration, Protection and Management." https://panorama.solutions/sites/default/files/gmrp_empowering_women_to_take_action_2_0.pdf.

Panorama Solutions. 2020. "Increasing Coastal Resilience and Social Development Opportunities: Guyana Mangrove Restoration Project (GMRP)." https://panorama.solutions/en/solution/increasing-coastal-resilience-and-social-development-opportunities-guyana-mangrove.

Paredes, J.R. 2017. "La red del futuro: Desarrollo de una red eléctrica limpia y sostenible para América Latina." Washington, DC: Inter-American Development Bank. https://publications.iadb.org/en/la-red-del-futuro-desarrollo-de-una-red-electrica-limpia-y-sostenible-para-america-latina.

Paulson Institute. 2020. "Financing Nature: Closing the Global Biodiversity Financing Gap." http://www.paulsoninstitute.org/key-initiatives/financing-nature-report/.

Quiroz, R.F. 2016. "Análisis de inversiones: Aeroportuarias y portuarias, América Latina y el Caribe al horizonte 2040." Corporación Andina de Fomento. https://scioteca.caf.com/bitstream/handle/123456789/1160/An percentc3 percenta1lisis percent20de percent20inversiones percent20aeroportuarias percent20en percent20Am percentc3 percenta9rica percent20Latina percent20y percent20el percent20Caribe percent20al percent20horizonte percent202040.pdf?sequence=5&isAllowed=y.

Reguero, B.G., M.W. Beck, V.N. Agostini, P. Kramer, and B. Hancock. 2018. "Coral Reefs for Coastal Protection: A New Methodological Approach and Engineering Case Study in Grenada." *Journal of Environmental Management* 210 (March): 146–61. doi:10.1016/j.jenvman.2018.01.024.

Robinson, M.M., and X. Zhang. 2011. "The World Medicines Situation 2011—Traditional Medicines: Global Situation, Issues, and Challenges," 14. http://digicollection.org/hss/en/m/abstract/Js18063en/.

Rycerz, A., W. Bugler, L. Messling, and W. Georgina. 2020. "Itaipú Dam: How Natural Ecosystems Support One of the World's Largest Hydroelectric Dams." Resilience Shift. https://www.resilienceshift.org/wp-content/uploads/2020/08/Itaipu-Dam-case-study-Resilience-Shift.pdf.

São Paulo. 2020. "Proteção e restauração de mata ciliar." Programa Nascentes. 2020. https://www.infraestruturameioambiente.sp.gov.br/programanascentes/.

SEDUVI (Secretaría de Desarrollo Urbano y Vivienda). 2020. Correspondence between the authors and SEDUVI, Mexico City. November 25.

Serebrisky, T., A. Suárez-Alemán, and A. Wohlhueter. 2018. "Lifting the Veil on Infrastructure Investment Data in Latin America and the Caribbean." https://publications.iadb.org/publications/english/document/Lifting-the-Veil-on-Infrastructure-Investment-Data-in-Latin-America-and-the-Caribbean.pdf.

Silva, M., G. Watson, A.L. Amin, G. Watkins, A. Rycerz, and J. Firth. 2020. "Increasing Infrastructure Resilience with Nature-Based Solutions (NbS)." Inter-American Development Bank. doi:10.18235/0002325.

Silver, J.M., K.K. Arkema, R.M. Griffin, B. Lashley, M. Lemay, S. Maldonado, S.H. Moultrie, et al. 2019. "Advancing Coastal Risk Reduction Science and Implementation by Accounting for Climate, Ecosystems, and People." *Frontiers in Marine Science* 6: 556. doi:10.3389/fmars.2019.00556.

Skurtis, T. 2020. Correspondence between the authors and Thomas Skurtis, Conservation International, Colombia.

Tellman, B., R.I. McDonald, J.H. Goldstein, A.L. Vogl, M. Flörke, D. Shemie, R. Dudley, et al. 2018. "Opportunities for Natural Infrastructure to Improve Urban Water Security in Latin America." *PLOS ONE* 13 (12). doi:10.1371/journal.pone.0209470.

Swann, S., L. Blandford, S. Cheng, J. Cook, A. Miller, and R. Barr. 2021. "Public International Funding of Nature-Based Solutions for Adaptation: A Landscape Assessment." Working paper. Washington, DC: World Resources Institute. https://doi.org/10.46830/wriwp.20.00065.

TNC (The Nature Conservancy). 2020. "Insuring Nature to Ensure a Resilient Future." https://www.nature.org/en-us/what-we-do/our-insights/perspectives/insuring-nature-to-ensure-a-resilient-future/.

TNC. n.d. "Water Funds Toolbox." The Nature Conservancy. https://waterfundstoolbox.org.

UNDP (UN Development Programme). 2019. "Pathway for Increasing Nature-Based Solutions in NDCs: A Seven-Step Approach for Enhancing Nationally Determined Contributions through Nature-Based Solutions." https://www.undp.org/content/undp/en/home/librarypage/climate-and-disaster-resilience-/pathway-for-increasing-nature-based-solutions-in-ndcs.html.

UNEP (UN Environment Programme). 2016. "Restoring Natural Capital Can Help Reduce Extreme Poverty." August. http://www.unep.org/news-and-stories/story/restoring-natural-capital-can-help-reduce-extreme-poverty.

UNEP. 2018. "The Coral Reef Economy." November 13. http://www.unenvironment.org/resources/report/coral-reef-economy.

UNEP. 2019. "The Nature-Based Solutions for Climate Manifesto." August 14, 2019. https://wedocs.unep.org/bitstream/handle/20.500.11822/29705/190825NBSManifesto.pdf?sequence=1&isAllowed=y.

UNFCCC (UN Framework Convention for Climate Change). 2011. "Project Overview: Adaptation to Climate Impacts in Water Regulation and Supply for the Area Chingaza-Sumapaz-Guerrero." https://unfccc.int/files/parties_observers/submissions_from_observers/application/pdf/733.pdf.

UN-Habitat. 2015. "Informal Settlements Discussion Paper." http://uploads.habitat3.org/hb3/Issue-Paper-22_ASENTAMIENTOS-INFORMALES-SP.pdf.

Victurine, R. 2020. Conservation Finance Alliance, Wilderness Conservation Society Ray Victurine Interview, September 21.

Waite, R., L. Burke, E. Gray, P. van Beukering, L. Brander, E. McKenzie, L. Pendleton, et al. 2014. "Coastal Capital: Ecosystem Valuation for Decision-Making in the Caribbean." World Resources Institute.

Watkins, G., M. Silva, A. Rycerz, K. Dawkins, J. Firth, V. Kapos, L. Canevari, et al. 2019. "Nature-Based Solutions: Scaling Private Sector Uptake for Climate Resilient Infrastructure in Latin America and the Caribbean." Discussion Paper IDP-DP-00724. https://publications.iadb.org/publications/english/document/Nature-based_Solutions_Scaling_Private_Sector_Uptake_for_Climate_Resilient_Infrastructure_in_Latin_America_and_the_Caribbean.pdf.

Weisse, M., and E. Goldman. 2020. "We Lost a Football Pitch of Primary Rainforest Every 6 Seconds in 2019." World Resources Institute, June 2. https://www.wri.org/blog/2020/06/global-tree-cover-loss-data-2019.

Welsh, M. 2017. "Restoration and Community Co-management of Mangroves (RECCOMM)." September 7. https://panorama.solutions/en/solution/restoration-and-community-co-management-mangroves-reccomm.

World Bank. 2017. "People Using Safely Managed Sanitation Services (Percent of Population): Latin America & Caribbean." https://data.worldbank.org/indicator/SH.STA.SMSS.ZS?locations=ZJ.

World Bank. 2020. "Infrastructure Financing in Times of Covid-19: A Driver of Recovery." http://pubdocs.worldbank.org/en/424911600887428587/Infrastructure-financing-in-times-of-COVID-19-A-driver-of-recovery.pdf.

World Bank. 2021. "Development Projects: BZ Marine Conservation and Climate Adaptation—P131408." Text/HTML. World Bank, March 30. https://projects.worldbank.org/en/projects-operations/project-detail/P131408.

World Economic Forum. 2020. "New Nature Economy Report 2020." http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf.

WWAP (World Water Assessment Programme)/UN-Water. 2018. *The United Nations World Water Development Report 2018: Nature-Based Solutions for Water*. Paris: UNESCO. http://unesdoc.unesco.org/images/0026/002614/261424e.pdf.

ACKNOWLEDGMENTS

This report was prepared through a partnership between the Inter-American Development Bank and World Resources Institute, with support from the Pan American Development Foundation and the FEMSA Foundation. The WRI team was led by Suzanne Ozment and included Maggie Gonzalez, Anelise Schumacher, Gabriela Morales, Emmie Oliver, Todd Gartner, and Lizzie Marsters. Suzanne conceived and designed the analysis and wrote the paper; Maggie collected data, crafted examples, and conferred with NBS projects in LAC; Anelise collected data and performed key parts of the analysis; Emmie collected and organized data. The IDB team was led by Mariana Silva, Greg Watson, and Alfred Grünwaldt and provided input, contacts, and review through every step of the project.

We express our sincere gratitude to the following individuals who provided incisive comments and guidance on this report: Emily Corwin, Director of Nature-Based Engineering Solutions, Conservation International; Gloria Cuevas, Director of Environmental Analysis, SEMARNAT (Mexico); Mary Ruckleshaus, Director, Natural Capital Project, Stanford University; Lisa Mandle, Lead Scientist, Natural Capital Project, Stanford University; Sowmya Krishnamoorthy, Director, Haiti Programs, and Practice Lead, Economic Opportunities, Pan-American Development Foundation; Gmelina Ramírez, Climate Change Senior Specialist, IDB; John-Rob Pool, Cities4Forests Implementation Manager, WRI; Luana Betti, Urban Finance Specialist WRI-Brasil, WRI; Javier Warman, Director of Forests WRI-Mexico, WRI; Gaia Larsen, Senior Associate, Finance Center, WRI; Jillian Du, Research Manager for Inclusive Cities, WRI; Francesca Battistelli, Water Program Associate, WRI; Charles Iceland, Interim Water Program Director, WRI; Renata Marson, Research, Data, and Innovation Lead, WRI-Brasil.

The case studies featured in this report draw on inputs from the following individuals: Natalia Acero (Conservation International), Luis Acosta (SUNASS), Luis Alban (Helvetas), Lucia Oralia Almeida (UNAM), Mónica Altamirano (Deltares), Tania Ammour (IUCN), Edgardo Arceo (Municipality of Mérida), Jessica Bautista (Desarrollo Comunitario de los Tuxtlas), Silvia Benítez (TNC), Angela Betancourth (3erPlaneta), Fabiana Bianchi (CAF), Bert de Bièvre (FONAG), Luis Bojórquez (Conselva), Henry Cáceres (Barranquilla Verde), Alejandra Campos (Sociedad de Historia Natural Nipajara), Jesús Cárcamo (Desarrollo Comunitario de los Tuxtlas), Steven Albert Carrion (World Bank), Juliana Castaño (World Bank), Margarita Castillo (Barranquilla Verde), Said Chuc (Municipality of Mérida), Hugo Contreras (TNC), Emily Corwin (Conservation International), Jessica Cornejo (Pan American Development Foundation), María Claudia Díazgranados Cadelo (Conservation International), Jehanne Fabre (Danone), Martha Gallego Salazar (Celsia Energía), Alejandra García (Sociedad de Historia Natural Niparaja), Emily Goodwin (IUCN), Kevin Grady (Northern Arizona University), Kerry Grim (Northern Arizona University), Sandra Guido (Conselva), Rolando Hernández (Protección de la Fauna Mexicana), Lina Herrera (Fundación Bavaria), Karla Hurtado (Clever Quito), David Jácome Polit (Quito Resiliente), Angelica Jiménez (Cerro Grande Colima), Benjamin Jiménez (CONAGUA), Estefania Jiménez (Organization of American States), Gonzalo Fernando Llosa Talavera (MINAM), Rebeca López (Guardianes de los Volcanes), Juan Lozano (TNC), Gustavo Madrid (eeTestudio), Gabriel Dias Mangolini Neves (Campinas City Hall), Luis Marino (Peru Environmental Ministry), Waylon Matson (4 Walls International), Alex Mauroner (AGWA), Francisco Medina (Helvetas), Griselda Medina (CONAGUA), Doris Mejia (Forest Trends), Rodrigo Migoya (Niños y Crías), Sandra Milena Giraldo (OTCA), Diego Pacheco (OTCA), Reinaldo Penailillo Burgos (Deltares), Peter Penning (ALO Advisors), Karen Podvin (IUCN), Maike Potthast (GIZ), Julián Alberto Prato Valderrama (Universidad Nacional de Colombia), Justus Raepple (TNC), Juliana Ribeiro (Boticario Group Foundation), Andromeda Rivera Castañeda (FONCET), Rocio Salinas (TNC), Thomas Skurtis (Conservation International), Alvaro Soldevilla (Global Resilient Cities Network), Ingrid Timboe (AGWA), Thiago Valente (Boticario Group Foundation), Carlos Vargas (Guardianes de los Volcanes), Eduardo Vázquez (Agua Capital), Georgina Vidrales (Ayuntamiento de Xalapa), Ana Maria Villa Grajales (Municipality of Medellín), Tatiana Valeria Watson (Presidencia Colombia), Alberto Yutronic (Water for People).

FUNDACIÓN FEMSA

PADF PAN AMERICAN DEVELOPMENT FOUNDATION

Cities4Forests

IDB
Inter-American
Development Bank

WORLD
RESOURCES
INSTITUTE