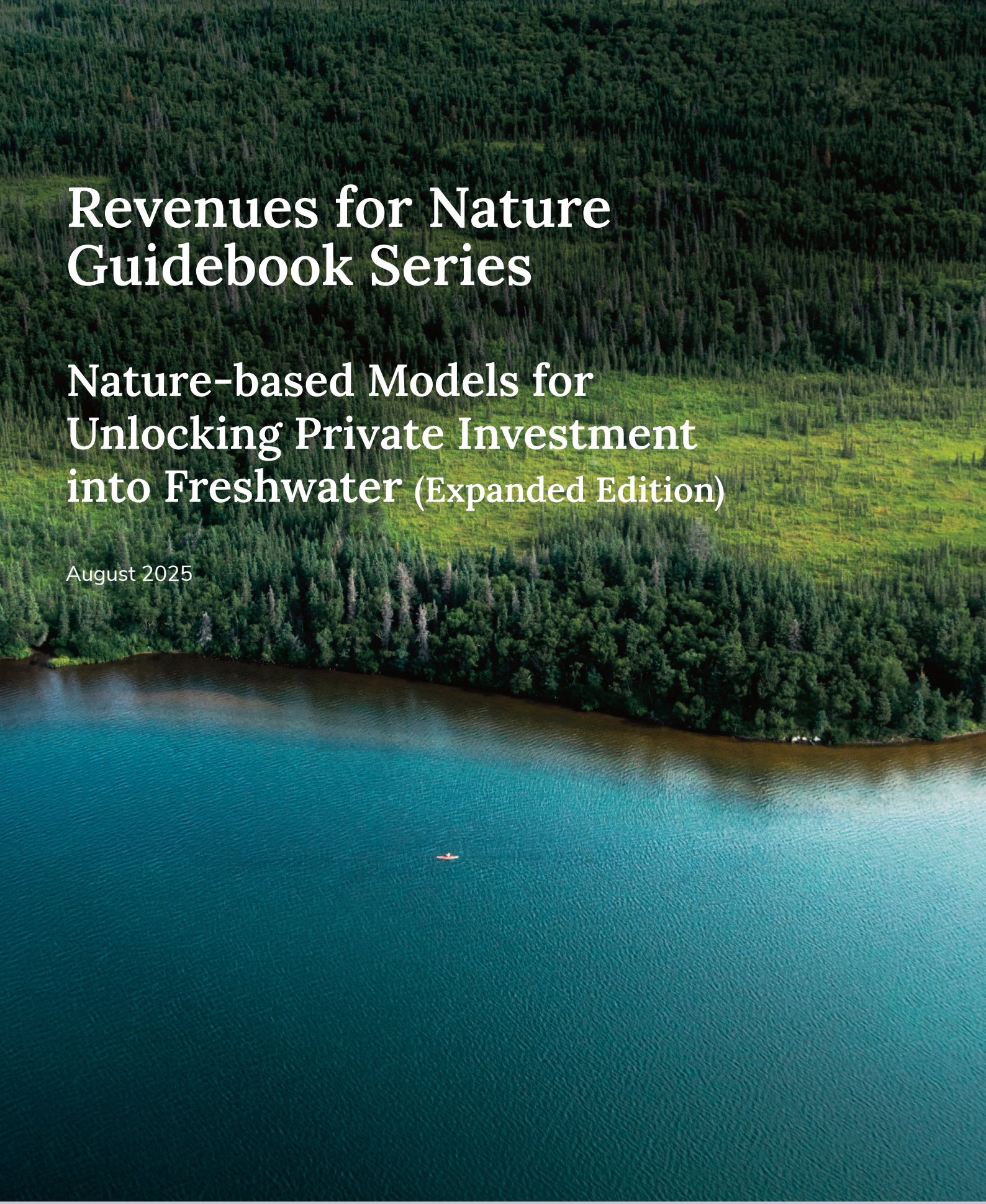


Revenues for Nature Guidebook Series

Nature-based Models for Unlocking Private Investment into Freshwater (Expanded Edition)

August 2025

Revenues for Nature

greenfinanceinstitute.com/gfihive/revenues-for-nature

Revenues for Nature Project

Revenues for Nature (R4N) is a global project led by the Green Finance Institute Hive, in partnership with UNDP Biodiversity Finance Initiative (BIOFIN) and UNEP Finance Initiative (UNEP FI).

R4N aims to contribute to the achievement of Target 19 of the Kunming-Montreal Global Biodiversity Framework (GBF) by supporting countries in identifying and implementing effective models for mobilising private sector finance into nature restoration and conservation.

The project's three pillars of work include:

1. **Knowledge Sharing,** with the publication of a series of detailed guidebooks capturing how to establish, replicate and scale high-integrity nature-based revenue models. The Guidebooks are complemented by a database of nature-based revenue models and markets that mobilise private sector finance into nature conservation and restoration.
2. **Multistakeholder Learning** via a Community of Practice which includes the private sector, governments, investors and funders, and project developers to support shared learning for the development of nature models and markets.
3. **Implementation** plans to support governments and relevant partners in rolling out impactful nature-based revenue models.

R4N is funded by the Gordon and Betty Moore Foundation.

Guidebook Series

The R4N Guidebook Series provides an in-depth analysis of models across the globe that unlock private sector capital into nature restoration or protection, including nature-based solutions (NbS). Each Guidebook offers detailed insights into the development of these models, the enabling conditions that allowed them to succeed, along with key lessons learned. The series examines the ecological, political, and socio-economic factors that support the replicability and scalability of these models in diverse regions, and explores how these models can generate revenue and improve biodiversity while leveraging some private sector financing.

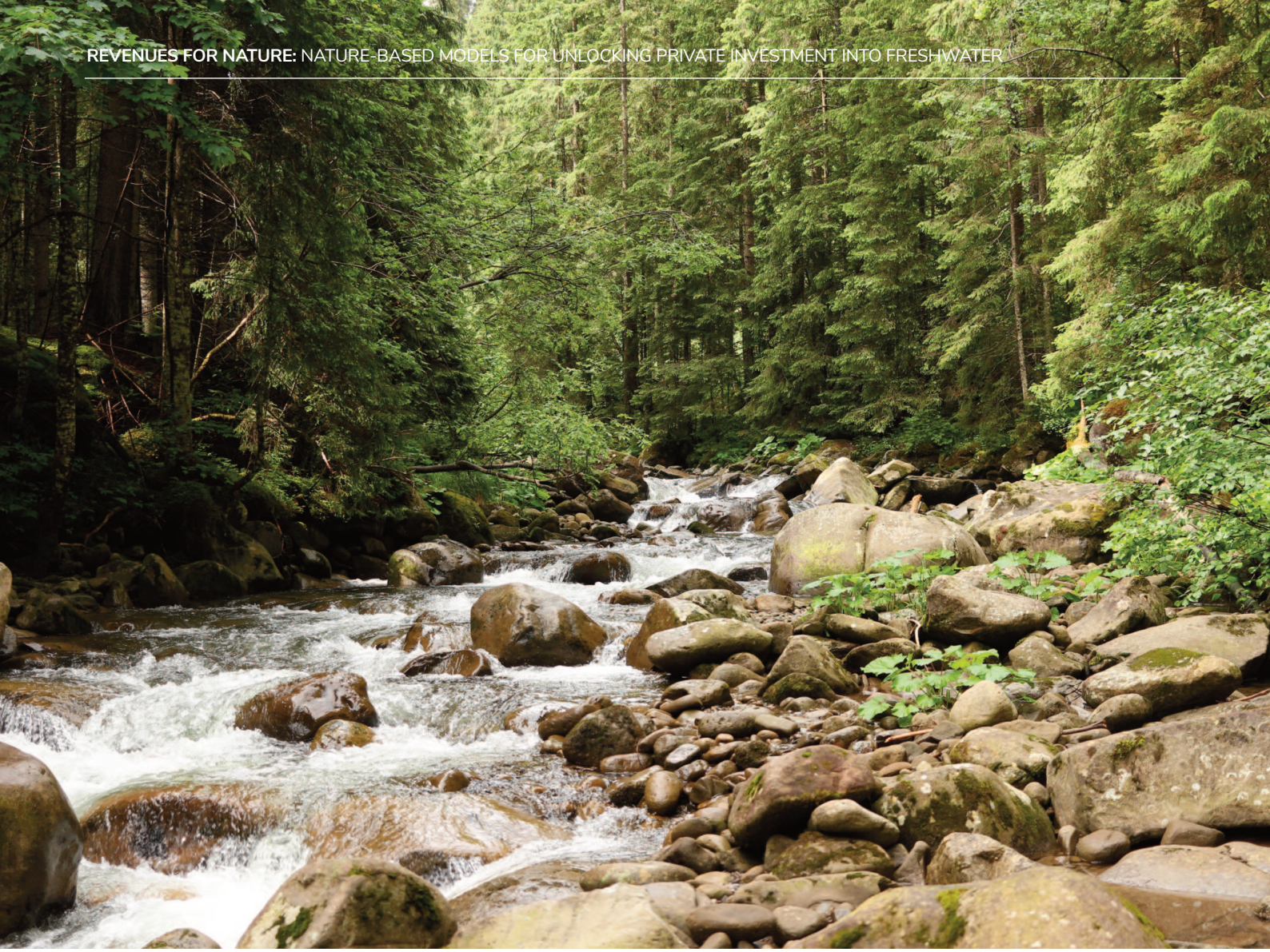
The R4N Guidebook Series currently include:

- Biodiversity Net Gain, England – October 2024
- Wetland Mitigation and Endangered Species Habitat Banking, United States – October 2024
- Habitat Banks, Colombia – October 2024
- Nature-based Models for Unlocking Private Investment into Water Quality and Availability, Part 1– October 2024
- Living Amazon Mechanism, Brazil – June 2025
- Project Finance for Permanence & Indigenous-led Conservation, Canada – July 2025
- Supply Chain Models, Global – July 2025

The next publications of the R4N Guidebook Series will be released in 2025 and 2026 and include:

- Payments for Ecosystem Services, Sri Lanka
- Wildlife Conservation Models, Sub-Saharan Africa
- Marine and Coastal Conservation Models, Global

The Guidebook Series is aimed at policymakers, corporates and investors who are interested in scaling high-integrity models to mobilise private sector capital at scale into conservation and nature-positive outcomes.



About this Guidebook

This Guidebook expands upon Part 1, published October 2024, focusing on 10 examples of models that leverage private capital to improve freshwater quality and availability in diverse regions. It provides summaries of the models and their development, as well as key lessons learned and considerations for replicating and scaling these models. This expanded edition also includes insights on particularly collaborative efforts to improve water resources, highlighting the benefits of cross-sector, multi-stakeholder collaboration to share costs, de-risk investment and catalyse change at the catchment scale. As the guidebook covers a wide range of revenue models with different stakeholder groups taking the lead, the guidebook can be useful for policymakers, corporates, project and scheme developers and land managers who are interested in exploring innovative ways to fund nature-based interventions to improve water quality and availability. The Summary of Case Studies outlines the key stakeholder groups involved in each revenue model type in order to guide the reader to sections most relevant to their interests.

The lead author for this guidebook is **A. Allan, Green Finance Institute**

Reviewers of this Guidebook include **Aurelia Blin, Katy Baker (UNEP Finance Initiative); Helen Avery, Tom Williams (Green Finance Institute); Gaurav Gupta, Eva Bortolotti, Maxim Vergeichik (UNDP Biodiversity Finance Initiative (BIOFIN))**.

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Executive Summary

This Guidebook outlines ten innovative revenue models that address the critical challenges of water quality and availability through nature restoration and nature-based solutions (NbS). Water quality and quantity are inherently linked—poor water quality reduces available freshwater, while water scarcity exacerbates pollution. Both public and private sectors play pivotal roles in restoring freshwater ecosystems and securing long-term water supplies. The models range from voluntary corporate actions and market-driven approaches to those underpinned by governmental regulations.

Governments, bound by international commitments like the Kunming-Montreal Global Biodiversity Framework (GBF), are essential in creating policy frameworks that protect water resources.[1] However, public funding alone is insufficient to meet growing water infrastructure demands, and there is an increasing need for additional private sector investment. Target 19 of the GBF illustrates the commitment of the international community to diversify and align financing sources for biodiversity, including private capital.

The private sector is increasingly aware of its interdependencies with water. Industries heavily dependent on freshwater are facing increasing financial risks from water shortages and pollution. These risks, compounded by climate change, are driving businesses to invest in NbS to enhance resilience, reduce operational costs, and meet increasing regulatory requirements and stakeholder demands.
In many contexts, NbS interventions for water provide a compelling business case, due to their cost-effectiveness, long term impact and adaptability compared to traditional grey infrastructure. NbS generally offer lower upfront costs, reduced long-term maintenance, and co-benefits such as enhanced biodiversity and improved relations with the communities in which they operate. By investing in NbS, businesses and private investors can mitigate water-related risks and improve the resilience of their operations/portfolio against climate and nature-related uncertainties, while contributing to global sustainability efforts.

[1] CBD (2023). Water and Biodiversity.

Importantly, achieving meaningful water outcomes requires collaboration. Companies increasingly recognise that water is a shared resource, and that basin-level impact cannot be achieved in isolation. As a result, cross-sector and inter-corporate collaboration is emerging as a powerful enabler of investment in water-focused NbS. Public-private partnerships (PPPs), and corporate coalitions, such as those explored in this guidebook – are unlocking new opportunities for collective investment, risk sharing and project development aligned to the priorities of communities in shared watersheds.

By investing in NbS and participating in collaborative approaches, businesses and private investors can mitigate water-related risks, enhance operational and portfolio resilience, and contribute meaningfully to global climate and nature goals.

Summary of Case Studies within this Guidebook

Policy driven models

Policy-driven models play a crucial role in addressing water-related challenges by creating regulatory frameworks that incentivise or mandate investment into NbS. By integrating NbS into regulatory requirements, governments can drive large-scale investments in watershed conservation, pollution control, and other measures for improved water quality and availability. This guidebook highlights two case studies where policy interventions have been designed to mobilise additional resources and create frameworks for NbS investment. If you are a policymaker, interested in compliance-based models, see the Compliance Models Section.

England's Nutrient Neutrality policy addresses nutrient pollution from nitrogen and phosphorus, which threatens water quality and biodiversity. Excessive nutrients from agricultural runoff and wastewater treatment contribute to poor ecological conditions in rivers, causing eutrophication and harming aquatic ecosystems. Under the Conservation of Habitats and Species Regulations 2017, developers are required to demonstrate that new projects do not increase nutrient pollution in protected areas.[2] This regulation has slowed development in some regions but aims to balance environmental protection with sustainable growth. The policy offers a framework for compensatory offsetting by requiring projects to achieve "nutrient neutrality," mitigating their environmental impact and helping restore England's waterways. Capacity has been a key challenge for local authorities which administer the scheme. Lack of supply of credits has presented an additional challenge, which government responded to by creating a national Nutrient Mitigation Scheme where nutrient mitigation projects would be publicly funded and supported by government.[3]

Nutrient pollution from agriculture, wastewater, and urban runoff is a major water quality issue in the U.S., contributing to algal blooms and coastal dead zones. To address this, water quality trading (WQT) allows regulated polluters to meet discharge limits by purchasing credits from others who reduce nutrient runoff, including farmers implementing conservation practices like wetland restoration and riparian buffers. Established under the Clean Water Act, WQT provides a flexible compliance mechanism, but adoption has been limited by regulatory uncertainty, verification challenges, and low market liquidity. Public programs like USDA's EQIP support credit generation, and some states have introduced clearinghouses to streamline transactions. With 19 programs active as of 2017, WQT illustrates how policy can enable market-based approaches to water protection. Interest is growing internationally, with similar initiatives emerging in countries like Australia and Canada.

[2] The Conservation of Habitats and Species Regulations (England) 2017

[3] Natural England & Department of Environment, Food and Rural Affairs (2023). Natural England's nutrient mitigation scheme for developers

In Peru, water tariff reforms have significantly boosted investments in nature-based solutions for water anagement, with funding increasing 13-fold between 2014 and 2019.[4] Water utilities are now required to earmark one percent of revenue to invest in natural infrastructure. The reforms began in 2009 in Moyabamba, where the water utility added a 1 PEN (USD 0.33) tariff to fund watershed conservation.[5] Legislative changes, such as the 2013 Sanitation Services Law and the 2014 Compensation for Ecosystem Services Law, further enabled utilities to integrate NbS into their 5-year plans and pay upstream landowners for conservation efforts. As of 2024, over USD 50 million has been committed for NbS by 40 utilities, including a USD 25 million commitment from Lima's utility, SEDAPAL.[6] However, delays in project execution highlight the need for building capacity and streamlining processes within utilities to manage NbS projects. This model demonstrates the importance of policy support, stakeholder engagement, and new tools for cost-benefit analysis to balance grey and green infrastructure investments.

Water Funds

Water funds are an innovative financial mechanism designed to attract, manage, and allocate resources for watershed conservation. Initially developed by The Nature Conservancy, these funds have been implemented across diverse geographies, providing a sustainable model for financing NbS. By pooling resources from various stakeholders, including public utilities, private companies, and local communities, water funds enable targeted investments in watershed conservation and restoration efforts. This guidebook highlights two case studies that illustrate the variety of funding sources and interventions that water funds support and how policy can support their development and scaling. If you are interested in landscape-based models, combining public and private funding, see the Water Funds section.

Quito, Ecuador's Water Fund, Fondo de Protección del Agua (FONAG), was the world's first water fund, established in 2000 through a 1% environmental surcharge on water bills by the city's water utility, EPMAPS. The fund's revenue is used to protect and restore the páramo ecosystems, which supply water to Quito's 2.7 million residents. FONAG invests in a range of NbS such as forest restoration, sustainable agriculture, erosion control, and community education to enhance water security. The fund supports over 28,000 hectares of watershed conservation efforts, benefiting more than 3,500 farming families and balancing ecosystem restoration with local economic needs.[7] Over time, FONAG's funding has increased, reaching 2% of water tariffs, providing a long-term financial source to safeguard Quito's water supply. The project has demonstrated how public money can be effectively used to crowd in private capital into nature-based water conservation activities and that effective monitoring and community engagement are key to the success and replicability of the scheme.

The Upper Tana-Nairobi Water Fund was Africa's first water fund, created to manage the Upper Tana River watershed, which provides drinking water to Nairobi, powers half of Kenya's hydropower, and supports over 300,000 smallholder farmers.[8] Initiated by The Nature Conservancy in 2014, the Fund brought together stakeholders from government, private sector, and NGOs to invest in conservation measures aimed at reducing erosion, improving water yields, and increasing agricultural productivity. By introducing sustainable farming practices and restoring degraded lands, the fund achieved a 50% reduction in sediment concentration and generated significant economic returns, with an estimated USD 21.5 million in benefits from a USD 10 million investment over 30 years.[9] The Fund has since become a model for similar water conservation projects across Africa, demonstrating the effectiveness of NbS and the versatility of this model for water management and economic development in different contexts.

[4] Forest Trends (2022) Opening the Tap: State of finance for natural infrastructure for water security in Peru, 2021.
[5] Gammie et al (2021). Mobilizing funding for nature-based solutions: Peru's drinking water tariff.
[6] Interview with Mia Smith, Forest Trends. (2024).
[7] Latin America Water Funds Partnership (2018). Fonda para la protección del agua.
[8] UTNWFT (2021). Upper Tana-Nairobi Water Fund Strategic plan 2022 – 2026.
[9] TNC (2015). Upper Tana-Nairobi Water Fund Business Case. Version 2. The Nature Conservancy: Nairobi, Kenya

Private-sector led models

The private sector contribution to the development and management of nature-based revenue models for water is growing. These models often leverage corporate resources, supply chain management, and partnerships to fund and implement nature restoration and NbS. This guidebook highlights five case studies demonstrating how private-sector-led initiatives can drive investment into NbS for water quality and availability in diverse geographical and economic contexts. If you are a corporate or group of corporates facing a particular water challenge that could be mitigated by upstream interventions, see the Payments for Ecosystem Services section. If you are a corporate interested in compensating for your water footprint, or a project developer or landowner implementing NbS for freshwater, see the Voluntary Credit Mechanisms section. If you are a corporate interested in investing directly within your supply chain to mitigate water risks, see the Corporate Direct Investment section.

The Kumamoto PES Scheme in Japan successfully addressed groundwater depletion by paying farmers to flood unused rice fields, enhancing groundwater recharge. Initiated in 2001 by Sony Semiconductor and a local NGO, the scheme compensated farmers for their participation, providing a sustainable income for an aging farming community while replenishing groundwater reserves. By 2009, the Technology Centre had replenished 9.8 million tons of groundwater, and the program expanded to include 38 companies by 2017.[10] The initiative, grounded in scientific understanding of local hydrology, proved highly cost-effective, costing just one-tenth of what increased water pumping would have required, offering a scalable and replicable solution to water scarcity in industrialised regions.

The Chishui River, vital for biodiversity, community livelihoods, and baijiu production, has faced threats from deforestation, agriculture, and industry in the past decades. To address these, a Payments for Watershed Services scheme was launched in 2014, led by UNDP/GEF and the Foreign Economic Cooperation Office, Ministry of Ecology and Environment, and co-financed by baijiu companies, to incentivise upstream communities to adopt sustainable practices like forest restoration, low-input farming, and erosion control. By 2020, over 10,000 farmers participated, covering 50,000 hectares, with results including improved water quality, reduced sedimentation, and diversified rural incomes. The scheme's flexible, voluntary structure and strong public-private partnerships made it effective and replicable. Its success has sparked interest in basin-wide expansion, demonstrating how private-sector-aligned, NbS can enhance watershed resilience and support sustainable development.

Act4Water is a voluntary water conservation initiative that enables companies to reduce and compensate for their water footprint by purchasing Positive Water Credits — representing 1,000m³ of water benefit — from verified water-positive projects. The Act4Water Standard provides a framework to certify projects improving water availability, quality, resilience, or biodiversity. CAPs can be generated by projects like wetlands, water reuse, or pollution reduction, and sold on a marketplace to organisations seeking Water Positive certification. Companies progress through certification levels from Water Committed to Water Positive by measuring and reducing their impacts, as well as investing in positive water conservation efforts.

[10] Okiria, Zaki, Noda (2021). A Review of Payment for Ecosystem Services (PES) in Agricultural Water: Are PES from the Operation of Agricultural Water Control Structures Ubiquitous? Sustainability, 13, 12624.

The Reef Credit Scheme is a voluntary market initiative designed to incentivise landholders to improve water quality in the Great Barrier Reef catchment in Australia. The scheme is administered by Eco-Markets Australia, an independent environmental organisation and was designed by GreenCollar, an environmental market investor and project developer, in partnership with natural resource management organisations, Terrain NRM and NQ Dry Tropics. The scheme employs a set of scientifically approved methodologies to quantify reductions in pollutants like nitrogen and sediment entering the Great Barrier Reef catchment. These methodologies go through independent scientific review and public consultation before being approved for use through the scheme. Eco-Markets Australia also allows for additional methodologies to be submitted for review, ensuring that the scheme is adaptable to a variety of pollutants and environmental contexts.

Reckitt, the global consumer goods company behind brands like Finish and Durex, has developed a comprehensive water strategy to reduce its water footprint and build resilience across its operations and supply chains. The company aims to achieve water neutrality at all water-stressed sites by 2030 and has implemented water efficiency, recycling, and rainwater harvesting at key manufacturing facilities. In Hosur, India, Reckitt achieved water-positive certification in 2022 by combining in-plant improvements with catchment-level restoration using the Volumetric Water Benefit Accounting (VWBA) methodology. Beyond operations, Reckitt has partnered with WWF to deliver NbS in key sourcing regions including India, Brazil, and South Africa.

Key Findings & Lessons Learned

In designing both policy-based and market-driven models that seek to crowd in private sector investment, the following provides an overview of key findings and lessons learned from the seven case studies.

Market-based mechanisms for NbS investment are most effective when their objectives are aligned to policy goals. In England, for example, Nutrient Neutrality regulations prompted the creation of a market mechanism aimed at facilitating housing development while also meeting water quality targets. By aligning the market with government priorities, the government was able to step in and "prime the pipeline" when limited project supply posed challenges. This support came in the form of public funding to assist project developers, which ensured that developers had access to high-quality projects from which to purchase nutrient credits. Similarly, in Australia, when the supply of credits outstripped demand, the Queensland government stepped in to purchase Reef Credits, as the scheme's objectives were consistent with the government's goals of improving water quality in the Great Barrier Reef catchment.

NbS can generate a wide range of benefits beyond their primary goal of improving water quality or quantity. These diverse outcomes can attract funding from a variety of sources, each interested in different results. Securing multiple sources of funding not only strengthens the financial sustainability of market mechanisms for NbS investment but can also ensures long-term environmental impact. For example, Water Funds attract contributions from public and private sources to support watershed conservation. Interventions made upstream can enhance both water quality and quantity downstream while delivering added benefits such as flood risk mitigation, increased biodiversity, and job creation. By effectively quantifying these co-benefits, Water Funds or models can appeal to a broader range of potential funders.

The success of these models requires a deep understanding of local environmental systems, incentives, and balancing environmental goals with socio-economic needs of local communities. Combining expert scientific research with the local knowledge of farmers, landowners, and communities ensures that interventions are both effective and contextually appropriate. This integrated approach helps achieve environmental objectives more efficiently.

Governments play a critical role in promoting and scaling up revenue models by offering financial and regulatory support. Governments are critical to create an overall regulatory framework on water quality and usage to enable the various models for water financing to function effectively. Additionally, governments can use their budget to incentivise best practices (demand creation for a credit market scheme, provide large investments in a water fund) and disincentivise bad practices (e.g. polluter pays mechanisms). Governments can also act as market participants when necessary and fund early-stage project development to develop a pipeline of supply-side projects.

Sustaining credit demand requires regulatory triggers or forward planning. As seen in the U.S. Water Quality Trading programs and Canada's South Nation TPMP, credit demand can sharply decline when water quality targets are met or when polluters operate within discharge limits. To maintain long-term environmental impact, governments should consider tightening discharge standards over time or embedding ongoing offsetting requirements, particularly for new developments or expanding operations.

Developing a clear, robust business case that uses recognised methodologies is crucial for demonstrating the socio-economic and environmental co-benefits of NbS for water. A well-articulated business case helps secure investment from both the public and private sectors by proving the long-term benefits of nature-based conservation over traditional infrastructure.

Current cost-benefit analyses tend to prioritise grey infrastructure. Policymakers and technical experts can support the development of new tools that better account for the long-term benefits and, in some instances, higher returns associated with green infrastructure.

Corporate leadership and direct investment can drive innovation and local impact. Companies like Reckitt demonstrate how voluntary, direct investment in NbS and catchment restoration can deliver both environmental and operational value. These projects build local resilience and reduce business risk, particularly in water-stressed regions.

Integrated stakeholder engagement improves outcomes. Combining scientific and technical input with the knowledge of local communities and land managers leads to more context-appropriate and durable solutions. This was central to Reckitt's watershed work and many credit-generating agricultural BMPs under WQT schemes.

Methodologies for measuring the impact of freshwater interventions should undergo thorough scientific and technical review, alongside public consultation. This ensures usability, accountability, and the highest likelihood of success, while also gaining public trust in the proposed interventions.

Verified water impact metrics can unlock access to sustainable finance. The Act4Water initiative demonstrates how quantified water benefits—measured through Positive Water Credits (CAPs) and verified by third parties like DNV—can be leveraged not only for corporate water stewardship but also to access sustainability-linked finance. In 2023, Hidralia, a Spanish water utility, secured a sustainability-linked loan from CaixaBank and others, using its commitment to achieving Water+ certification and expected CAP generation as a loan KPI.

Introduction

This Guidebook focuses on revenue models which address the causes and impacts of freshwater quality and availability challenges. The quality and quantity of water are closely linked both in their causes and potential solutions. Water quantity issues, particularly drought-related shortages and over-extraction, often exacerbate water quality issues, concentrating pollutants in smaller volumes of water, leading to higher contamination levels. Conversely, poor water quality can limit the amount of accessible freshwater, reducing overall availability.

Similarly, the solutions to these challenges are often connected. For example, forest restoration and improving soil health of upstream lands can both decrease sediment runoff and regulate water flow, addressing both quality and quantity issues downstream. Restoring wetlands enhances water holding capacity, which can decrease the impacts of drought, while filtering pollutants to improve quality. Both governments and the private sector have roles to play in protecting and restoring freshwater ecosystems and can work in tandem to develop and scale effective revenue models which will drive investment into these ecosystems.

Governments

National and local governments are responsible for policy, regulation and oversight of water resources and services and play a crucial role in addressing water-related challenges due to the systemic risks these issues pose to public health, infrastructure, and economies. However, government expenditure on water infrastructure and efforts to promote private investment need to increase, and environmentally harmful subsidies leading to water pollution and scarcity should be redirected, phased out or eliminated.[11] Investments to prevent water crises are in the interest of governments, as these crises can have far-reaching impacts on societies. They can compromise food security, jeopardise access to sanitation services, and ultimately lead to civil unrest and conflicts.

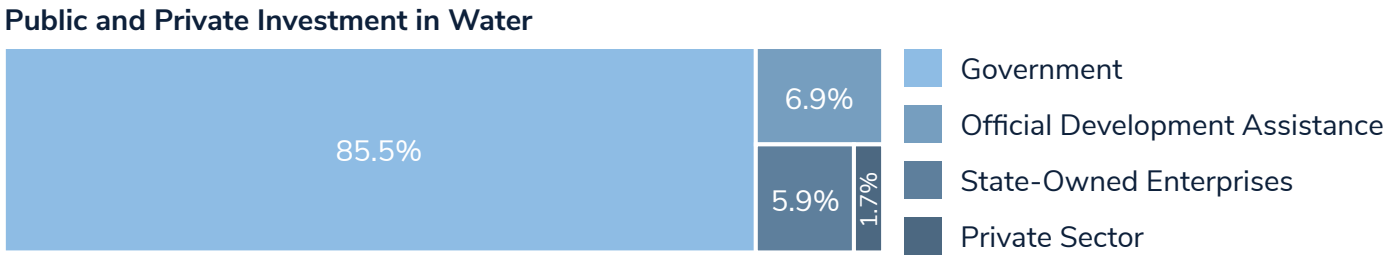
In addition to domestic considerations, governments are bound by international commitments, including those laid out in the Kunming-Montreal Global Biodiversity Framework (GBF). Parties to the GBF have committed - in Targets 2 and 3 - to restore and protect at least 30% of terrestrial, inland water, marine, and coastal areas by 2030. Achieving these targets will require substantial investment in water-related infrastructure and ecosystem restoration.

Currently, over 95% of funding for water projects comes from public sources, including government, state-owned enterprises and Official Development Assistance (ODA). However, with an estimated global financing gap of USD 6.7 billion for water infrastructure by 2060, governments alone cannot meet these challenges.[12] In accordance with Target 19 of the GBF, which calls on signatories to mobilise at least USD 200 billion per year into biodiversity by 2030, the diversification of financial sources and notably private finance should be achieved to close the water infrastructure financing gap. These financial resources will come from diverse sources including domestic and international, public and private.

[11] Signatories to the GBF have agreed to reduce subsidies harmful to biodiversity in a proportionate, just, fair, effective and equitable way by at least USD 500 billion per year by 2030. See the GBF 2030 targets

[12] World Bank (2024). Funding a Water-secure Future: An Assessment of Public Spending

Figure I: Global share of public and private investment in water as of 2024[13]



Source: World Bank (2024). Funding a Water-secure Future: An Assessment of Public Spending

While water is often considered a public good, only 10% of freshwater withdrawals globally is for domestic use, with the remaining 90% being consumed by agriculture and industry.[14] Sectors across the economy are increasingly recognising the risks posed by water scarcity and pollution, as well as the investment opportunities that green infrastructure present. Governments can play a role in creating the enabling policy environment to encourage private sector investment into NbS for water.

Private Sector

The private sector plays an essential role alongside governments in addressing water challenges. Industries from agriculture and fisheries to energy and manufacturing depend on freshwater resources, with agriculture accounting for approximately 70% and the industrial sector for 20% of global freshwater withdrawal, however this varies region by region (e.g. in the United States, agricultural water allocation is about 40%).[15]

Industrial Sectors Dependencies and Impacts on Freshwater

- **Energy Production**
  - Dependencies: Particularly thermal power plants require substantial amounts of water for cooling and hydropower depends entirely on water flow to generate energy
  - Impacts: High withdrawals for cooling can lead to water stress. Hydropower alters river flow and disrupts aquatic ecosystems
- **Mining and Metals**
  - Dependencies: Freshwater is essential for mineral processing and dust suppression. Freshwater is also critical to tailings management, acting as a transport medium and component of slurry.
  - Impacts: Mining is a large contributor to freshwater pollution by industrial chemicals and metals.
- **Textiles and Apparel**
  - Dependencies: Beyond agricultural production of raw materials, processes like dyeing and finishing consume large volumes of freshwater
  - Impacts: The textile industry is one of the largest polluters of freshwater resources due to untreated wastewater discharges and chemical pollution from processing.

[13] Roughly 91% of annual spending on water comes from the public sector, including 85% by governments and 6% by state-owned enterprises (SOEs). Less than 2% comes from the private sector. See World Bank (2024). Funding a Water-secure Future: An Assessment of Public Spending

[14] UNESCO (2024). The United Nations World Water Development Report 2024: water for prosperity and peace; facts, figures and action examples

[15] Ibid.

Both water scarcity and pollution pose significant risks to business operations and profitability with water-related challenges expected to increase in the coming years due to the destabilising impacts of climate change.

The financial risks associated with water shortages are already being felt in many industries. For instance, the energy and mining sectors already have USD 15 billion in stranded or at-risk assets due to water-related risks. [16] In 2019 alone, water-related losses were estimated to have cost businesses USD 425 billion, a figure expected to grow as climate change exacerbates water quality and availability issues. [17]

As these risks grow, businesses are under increasing pressure from investors, customers, and regulators to assess, report, and act on their environmental impacts. Frameworks such as green taxonomies, the Taskforce on Nature-related Financial Disclosures (TNFD), and the Corporate Sustainability Reporting Directive (CSRD) are driving companies to take a more proactive approach in managing nature-related risks. By investing in NbS for water, businesses can not only address these risks but also contribute to broader environmental goals, enhance resilience, and potentially reduce costs associated with regulatory compliance.

The Private Sector Business Case for Investing in NbS for Water

Investing in nature can present a compelling business case for addressing water quality and availability challenges, while contributing to global efforts to protect and restore freshwater resources. As water-related risks continue to grow due to climate change, population growth, and industrial demand, NbS can provide an innovative, cost-effective, and scalable alternative to traditional water management approaches. By prioritising NbS, businesses can safeguard their operations, enhance their resilience, and reduce costs associated with water risks.

Cost-effectiveness

While grey infrastructure tends to be capital intensive, requiring ongoing maintenance and typically addresses a single issue, green infrastructure and NbS often require lower initial investment while providing co-benefits. A study out of the US found that upfront project costs for green infrastructure projects for water are between 15 – 80% lower than costs for grey infrastructure.[18]

NbS can also enhance the performance of existing grey infrastructure and make it more cost-efficient.[19] For example, upstream forest restoration or riparian buffer zones can reduce sedimentation in rivers, lowering the need for expensive dredging operations or improving the efficiency of downstream water treatment facilities. These natural solutions help maintain the quality of water before it reaches industrial or municipal treatment plants, decreasing the operational costs of these facilities and extending their operational lifespans.

From a long-term perspective, NbS can be adaptable and resilient to the impacts and uncertainties of climate change. Traditional grey infrastructure is often designed based on historical climate patterns, making it less effective in adapting to future environmental conditions.[20] In contrast, NbS are inherently dynamic, able to adapt naturally to changing water flows, weather patterns, and environmental shifts.

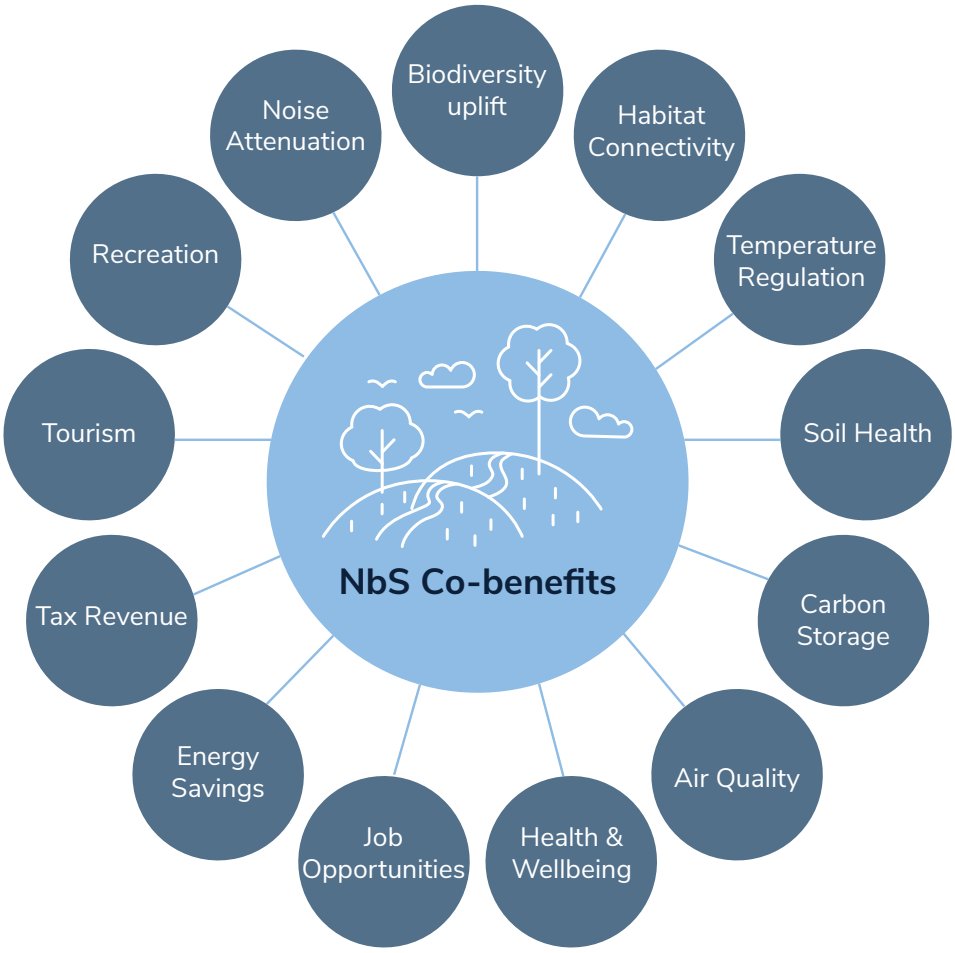
[16] CDP (2022). Planet Tracker 'High and Dry: How Water Issues are Standing Assets'
[17] CDP (2020). Cleaning up their act: are companies responding to the risks and opportunities posed by water pollution?
[18] US EPA (2007). Reducing stormwater costs through low impact development strategies and practices.
[19] Cooper, R. & Matthews, J.H. (2020). Water Finance and Nature-based solutions. K4D Helpdesk Report 857. Brighton, UK: Institute of Development Studies.
[20] Esraz-Ul-Zannat et al (2024). A review of nature-based infrastructures and their effectiveness for urban flood risk mitigation

Co-benefits

In addition to being cost-effective, NbS offer significant environmental, social, and economic co-benefits. Restoring wetlands, for example, improves water retention while simultaneously boosting fish stocks, benefiting both ecosystems and the fisheries sector. Similarly, lake restoration can reduce sediment and enhance biodiversity. [21] While these co-benefits may not directly align with corporate objectives, they can enhance a company's reputation and strengthen its relationships with local communities.

Quantifying these co-benefits and including them in the analysis of the cost-benefit of these interventions can present challenges as traditional cost-benefit analysis (CBA) only take into account the cost and benefit of the primary impact of an investment. Developing a CBA approach that incorporates the added benefits of NbS is integral to accurately assessing the suitability of NbS alongside or in place of grey infrastructure investments. TNC's Benefit Accounting methodology can help the water industry identify and quantify the ecological and social benefits that can be expected from different NbS interventions.[22]

Figure II: Co-benefits of NbS for Water



Source: Ommer et al (2022). Quantifying co-benefits and disbenefits of Nature-based Solutions targeting Disaster Risk Reduction

[21] NWRM Benefit Tables
[22] TNC (2021) Benefit accounting of nature-based solutions for watersheds: guide.

Business Resilience

Investing in NbS for water can significantly enhance business resilience by mitigating the risks posed by water scarcity and poor water quality. Water-related disruptions can have severe consequences on operations, supply chains, and overall profitability, particularly for water-intensive industries such as agriculture, manufacturing, and energy. By investing in nature restoration and NbS, businesses can safeguard their operations against these risks. For example, restoring upstream wetlands or forests can stabilise water flows, reduce the risk of floods, and increase water availability during drought periods. This can prevent disruptions to production caused by water shortages, ultimately ensuring a more stable operational environment.

Furthermore, investments in nature for water are one of the levers for companies to respond to more stringent regulatory environments and mitigate reputational risks. Regional, national and sub-national regulatory requirements regarding companies' impact on water use and pollution have been increasing in the past years and this trend is expected to continue. Businesses that preemptively invest in sustainable water management practices are better positioned to comply with existing and future regulations and avoid potential fines or sanctions. Additionally, companies seen as leaders in environmental stewardship can strengthen their reputation with consumers and improve their perceived competitivity among investors.

In the long run, incorporating ecosystem restoration and NbS into business operations not only addresses immediate water-related risks but also builds greater adaptability to future environmental uncertainties. Companies that take a forward-looking approach to water resource management are better equipped to maintain business continuity in the face of increasingly volatile environmental conditions, securing their long-term resilience and profitability.

This Guidebook introduces a range of models which mobilise private sector financing to improve freshwater quality and availability in a diversity of regions. These models can help governments achieve their domestic and international environmental targets while supporting corporates in addressing their water-related risks. The Guidebook describes the key features of these models, focusing on the concrete steps to replicate and scale them, along with key barriers and lessons learned.

Corporate Commitments & Replenishment Strategies

As freshwater scarcity intensifies due to climate change, population growth, and unsustainable water use, companies are increasingly committing to water positive targets—aiming to return more water to nature and communities than they consume within their operations and throughout their supply chains. These commitments go beyond water efficiency and pollution reduction by focusing on restoring freshwater ecosystems, enhancing watershed resilience, and supporting communities that rely on shared water resources, often using nature-based solutions to achieve these goals. Leveraging corporate interest in replenishing freshwater resources can be a key demand driver for the development of nature-based revenue models with NbS often presenting a cost-effective way to address quality and quantity issues whilst delivering co-benefits for climate, biodiversity and communities.

Defining Water Positive Commitments

There are multiple ways companies frame their freshwater commitments, including water neutrality, regenerative, and net water positive. Leading international companies such as Microsoft, Google, PepsiCo and Coca-Cola have pledged to become water positive, although there is currently no global consensus on what this means at the corporate level. Often, this means that companies are replenishing more water than they use, but it can also include broader impacts in the watershed and communities.

The CEO Water Mandate's Net Water Positive Impact (NWPI) initiative is working to define 'water positive' focusing on basin-level impacts and expanding the definition beyond replenishment. The Mandate defines NWPI as: "A state where the water-related contributions of a company and its partners exceed the water-related impacts they cause, particularly in water-stressed basins."[23]

The initiative's guidance focuses on three dimensions of water security – notably, focused on security, rather than simply quantity:

Availability: Ensuring that water withdrawals do not surpass the natural replenishment rates of local water sources.

Quality: Preventing pollution and enhancing water quality through effective wastewater treatment and pollution prevention measures.

Accessibility: Supporting equitable access to clean water and sanitation services (WASH) for communities within the operational basins.

The NWPI guidance aims to support companies in achieving true water-positive outcomes through focus on basin-level impacts, rather than focusing solely on a companies own operations. The initiative also suggests focusing on water-stressed regions, were action can have the most significant impact both for nature and communities that rely on shared water resources. The initiative also stresses taking a holistic approach to water management, moving beyond replenishment to focus also on the quality of water throughout the basin and the accessibility of that water for local communities. Crucially, the initiative acknowledges that basin-level impact cannot happen with single corporates taking action in siloes. Collaboration between companies within shared sourcing regions and aligning corporate action with policy goals and community interests is imperative for achieving landscape-level impact.

To achieve NWPI, companies are encouraged to:

- **Assess and Prioritise:** Identify water-stressed basins where their operations have significant impacts and prioritise these areas for intervention.
- **Set Clear Targets:** Establish measurable goals for improving water availability, quality, and accessibility within the prioritised basins.
- **Engage Stakeholders:** Collaborate with local communities, governments, and other stakeholders to develop and implement water stewardship initiatives.
- **Monitor and Report:** Regularly track progress against set targets and transparently report outcomes to stakeholders.

[23] CEO Water Mandate (2024) Net Positive Water Impact: An Introduction

Water Replenishment Strategies

To achieve water positive goals, companies implement or finance water replenishment projects that restore and protect freshwater systems. Projects can either be implemented by the company itself, or through financing third-party restoration. Some key interventions include:

- Watershed Restoration and Reforestation: Reforestation and wetland restoration help improve infiltration and reduce runoff, enhancing groundwater recharge.
- Regenerative Agriculture and Soil Conservation: Companies work with farmers to implement regenerative agriculture, reducing water consumption and improving soil moisture retention.
- Wetland and Aquifer Recharge Projects: Constructed wetlands and groundwater recharge projects help restore water tables and improve water quality.
- Managed Aquifer Recharge (MAR): The process of storing water in underground aquifers for future use. Excess surface water is captured (e.g. from rivers, stormwater, or treated wastewater), treated as needed, and then infiltrated or directly injected into aquifers.

Challenges

With corporates increasingly looking to adopt 'water positive' targets alongside other sustainability objectives, there are challenges with such an approach and concerns that the adoption of the framework in corporate sustainability may not lead to—or may even inhibit—progress toward basin and watershed-scale solutions.

The WWF, for example, has pushed for companies to take a cautious approach to incorporating 'water positive' into their strategies, highlighting several key challenges and risks, including:

- Water-positivity' typically focuses on replenishment, which does not address other dimensions of water security and does not encourage collective action or addressing broader water governance challenges
- The idea of net-water positive at the basin level is highly unlikely, as it would depend on universal uptake of both water-positive target setting and successful integration of strategies
- Single-company actions, particularly when focused on operational water use are insufficient to address systemic water challenges and basin-wide impacts
- Can lead to short-term 'drop chasing', where companies try to maximise litres of water replenished, rather than addressing and adopting long-term, systemic changes – entrenching ineffective solutions to water challenges into corporate water strategies[24]

[24] WWF (2022). "Net Positive Water": Considering its role in water stewardship and solving the linked freshwater, biodiversity and climate crises.

There are also some key limitations and challenges with water replenishment strategies which should be kept in mind by companies trying to improve their water impacts and enhance resilience of water resources. A recent WWF report highlights key issues, including the lack of standardised methodologies for measuring and verifying water benefits, especially in relation to basin health and long-term outcomes of interventions. Attribution of replenishment volumes remains unclear, often leading to double-counting or overstated impacts. Companies also often focus solely on water use within their operations which is easier to control, but often accounts for only a small portion of their water footprint. Expanding the scope from operations to the entire value chain is essential to delivering desired impacts.

Financial barriers also persist—many initiatives are short-term and underfunded, with limited mechanisms to scale. Finally, current strategies often fail to integrate replenishment within broader watershed management or align with public policy goals or global frameworks like the Sustainable Development Goals or Science-Based Targets for Nature.[25] Addressing these limitations will require stronger monitoring, better coordination among stakeholders, clearer guidance on impact accounting, and a shift toward more systemic, place-based approaches that are based in collaboration and prioritise lasting resilience in watersheds.

Collaboration and Measurement

To ensure transparency and effectiveness, companies often partner with NGOs, governments, and scientific organisations to design and monitor replenishment projects. They also use standardised measurement frameworks, such as:

- Alliance for Water Stewardship (AWS) Standard for stewardship certification.
- The Volumetric Water Benefit Accounting (VWBA) Methodology to quantify water replenishment impacts.
- Science-Based Targets for Nature (SBTN) to align corporate water goals with planetary boundaries.

Other tools and frameworks are explored in the Appendix.

Collaborative Approaches for Water Investment

Investing in NbS for freshwater often requires coordination across sectors, jurisdictions, and value chains. Collaborative frameworks can help align incentives, pool resources, and generate shared outcomes for water security, biodiversity, and community and business resilience. The following examples highlight different models of collective action, demonstrating how structured collaboration based on shared water risks can accelerate the design, financing and delivery of NbS interventions at scale.

[25] WWF (2025) Strengthening Corporate Water Replenishment

2030 Water Resources Group

The 2030 Water Resources Group (2030 WRG) is a global public-private-civil society initiative hosted by the World Bank. Operating in over 15 countries, 2030 WRG brings together governments, businesses, development banks, and civil society to co-design solutions that address water security challenges, focused on food, cities and ecosystems – particularly where water scarcity threatens economic development.

The initiative creates national and sub-national multi-stakeholder platforms that identify priority investment areas in a given region – such as industrial water reuse, irrigation efficiency or watershed restoration – and develops investable project pipelines. The initiative aims to align diverse interests to unlock blended finance mechanisms supported by policy, reducing investment risk for private investors. Recent projects include[26]:

Kenya – Development of project concepts for performance-based contracts aimed at reducing non-revenue water (NRW).[27] The initiative aims to achieve a 20% cumulative reduction in municipal water losses, and to facilitate $50 million in private sector investments for operational efficiencies and service delivery.

Vietnam – Facilitation of stakeholder engagement to identify and advance investment opportunities in sustainable water management within the textile industry. Key areas of focus include wastewater reuse and the development of public-private partnerships (PPPs) to scale water-efficient technologies, reduce industrial pollution, and promote compliance with environmental standards.

India – Support for micro-irrigation scale-up in Uttar Pradesh, with over 90,000 hectares covered and 72,000 farmers reached to date. The initiative, which aims to reach 1 million farmers over five years, is driving the adoption of climate-smart irrigation practices and technologies.

As of 2024, the initiative has mobilized USD 1.6 billion in public and private investments and saved 1 billion cubic meters of water.[28] In 2025, 2030 WRG will launch three new initiatives under its key priority themes to support businesses and governments to scale investments into specific water areas: Water Secure Cities, Low Methane Rice and Scaling Water Reuse.

Alliance for Water Stewardship Collective Action Accelerators

Alliance for Water Stewardship's Collective Action Accelerators are collaborative, place-based initiatives designed to bring multiple sites together to implement the AWS Standard across a catchment.

Businesses that share sourcing regions can come together to address shared water challenges and work together to fund interventions and develop collaborative solutions. Accelerators are structured inn two phases:

- **Phase 1** focuses on capacity building for businesses and supporting them in training and data collection and developing a water stewardship plan.
- **Phase 2** is focused on turning the insights and data from Phase 1 and turning them into action, with participants implementing their water stewardship plan while continuing to share learnings and challenges.[29]

[26] World Bank (2024) Advancing Global Water Security Through Public-Private Collaboration: 2030 WRG Annual Report

[27] Non-revenue water refers to the difference between the amount of water a utility produces and the amount it sells to customers. This water is essentially "lost" or unaccounted for before reaching the consumer. NRW can include real losses due to leaks and breaks in the distribution system, as well as apparent losses like inaccurate meters or unauthorised consumption.

[28] World Bank (2024) Advancing Global Water Security Through Public-Private Collaboration: 2030 WRG Annual Report

[29] Alliance for Water Stewardship. AWS Collective Action Accelerator: Overview for Brands and Retailers.

Active in regions such as Murcia and Huelva in Spain, as well as areas in Mexico, India, Pakistan, China, South Africa, and Peru, the Accelerator exemplifies scalable solutions to shared water challenges.

In China, AWS launched its first Impact Accelerator cohort in the Wusong River Basin near Shanghai in 2024. The cohort brings together companies such as TCI Group, Haleon, Boehringer Ingelheim, Cisco, Primark, and Western Digital to restore priority watersheds.[30] Building on the success in Shanghai, AWS is planning to launch a new programme in the Pearl River Catchment in 2025.[31]

In Spain, the Accelerator operates in Murcia, a key agricultural region, and collaborates with WRAP on water stewardship initiatives in Huelva. In Mexico, active sites include the Río Lerma/Guadalajara area and Mexico City & Veracruz, where projects focus on optimising water use within manufacturing plants and implementing NbS to enhance water supply.

In India, the Accelerator is active in Hyderabad and Nashik, supporting sites like those of ITC Ltd in pursuing AWS certification. Pakistan's Lahore region includes participants such as Nestlé and Archroma, working towards sustainable water management practices to improve supply chain resilience.

uMhlathuze Water Stewardship Partnership

The uMhlathuze Water Stewardship Partnership (UWASP) is a collaborative initiative established in 2016 in the Mhlathuze River Catchment of South Africa brings together corporates operating within the Richards Bay Special Economic Zone along with municipal government, NGOs and the local community to develop solutions to water security issues.[32]

The partnership is a voluntary structure that aims to allow for collective decision-making around water catchment management with corporates paying for community-based NbS that enhance water availability for both commerce and community. The governance is structured through:

- Partners Platform: An open, consultative advisory platform to develop high level strategy and identify interventions to improve water quality and availability.
- Management Committee: Responsible for implementing identified activities and coordinating partnerships
- Project Managers and Technical Advisors: Responsible for managing the five work areas agreed by the partners, coming from the National Business Initiative (NBI), GIZ and the WWF.[33] The five work areas are:

    1. Enhanced coastal lakes management and dam mentorship programme
    2. Downstream water use efficiency and water losses
    3. Agricultural water stewardship and efficiency
    4. Ecological infrastructure: invasive clearing and wetland rehabilitation
    5. Developing community water-related champions, entrepreneurs and micro enterprises

Membership in UWASP is open to all stakeholders with a presence and interest in the Mhlathuze catchment. Interested parties can join by signing a letter of intent, which guides partners on their involvement in supporting and implementing various water stewardship initiatives.

[30] PR Newswire (May 9 2024). TCI Group Takes Lead in Joining AWS Impact Accelerator Program, Committing to Advance Sustainable Water Management
[31] Alliance for Water Stewardship (2024). Shanghai Water Stewardship Forum.
[32] National Business Initiative. (UWASP) uMhlathuze Water Stewardship Partnership
[33] National Business Initiative (2020) Introducing the uMhlathuze Water Stewardship Partnership

The Catchment Based Approach

Based in the UK, the Catchment Based Approach (CaBA) is a civil-society led initiative that brings together government, Local Authorities, water companies, businesses and farmers to improve water resources and freshwater ecosystems. Launched in 2011 by the UK Department for Environment, Food & Rural Affairs (DEFRA), CaBA operates through more than 100 local catchment partnerships across England and Wales, coordinated by local NGOs, trusts, or multi-stakeholder groups.[34] The initiative seeks to address the fragmentation often seen in freshwater management by encouraging collaboration at the catchment scale.

CaBA supports a wide range of NbS, including habitat creation, riparian buffer strip creation, removal of fish migration barriers, and regenerative land management. These interventions help reduce nutrient run-off, improve water quality, increase biodiversity, and enhance resilience to flooding.

A key feature of CaBA is its collaborative governance and financing structure. Partnerships often leverage funding from multiple sources—including public grants, private water company contributions and agri-environment schemes. The approach can de-risk participation and increase the long-term sustainability of NbS projects. In the 2023/24 year, 74% of CaBA partnerships received funding from water companies and for every GBP 1 invested by government, the partnerships raised an average of GBP 3 from non-government partners.[35]

CaBA has proven effective in enhancing water resources for people and wildlife.[36] Results from 2023/24 include:

- **2299 ha** habitat created
- **67** barriers to fish migration mitigated
- **292** projects undertaken to improve ecological quality of waterbodies
- **215** projects undertaken to tackle pollution and improve water quality

These outcomes illustrate how coordinated, catchment-level action can deliver measurable environmental improvements. While challenges remain in scaling and standardising such efforts, CaBA provides a practical model for mobilising diverse stakeholders and blended finance around NbS for freshwater.

[34] Catchment Based Approach
[35] Catchment Based Approach Benefits Report
[36] Catchment Based Approach Benefits Report

Case Studies, 10 water-based revenue models

The following case studies explore examples of different typologies for investment into NbS for water with a diversity of private sector financing modalities. These examples represent multiple geographies, GDP levels and address different pressures on water quantity and quality. Key lessons learned are drawn out for water sector actors interested in developing similar schemes and highlight core characteristics for effective scaling or replication of these models. The case studies are presented in decreasing order of regulatory oversight, beginning with Compliance Models which require legislative underpinning, followed by Water Funds, Payments for Ecosystem Services schemes, Voluntary Credit Mechanisms and an example of Corporate Direct Investment. Where available, investment figures and capital structures are included, though this information is not consistently accessible across all case studies.

Compliance Models

Compliance-based models create enforceable legal or regulatory obligations that can generate financial flows for nature-based interventions for freshwater quality and availability. Unlike purely voluntary or incentive-based approaches, these models are embedded in legal frameworks and create predictable, and often long-term, revenue streams. These models can take several forms:

Water Tariffs
Although most water utilities around the world are public sector entities, they have the potential to mobilise private investment by demonstrating reliable revenue streams. Water tariffs are one way to facilitate such investment by offering stable funding for NbS. Reform may be required to support, incentivise or mandate water utilities to utilise tariff revenue to invest in NbS, as seen in the Peru example discussed below.

Compensatory Offsetting Schemes
Compensatory offsetting refers to the requirement to compensate for environmental damage by restoring or protecting ecosystems or natural resources elsewhere. These offsetting obligations are typically designed to limit net environmental loss from development or other economic activity, and create pathways for the private sector to support the government's environmental objectives.

Compensatory offsetting can take various forms. In some cases, companies directly restore ecosystems to compensate for harm. In others, they pay for a third party to deliver the restoration through credit markets or direct project payments. The case studies below from England and the United States highlight different examples of compensatory offsetting for freshwater.

Polluter Pays
Polluter Pays programmes are environmental policies which make those entities responsible for pollution pay for its remediation, rather than government or downstream users, or even indirectly through the purchase of credits. For example, the EU has introduced "extended user responsibility" to its urban waste water treatment directive which will require pharmaceutical and cosmetics companies to contribute to the costs of water treatment if they are contributing to pollution.[37]

[37] Horton & Laville (2024). 'England won't adopt EU river pollution rules for pharma and cosmetics firms', The Guardian. March 22.

England's Nutrient Neutrality

Nutrient pollution, particularly from nitrogen and phosphorus, is a significant environmental challenge in England, where only 16% of rivers are in good ecological condition and none are in good chemical condition.[38] These nutrients primarily come from agricultural run-off (including agrochemicals and livestock waste) and wastewater treatment. Excess nutrients can lead to eutrophication – excess algal growth – which degrades water quality and reduces aquatic biodiversity, which can have severe ecological and economic impacts.[39]

In England, the Conservation of Habitats and Species Regulations 2017 regulates 'protected sites' - nature sites and areas of countryside that have special status due to their natural or cultural important.[40] The Regulations stipulate that development cannot increase nutrient load to waterways within these protected sites and require 'competent authorities' to assess the environmental impact of planning projects and only approve those that demonstrate nutrient neutrality.[41] These regulations had been slowing development in areas of England facing challenges with housing availability. A market mechanism was developed by the government in 2022 to help unlock housing without compromising environmental objectives. Developers are now able to demonstrate nutrient neutrality by purchasing nutrient 'credits' from landowners in the same catchment area who decrease their nutrient run-off. This can be done by directly decreasing their use of agrochemicals or by implementing NbS such as planting buffer strips or creating wetlands.

Design of the programme

In order to demonstrate that a development will have no negative impact on the nutrient load in local waterways, the scheme allows property developers to pay land managers in the catchment to reduce their nitrogen or phosphate run-off to compensate for the additional nutrients expected from housing. This is measured in nutrient credits (1kg of total nitrogen or total phosphate). The scheme is enforced across 74 Local Planning Authorities (LPAs), which have been deemed having waterways in unfavourable condition. LPAs are responsible for administering the scheme, setting requirements for new developments and assessing how many credits developers must purchase. Natural England - a non-departmental public body sponsored by the Department for Environment, Food and Rural Affairs - designed a generic methodology for calculating the number of credits required by a development, but LPAs can customise their measurement methodologies to suit the needs of the area.[42]

[38] UK Environment Agency (2024). State of the water environment indicator B3: supporting evidence
[39] USEPA. The Effects: Dead Zones and Harmful Algal Blooms
[40] HMG. Find protected areas of countryside.
[41] A competent authority is defined by Natural England as including planning decisions-makers such as LPAs, the Planning Inspectorate and the Secretary of State. It also includes all government departments, public bodies (such as the Environment Agency and Ofwat), Statutory Undertakers (such as water companies) and persons holding public office.
[42] Natural England (2022). Nutrient Neutrality Generic Methodology.

Supply of credits

Land managers generate credits by reducing their agricultural run-off. This can be through reducing application of agrochemicals, planting buffer strips or riparian trees to filter run-off or planting cover crops to reduce leaching. Credits are priced through negotiations between seller and buyer and have been going for between £1,800 – £4,000/ kg of nitrogen and £14,000 – £100,000/kg of phosphate.[43] The reductions are meant to be permanent, with local authorities setting the number of years used to define perpetuity, ranging from 80 to 125 years.[44]

Land managers can combine nutrient neutrality payments with Biodiversity Net Gain (BNG) payments, allowing land managers to develop diversified income streams from delivering interventions with multiple environmental benefits.[45]

Challenge: Capacity and Supply

The Local Government Association estimated in 2022 that the scheme had kept 20,000 new homes from being built each year from regulations on nutrient pollution.[46] Some of this bottleneck was due to the regulations themselves but capacity and resourcing in LPAs and a lack of supply has also created challenges.

In response to the low supply of credits available to LPAs, Natural England created a national Nutrient Mitigation Scheme, which would develop publicly funded nutrient mitigation projects to then sell to developers.[47] The Scheme has so far delivered credits to build 4,730 homes by creating 260 hectares of habitat.[48]

Replicability & Scalability

The Nutrient Neutrality scheme offers a promising model for compensatory offsetting that can be adapted and scaled in other regions facing similar issues of nutrient pollution and urban development pressure. The scheme can support governments or regional authorities in mobilising private capital to support achieving environmental goals while encouraging innovations in residential wastewater management. The scheme's core design – having property developers purchase nutrient credits from landowners - addresses a pressing challenge: balancing environmental protection with housing development. In a country where nutrient pollution, particularly nitrogen and phosphorus run-off, severely affects water quality, this scheme offers a structured approach to both mitigating ecological impacts and unlocking housing projects that may be stalled due to environmental restrictions.

As of 2022, 74 LPAs across England were implementing the scheme, demonstrating its scalability across a broad geographic and administrative range. The inclusion of Natural England's national Nutrient Mitigation Scheme has further scaled the initiative.

[43] Green Finance Institute (2024) Farming Toolkit for Assessing Nature Market Opportunities
[44] Green Finance Institute (2024) Farming Toolkit for Assessing Nature Market Opportunities
[45] Defra (2023). Combining environmental payments: biodiversity net gain (BNG) and nutrient mitigation
[46] Local Government Association (2023). Stuck in neutral: A call for partnership working on river quality and water quantity
[47] Natural England & Department of Environment, Food and Rural Affairs (2023). Natural England's nutrient mitigation scheme for developers
[48] Natural England (2024). Delivering for nature and the economy (Blog)

The ability to combine nutrient neutrality payments with BNG payments highlights the model's potential to be integrated with other environmental markets, creating multiple income streams for land managers. Land managers and farmers have put pressure on the government to further expand stacking and bundling potential across multiple nature markets (carbon, biodiversity, nutrients, flood risk). This should be a key consideration for other jurisdictions designing a compensatory offsetting scheme as it can increase the attractiveness and financial viability of participation in the scheme.

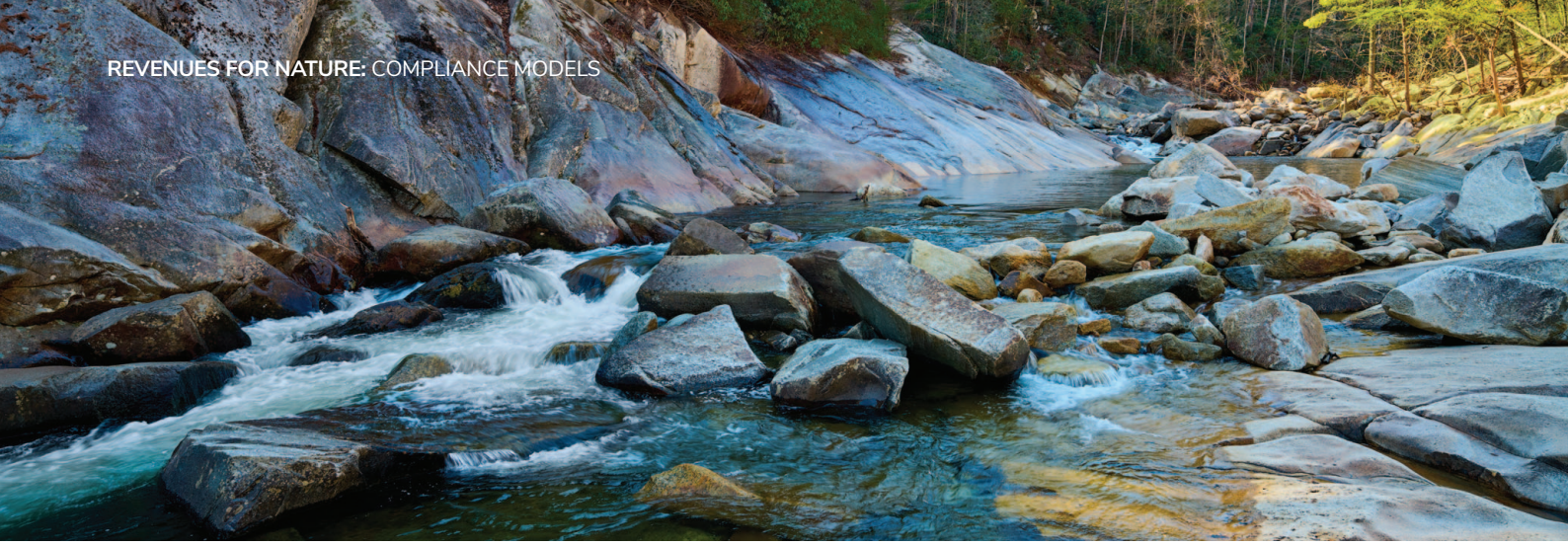
Given that nutrient pollution from agricultural run-off and wastewater is a global problem, this model has significant potential for replication in other countries and offers a pathway to achieving nutrient pollution reduction targets. For example, the European Commission set a target as part of the European Green Deal to reduce nutrient losses from both organic and mineral fertilisers by at least 50% by 2030.[49] A market approach can offer farmers compensation for reducing their use of agrochemicals which may impact their yields in the short term.

Lessons Learned

- A lack of capacity and resourcing in LPAs has hindered the scheme's implementation and led to delays in planning approvals. When designing a compliance mechanism for NbS, it is crucial to ensure that the implementation and enforcement authorities have sufficient resources to take on this new set of responsibilities.

- Government support can help 'prime the pipeline' of projects by financially supporting land managers in developing nutrient mitigation strategies and connecting buyers to sellers.

[49] European Commission. Sustainable use of Nutrients.



US Water Quality Trading

Nutrient pollution from nitrogen and phosphorus is a major environmental issue in the United States, contributing to excessive algal growth that depletes dissolved oxygen, harms aquatic life, and increases water treatment costs. This pollution has led to the formation of 'dead zones' in coastal areas, sometimes thousands of miles downstream from nutrient sources, where low oxygen levels make it impossible for aquatic life to survive.[50] The primary sources of these pollutants in the U.S. include agricultural runoff, wastewater treatment plants, and contaminated urban stormwater.

In the United States, the Clean Water Act (CWA) [51] regulates water quality, and requires states to set Total Maximum Daily Loads (TMDLs) for 'impaired' water bodies'.[52] The CWA also prohibits entities from discharging pollutants into U.S. water unless they acquire a National Pollutant Discharge Elimination System (NPDES) permit. In 2003, the Environmental Protection Agency (EPA) issued its National Water Quality Trading Policy, which allowed for the development of state-level Water Quality Trading schemes as a market-based strategy for states to reduce pollutants in impaired waterways and for NPDES holders to demonstrate compliance with effluent cap limits.[53]

Design of Programmes

Water quality trading (WQT) is a market-based approach in which public authorities set a pollution cap within a watershed and allocate discharge allowances to identified polluters. These allowances, issued as permits, specify the permissible quantity of pollutants that can be discharged over a defined period. Point-source polluters, such as factories, water and sewage treatment plants and industrial facilities which reduce their emissions below their allowance can sell excess permits to those needing additional capacity, creating an incentive for cost-effective pollution reduction.[54] Nonpoint-source polluters, such as farmers can also generate credits by implementing pollution control practices and NbS on their land. States design their own WQT schemes to align to their industrial or environmental context and specific policy goals but each must include a way of incentivising supply-side participation, stimulating demand, and enabling transactions and verification of credits.

[50] US Environmental Protection Agency. The Effects: Dead Zones and Harmful Algal Blooms

[51] US Environmental Protection Agency. Overview of Identifying and Restoring Impaired Waters under Section 303(d) of the CWA

[52] Lists of impaired water bodies are compiled by states and defined as water bodies that do not meet water quality standards. States can use a number of ways to determine whether a body of water meets quality standards but the Clean Water Act say that states must evaluate all existing and readily available information when developing their lists. EPA regulations contain a nonexclusive list of information that must be considered by states.

[53] US Environmental Protection Agency (2003). Water Quality Trading Policy.

[54] Tabaichount et al (2019). Water quality trading schemes as a form of state intervention: Two case studies of state-market hybridization from Canada and New Zealand

Supply of Credits

Credits can be generated by point-source polluters, such as wastewater treatment facilities by controlling its discharge above what is required. They can then sell their unused discharge allowances as credits to other entities that are discharging above their allotment. Non-point sources, such as landowners generate credits by implementing agricultural best management practices (BMPs) that reduce nutrient runoff. Common practices include:

- **Riparian buffer zones:** Planting vegetation along waterways to filter pollutants.
- **Cover cropping:** Planting soil-covering plants in non-growing seasons to reduce soil erosion and nutrient leaching.
- **Nutrient management plans:** Optimising fertiliser application to minimise excess nutrient runoff.
- **Wetland restoration:** Returning degraded wetlands to their former function to improve nutrient-filtering and retention capacity and reduce runoff into coastal waters.

These credits can be sold directly from between buyers and sellers, or through intermediaries like clearinghouses. In Maryland for example, the state registers available credits on an online registry but buyers contact the sellers directly to transact.[55]

Stimulating Demand

To create demand for credits, states often must go beyond federal legislation that simply allows for WQT, and implement regulations that require some level of offsetting. For example, in Minnesota, the state government requires point-source polluters to offset 100% of new or expanded discharges into impaired water bodies.[56] In contrast, in the Long Island Sound watershed, many facilities were already meeting discharge limits, resulting in little demand for credits and limited market activity.[57]

Market Characteristics

Credit prices vary depending on location, trading ratios, and demand from regulated entities. In some programs, nutrient credits for nitrogen have ranged from $2 to $20 per pound, while phosphorus credits can be significantly higher due to its greater eutrophication potential. Trading can take place directly between entities (point source to point source or point source to non-point source) or through a third party exchange.

Trading ratios are used to address scientific uncertainty on the benefits of BMPs and other credit-generating actions. The trading ratio determines how many credits a point-source polluter is required to purchase to offset their discharges and ensure environmental benefit. These range from 1:1 (meaning a kg of nitrogen discharged from a point-source is offset by purchasing a credit for one kg of nitrogen pollution reduction) to as high as 4:1.

[55] Maryland Department of the Environment. Water Quality Trading Registry and Marketplace.
[56] Minnesota Pollution Control Agency (2025). Water Quality Trading Guidance.
[57] New England Interstate Water Pollution Control Commission (2021). Obstacles and Opportunities for Water Quality Trading in the Long Island Sound Watershed.

Challenges

Despite the potential cost savings and environmental benefits, challenges remain in scaling water quality trading in the US:

- **Limited Nonpoint source participation:** Non-point source polluters like farmers face high upfront costs to implement interventions technical complexity and uncertainty around returns from credit sales.

- **Monitoring and verification:** Ensuring that non-point source reductions are accurately measured remains a technical and administrative challenge, particularly when state authorities are under-resourced.

- **Low market liquidity:** Without consistent credit demand or clear compliance incentives, many programs have seen low transaction volumes.

To address supply constraints, public programs like the USDA's Environmental Quality Incentives Program (EQIP) have provided funding for farmers to adopt conservation practices that can later generate credits.[58] To streamline transaction processes, some states, such as Pennsylvania, have explored nutrient credit clearinghouses, where the state acts as an intermediary between buyers and sellers of credits. The aim is to reduce search costs by allowing buyers to enter into a single contract with the clearinghouse rather than needing to negotiate single transactions.[59] Some states have developed technical assistance programs or grants to support land managers in implementing agricultural BMPs. To reduce transaction costs for farmers, some states allow for supply-side aggregation to pool small-scale credits and decrease transaction costs for both buyers and sellers.

Replicability & Scalability

Water quality trading in the U.S. offers a replicable model for balancing industrial economic activity with water quality maintenance and illustrates how federal policy can clear the way for a diverse set of sub-national regulatory frameworks to drive investment into water resources protection and restoration. As of 2017, 19 U.S. WQT programs were actively operating, with a total of over 355 distinct trading markets having been established since the early 2000s.[60]

Although water quality trading has mostly been implemented in the US, global interest in such schemes is emerging. The World Resources Institute found 57 WQT programmes in operation worldwide, though many are still in pilot stage or are dormant.[61] For countries facing nutrient pollution challenges, market-based offsetting schemes like WQT offer a pathway to meet water quality targets while enabling economic activities to continue under stricter ecological constraints.

[58] USDA. Environmental Quality Incentives Program.
[59] Pennsylvania Government (2017) PENNVEST Nutrient Credit Clearinghouse Rulebook.
[60] BenDor et al (2021). Predicting the Existence and Prevalence of the US Water Quality Trading Markets.
[61] World Resources Institute (2009). Water Quality Trading Programs: An International Overview

Lessons Learned

- Some programs allow pre-crediting (before full implementation), while others require ex post verification of actual nutrient reductions. Requiring practices to be undertaken before credits are issued helps real environmental impact. A trading ratio above 1:1 can also help to ensure the target water quality improvements are achieved.
- Successful WQT programs typically include robust support for landowners, including technical and financial support to implement BMPs, well-resourced regulators to administer and monitor the scheme, and streamlined transaction systems like online credit registries.
- When water quality targets are met, or point-source dischargers consistently operate below permitted levels, demand for credits can decline sharply. To maintain program relevance and ongoing environmental benefits, governments could consider tightening discharge limits over time or gradually strengthening water quality targets, ensuring continued demand for nutrient reduction interventions.

South Nation Total Phosphorus Management Program (TPMP) – Canada

An example of water quality trading in Canada comes from the South Nation Total Phosphorous Management Program in Ontario. Launched in 1999 by the Ontario Ministry of the Environment (MOE) in collaboration with South Nation Conservation (SNC), a community-based watershed conservation organisation, the program aims to address phosphorus pollution by allowing point source dischargers, such as municipal wastewater treatment plants, to offset their phosphorus emissions by purchasing credits generated from non-point source reductions, primarily from agricultural best management practices.

In the 1990s, the South Nation River experienced phosphorus concentrations exceeding provincial water quality objectives by 3–5 times, largely due to agricultural runoff.[62] To mitigate this, the TPMP was established to enable point source dischargers to comply with stringent "zero discharge" phosphorus regulations by investing in upstream non-point source reductions.

To generate credits, farmers implement BMPs - such as livestock fencing, manure management and storage, or planting buffer strips – to reduce phosphorous runoff. Municipalities or corporates that require phosphorous discharge allowances can then purchase these credits to comply with environmental regulations. To mitigate against ineffective BMPs and debate around how nutrients travel through watersheds, the MOE requires a 4:1 ration for phosphorous offsets. i.e., 4kg of phosphorous must be removed from non-point sources for every 1 kg released from a point source.[63]

[62] Tabaichount et al (2019). Water quality trading schemes as a form of state intervention: Two case studies of state-market hybridization from Canada and New Zealand

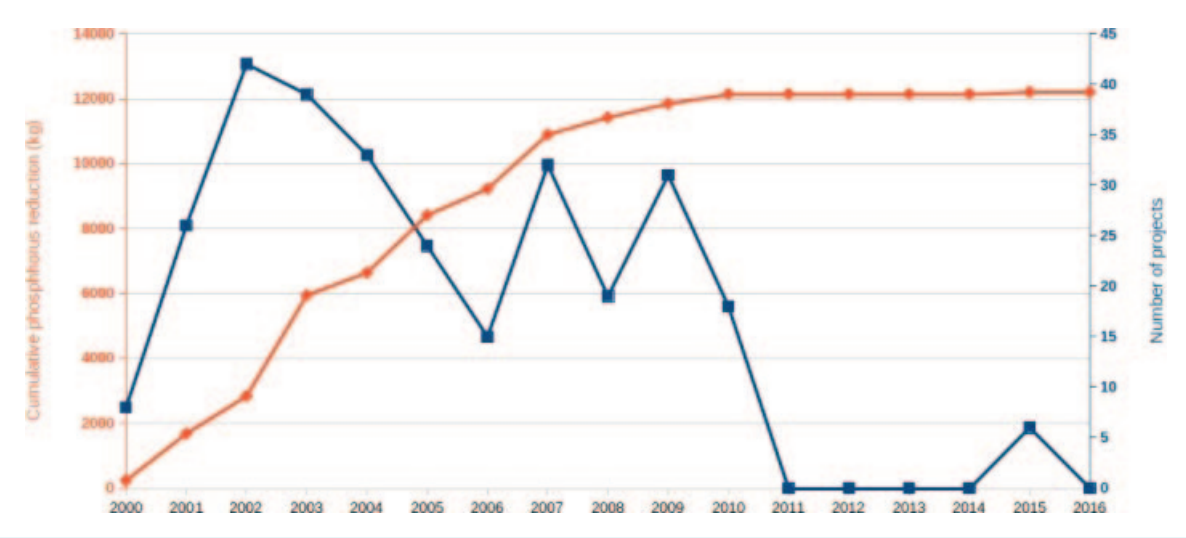
[63] O'Grady (2008). Point To Non-point Phosphorus Trading In The South Nation River Watershed

The program is managed by a multi-stakeholder Clean Water Committee (CWC) comprising representatives from agricultural sectors, municipalities, environmental organizations, and government agencies and chaired by SNC. The CWC acts as a clearinghouse, connecting buyers and sellers of credits, facilitating transactions and administering payments.[64] The TPMP sits within SNCs broader Clean Water Program which also offers grants for non-point source reduction projects to support the adoption of BMPs. Since the inception of the CWP, SNC has allocated CAD 2.6 million in grants to over 880 projects.[65]

Impact

Although it is difficult to assess the ecological impact of the scheme due to the long-time period phosphorous can remain in waters and soils, SNCs own estimates project that the phosphorous reduction projects financed through the TPMP would have reduced phosphorous emissions to the watershed by 12,204 kg between 2000 and 2016.[66] However, since 2010, the number of trades has declined sharply, with most subsequent years seeing little to no trading activity.[67] While the option to trade remains available—for example, if a facility increases its discharge or a new point source is established—this only creates episodic demand. The South Nation experience underscores a key lesson for compensatory offsetting schemes: in the absence of tightening discharge limits or ongoing compliance triggers, demand for credits may collapse, limiting long-term program impact.

Figure III: Cumulative phosphorous reduction (kg) and number of projects in the TPMP (2000 – 2016)



Source: South Nation Conservation Authority (undated). Retrieved from Tabaichount et al (2019)

[64] Tabaichount et al (2019). Water quality trading schemes as a form of state intervention: Two case studies of state-market hybridization from Canada and New Zealand
[65] South Nation Conservation Clean Water Program (Consulted April 2025)
[66] Tabaichount et al (2019). Water quality trading schemes as a form of state intervention: Two case studies of state-market hybridization from Canada and New Zealand
[67] South Nation Conservation Clean Water Program (2025) Total Phosphorus Management (TPM) Program Annual Summary for 2000-2024

Water Tariff Reform: Peru

Investment into Nbs for water has grown substantially in Peru since the mid-2000s both by the public sector and by downstream water users such as water utilities. Between 2014 and 2020, investments into nature interventions increased 13-fold, reaching USD 13 million in 2019 before a decline during the Covid-19 pandemic.[68] This substantial increase was facilitated by early experiments in water tariff reforms, followed by legislative and regulatory reforms to promote NbS investments for water and a reframing of nature as an asset to combat water-related risks. Peru's water tariffs, which act as mechanisms for payments for ecosystem services have grown to cover over two thirds of the country's utilities.

Early tariff reforms

In the early 2000s, Moyabamba's water utility faced declining water quality and rising operational costs, prompting consideration of water restrictions. Local advocacy organisations and international institutions launched public campaigns highlighting the importance of watershed conservation for water security. A 2007 study found the public was willing to pay for conservation through water tariffs.[69]

In 2009, after a public hearing showed broad support, SUNASS implemented a 1 PEN (USD 0.33) tariff to fund nature-based interventions in the watershed. A management committee, comprising community groups, NGOs, and government officials, negotiated with upstream land managers to improve land practices. In exchange for technical assistance and materials for agroforestry systems, farmers and land managers agreed to implement forest conservation measures aimed at improving water retention and reducing erosion.

Legislative reform

Following the success of the Moyabamba tariff reform, a similar reform took place in the watershed serving Cusco. These two examples started to generate the evidence for the model. National legal frameworks were not in place however to facilitate and encourage tariff reforms. Prior to Moyabamba and Cusco implementing their reforms, investment in watershed conservation above a water utility's intake was broadly considered outside of their jurisdiction and responsibility.[70] Additionally, public sector water utilities did not have a mechanism through which to compensate upstream water users.

[68] Forest Trends (2022) Opening the Tap: State of finance for natural infrastructure for water security in Peru, 2021.
[69] Gammie et al (2021). Mobilizing funding for nature-based solutions: Peru's drinking water tariff.
[70] Ibid.

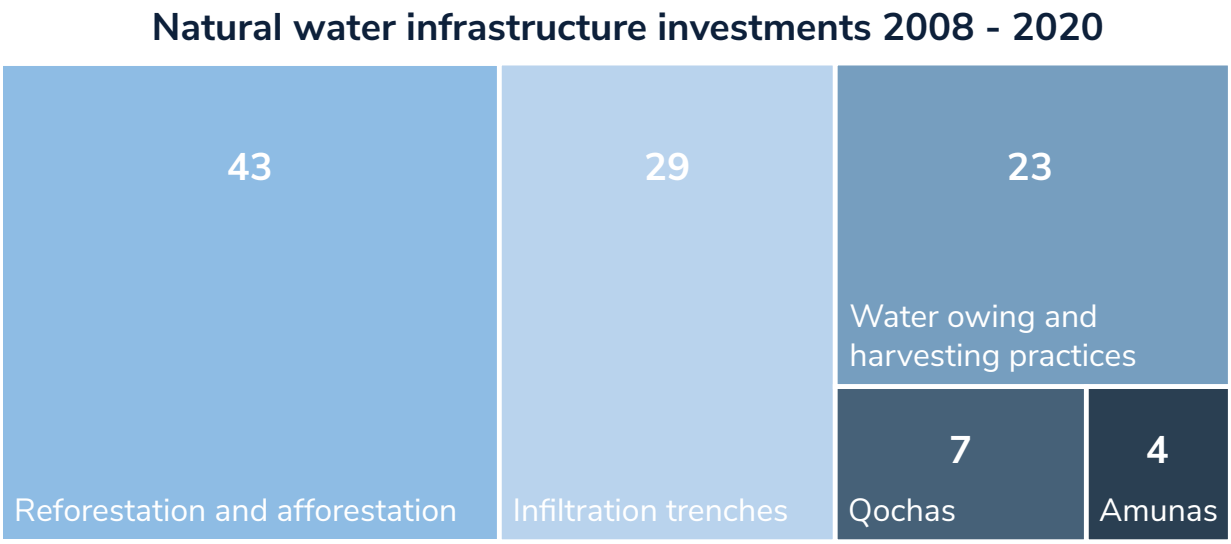
In 2012, during the comment period for the modernisation of the Sanitation Services Law, SUNASS proposed adding a provision to legally recognise and promote the role and responsibilities of water utilities in funding watershed conservation.

The Sanitation Services Law, approved in 2013 requires all water utilities to at minima, consider funding NbS alongside funding grey infrastructure projects when developing their 5-year master plans and budgets. The law states that SUNASS should support water utilities in assessing the cost-effectiveness of these interventions and ensure due consideration of such investments in their master plans. The requirement for water utilities to consider NbS, along with SUNASS's mandate to support utilities in this process, creates institutional demand to develop internal capacities for designing and implementing NbS interventions, and generates earmarked revenue for NbS.

Mechanisms of Rewards for Ecosystem Services (MRSE) Law

While the reform of the Sanitation Services Law created the legal framework to support water utilities to raise funds for watershed conservation, the mechanism through which utilities could pay upstream users was not in place at the national level. In 2014, the Law on Compensation for Ecosystem Services Mechanisms formalised compensation for ecosystem services within the forestry, agriculture and water sectors and explicitly permits the use of public funds for this compensation.

Figure IV: Natural infrastructure interventions funded by public investments in Peru: 2008 – 2020



Source: Forest Trends, 2021

Challenges and Bottlenecks

Despite success in mobilising investment into NbS, challenges remain in operationalising projects and monitoring their benefits. Many utilities face delays in project execution, with significant gaps between allocated and executed funds.[71] This is attributed to a capacity gap within utilities, as they may lack the expertise to develop, implement and manage a new type of investment and unfamiliar NbS interventions. To address this, Forest Trends has been working with the Peruvian government and water utilities to increase capacity and develop supportive institutional frameworks to streamline the process of investing in NbS through their National Infrastructure for Water Security project.

[71] Forest Trends (2022) Opening the Tap: State of Finance for Natural Infrastructure for Water Security in Peru, 2021.

There are also inconsistencies across utilities and projects in the estimation and monitoring of hydrological and other benefits. While legislative changes have integrated NbS into infrastructure planning, there is no requirement in the public investment system to quantify and report on the hydrological benefits of these investments.[72] Future reviews of the Sanitation Services and MRSE laws could include requirements to monitor and report on these benefits, which would improve transparency and accountability.

Replicability and Scalability

Since the implementation of the first water tariff reform in Moyabamba, the model has scaled significantly. As of August 2024, over USD 50 million has been committed for investments in ecosystem services by 40 utilities, representing two thirds of the water utilities in the country. An additional USD 112 million has been allocated from water tariffs for climate change adaptation and disaster risk reduction, much of which is expected to be invested in NbS.[73]

Reforming Water Tariffs

Assessing affordability and willingness to pay

Before implementing water tariff reforms, it is crucial to assess the willingness to pay and affordability of the proposed tariff on the target user groups. This is particularly important in lower income countries and regions where small increases in the price of water can make a substantial impact on household finances. Assessing the willingness and ability of user groups to pay for NbS interventions is crucial for generating buy-in and ensuring that proposed reforms do not disproportionately burden low-income households.

Identifying NbS interventions

Appropriate and cost-effective NbS interventions will depend on the ecological, hydrological, political and economic context of the region. When determining appropriate interventions, an ecological and cost-effectiveness assessment should be undertaken on multiple potential interventions to ensure they meet the needs of local communities and have the highest chance of delivering on the intended environmental outcomes.

There are many open-source tools to assist utilities and others in the water sector to assess the impact and cost-effectiveness of proposed interventions. The Water Action Hub's NbS Explorer Tool and TNC's Benefits Accounting for NbS for Watersheds are two widely used supportive resources for assessing impact of NbS interventions and designing investment programs to fund them.

[72] Forest Trends (2021) Opening the Tap: State of Finance for Natural Infrastructure for Water Security in Peru, 2021.
[73] Gammie et al (2021). Mobilizing funding for nature-based solutions: Peru's drinking water tariff.

The most ambitious tariff reform in Peru took place in Lima in 2015, when the city's water utility, Servicio de Agua Potable y Alcantarillado de Lima (SEDAPAL), approved its 2015 – 2020 master plan. The plan included a 1% increase, earmarked for NbS, in addition to a 3.8% increase for climate change adaptation and disaster risk reduction which can also be used to fund NbS. This is the largest commitment by any Latin American water utility to fund NbS, with the 1% increase representing USD 25 million in revenue over the 5-year period.

The Peruvian model has proven to significantly increase investments into NbS for freshwater and provides a cost-effective model for water utilities to sustainably manage the water resources on which they depend. Although Peru's water utilities are public entities, the model could also prove to work for private companies, which represent approximately 10% of global water operators.[74]

Lessons Learned

- The adoption of policies explicitly earmarking some tariff revenue to finance NbS can contribute to closing the financing gap for water, and to overcome low levels of investments in water NbS due to unfamiliarity with these NbS and perceived high costs for their implementation.
- Early engagement with all interested stakeholders is key to assessing willingness and ability to pay an additional tariff and identifying NbS interventions which will address the needs of local communities.
- Current CBA prioritises grey infrastructure investments. Policy and technical assistance can support the development of new tools for accurately assessing the costs and benefits of green vs grey infrastructure for water.
- Without a requirement to consistently monitor and report on hydrological and ecological benefits, it will be difficult to demonstrate the impact of the model and learn from the experiences of other utilities. Monitoring and evaluation should be integrated from the beginning into water tariff models.

[74] AquaFed. Private Water Operators.

Water Funds

Originally designed by The Nature Conservancy, a water fund is an innovative model to structure and facilitate flows of capital from multiple stakeholders to finance upstream water management over the long term. Water funds attract capital from large water users such as water utilities, hydropower plants, beverage and bottling companies, and agricultural users. Those funds are then invested into the financial market with the aim of generating sustainable returns which are then invested into conservation interventions.[75] These interventions are targeted to the major drivers of water pollution and overuse across a watershed:

- **Sustainable Agriculture** – Training farmers in adopting agricultural practices which decrease overconsumption of water upstream
- **Erosion control** – Incentivising farmers to implement erosion control measures such as terracing, tree planting, riparian planting
- **Removal of invasive species** – Removing water-hungry invasive plants to make room for native species
- **Conservation easements** – Funding purchases of land to be set aside for regeneration and restoration
- **Community Engagement** – Knowledge sharing and community initiatives to promote sustainable water use

Since the first water fund was established in Quito, Ecuador, TNC has created 43 water funds in 13 countries across Latin America, North America, Europe, Africa and East Asia.[76]

[75] TNC (2012). Water Funds: conserving green infrastructure.

[76] TNC continues to work with in-country partners to design and implement water funds. The organisation also established a technical assistance facility, the Nature for Water Facility to provide financial and technical support to countries and municipalities who are interested in developing their own watershed investment programmes.

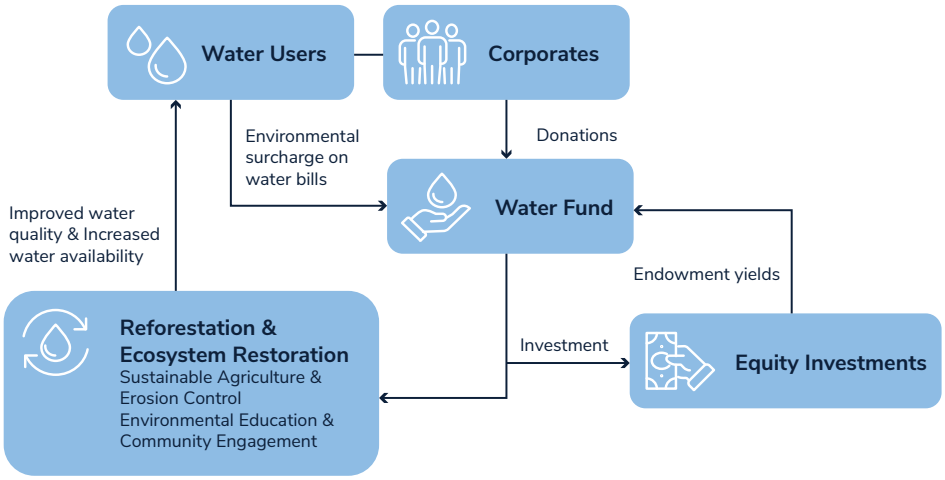
Quito Water Fund

The high-altitude city of Quito relies on the surrounding páramo ecosystems of tropical grasslands to supply water for its 2.7 million inhabitants. In the 1990s, these ecosystems were under increasing threat from deforestation, agriculture, and urbanisation.

In 2000, the city's water utility company, Empresa Pública Metropolitana de Agua Potable y Saneamiento (EPMAPS), implemented a reform to the city's water tariff system, introducing a 1% charge on water bills, specifically earmarked for environmental protection.[77] The additional charge was allocated to a newly established fund: Fondo de Protección del Agua (FONAG), the first water fund in the world.[78]

FONAG operates as a trust fund dedicated to the conservation and restoration of Quito's watersheds. In addition to the surcharge on water bills, it receives contributions from private companies who rely heavily on the city's surrounding watershed, including breweries, bottled water companies and the electricity sector. The fund is structured as a private mercantile trust, using the yields of its equity to finance conservation projects to protect and restore the watersheds.[79] The fund's board includes representatives from public and private sectors, as well as civil society.

Figure V: FONAG Structure



[77] TNC Resilient Watersheds. (2020). The story of Quito – the first "water fund".
[78] Latin American Water Funds Partnership. (2018). Fondo para la proteccion del agua - FONAG
[79] Lorena (2019). The Path of Water — FONAG: work and lessons.

Interventions

The Fund invests in a wide range of NbS aimed at preserving and improving the health of Quito's watersheds, both in lands owned by the utility and by engaging with private landowners. The Fund manages about 20,000 hectares of its own lands where park rangers are posted to conduct restoration activities.[80] In privately-owned lands, the Fund developed conservation agreements which could include support for sustainable productive activities. In utility or Fund-owned land, the land is used only as a source of water with no productive activity.

Reforestation and Ecosystem Restoration: FONAG invests in the restoration of degraded lands in the páramos. This includes planting native tree species, restoring riparian zones, and creating wetlands.[81] These efforts improve water infiltration, reduce soil erosion, and enhance biodiversity.
Through the Fund's Vegetation Cover Recovery Program (PRCV), native tree species like the Polylepis tree are planted to increase overall vegetation cover and improve water filtration.[82] Healthy forest and riparian zones serve as natural buffers that reduce sedimentation and erosion, allowing rainwater to be absorbed gradually, which recharges aquifers and helps ensure a stable water supply for downstream areas. FONAG also funds the creation and restoration of wetlands which act as natural water reservoirs and filters. Restored wetlands enhance the páramo's ability to retain water during rainy periods and release it slowly during dry seasons, contributing to year-round water availability.

Sustainable Agriculture & Erosion Control: FONAG works with local farmers to promote agroecological practices that minimise the sector's impact on water resources, improve the water holding capacity of soils and reduce erosion. This includes training in agroforestry and sustainable livestock management and the implementation of erosion control measures such as terracing and contour plowing. Through these programs, FONAG has provided training and technical assistance to over 3,500 farming families, improving agricultural productivity while mitigating environmental degradation.[83]

Environmental Education and Community Engagement: FONAG has a strong focus on environmental education and raising awareness among local communities about the importance of watershed conservation. The fund supports environmental education programs for members of the water sector, community workshops, and participatory planning processes that involve residents in decision-making and conservation activities.

Initially, the focus was on primary school children, using diverse educational approaches such as school visits to the Cachaco Ecological Park, visits to rural schools and creating camping experiences for urban schoolchildren. These interventions aimed to foster emotional connections to nature, combined with value-based education and experiential learning. Each child was appointed as a "Water Guardian" to instill a sense of responsibility for protecting water resources.[84]

Other initiatives introduced community members and educators to the critical role of watersheds through guided tours and workshops. Using a combination of experiential learning, popular education, and emotional engagement, the program has evolved to address the specific needs of different stakeholders.

[80] Lorena (2019). The Path of Water — FONAG: work and lessons.
[81] Latin American Water Funds. Fund for the Protection of Water (FONAG)
[82] ProAmazonia. FONAG: a benchmark in the ecological restoration of water source ecosystems
[83] Lorena (2019). The Path of Water — FONAG: work and lessons.
[84] Lorena (2019). The Path of Water — FONAG: work and lessons.

Water Quality Monitoring and Research: FONAG invests in monitoring and research initiatives to assess the health of the watersheds and the effectiveness of conservation measures. The data collected helps inform future interventions and helps to quantify the return on investment of conservation measures.[85]

The Monitoring and Surveillance of Protected Areas program started in 2004 with monitoring activities focused on both water quantity and quality to evaluate the impact of interventions and ensure that ecosystems storing and regulating water resources remain in a healthy state.[86] Water quantity monitoring is focused on understanding the regulation of water flow within ecosystems, detecting variations that might indicate issues, while water quality monitoring analyses physical-chemical characteristics to ensure compliance with standards for human consumption.

Status of the Fund

Although the original agreement for EPMAPS to add an environmental charge to water bills was done at their own behest, in 2007 the Metropolitan Ordinance No.199 and No. 213 ratified the 1% contribution to conservation into law and set out that this would increase by 0.25% annually until it reached 2%, where it stands today.[87] This created a long-term source of revenue for the Fund. The Fund has so far leveraged USD 22.5 million, benefiting over 3,500 farming families and implementing NbS across over 28,000 ha.[88] Comparative studies have found that in areas managed by FONAG, suspended solids are significantly lower (from 4 – 11 mg/l) than areas not managed by the Fund (6 – 70 mg/l).[89] From the perspective of the water utility, UNEP found that for each dollar invested in the Fund for conservation activities, EPMAPS saved USD 2.15 over 20 years of the Fund's operation.[90]

Replicability & Scalability

FONAG's success as the world's first water fund demonstrates the replicability of this model for addressing watershed conservation in urban areas dependent on natural ecosystems for their water supply. The Fund's design ensures a steady source of revenue to pursue watershed conservation, environmental education and monitoring. By embedding conservation funding into a public utility system, this approach offers a sustainable financial solution that other cities can adopt. The Fund has already inspired similar initiatives globally, particularly in Latin America, where cities like Bogotá, Lima, and São Paulo have developed water funds modelled after FONAG's success.

FONAG successfully navigated designing interventions for multiple land ownership contexts. While lands owned by the utility are reserved solely for water production, private landowners are engaged through conservation agreements that incorporate sustainable productive activities like agroforestry, allowing them to generate income while protecting critical water resources. This adaptability makes the FONAG model suitable for various land-use contexts, balancing economic needs with conservation goals.

The Fund's engagement with multiple stakeholders through its educational activities complemented the direct NbS interventions by creating a sense of shared ownership and shared responsibility for the watershed.

[85] Ibid
[86] Ibid
[87] Lorena (2019). The Path of Water — FONAG: work and lessons.
[88] Latin America Water Funds Partnership (2018). Fonda para la protección del agua – FONAG
[89] Ibid
[90] UNEP (2021). In Ecuador, an innovative financing tool secures water supplies

FONAG's focus on monitoring and demonstrating the cost-effectiveness of NbS ensures that the interventions are evidence-based and can attract future investment. The success of the Monitoring and Surveillance of Protected Areas program in showing tangible improvements in water quality and ecosystem health highlights the importance of collecting and sharing data to measure the return on investment. This data-driven approach is crucial in securing ongoing funding and expanding the model to other regions.

Lessons Learned

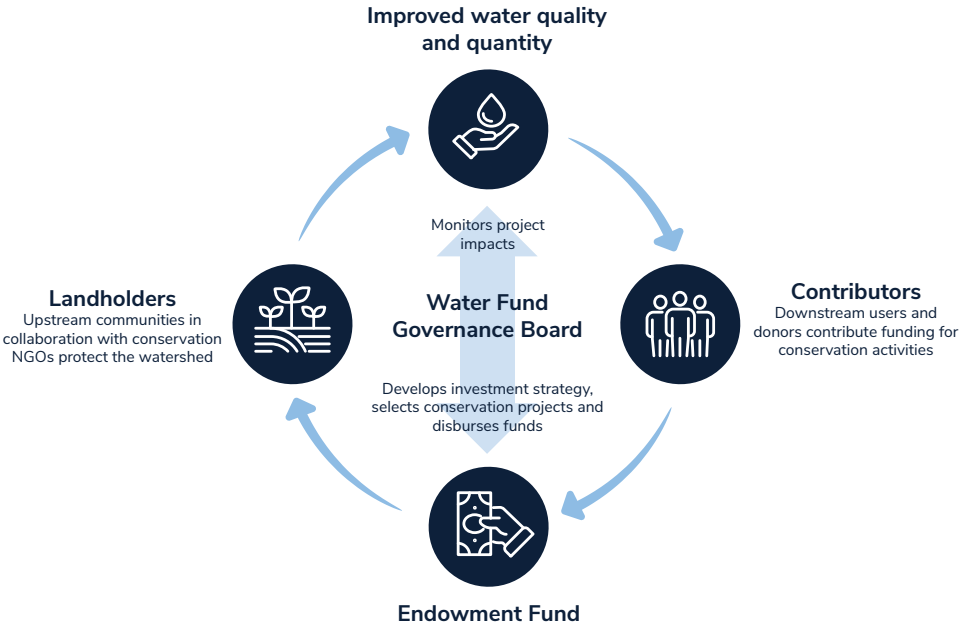
- Monitoring impact of NbS for water is key to demonstrate cost-effectiveness and attract additional investment.
- The economic and social needs of local communities need to be balanced with conservation. In the case of FONAG, interventions proposed on utility-owned land differed from those implemented on privately-owned land, with private owners supported to adopt sustainable productive activities such as agroforestry which would provide income while protecting and restoring the watershed.
- The Quito Water Fund illustrates how a water-based revenue model can be designed at the city level, as in this case the mayor's support was central to the launch of the Fund, illustrating the diversity of public governance levels that water-based revenues can relate to (e.g. State level for the Reef Credits scheme in Australia, Federal/National level for England's Nutrient Neutrality Scheme).
- Setting an independent financial manager for the Quito water fund ensured that conflicts of interest of the various stakeholder groups financing and impacted by the Fund are adequately managed. This is a key aspect of the success of water funds.
- Water Funds such as this one enable the implementation of localised interventions for improved water quality from passive interventions (e.g. the elimination of invasive species) to active restoration strategies (e.g. restoring native paramo vegetation and wetland habitat).
- For countries implementing water funds in context of socio-economic uncertainty, the Quito Water Fund demonstrates the importance of long-term public support for the mechanism which enabled this Water Fund to overcome the macroeconomic crisis faced by Ecuador since 1998. In Sri Lanka for example, a similar scheme is going through a re-launch due to private sector companies withdrawing their contributions when the country suffered from a severe macroeconomic crisis.

Upper Tana-Nairobi Water Fund

The Upper Tana-Nairobi Water Fund (UTNWF) is the first water fund developed in Africa to manage the Upper Tana River's watershed which provides drinking water for Nairobi's residents. The Tana River plays a major role in the health and economic development of Kenya. The river supplies water to the county's key national parks, generates half of the hydropower produced in the country, provides 95% of water used in Nairobi and underpins the country's most productive agricultural areas, supporting over 300,000 smallholder farmers.[91]

Since the 1970s, the expansion of agriculture in the Upper-Tana's watershed was leading to lower water levels and hydropower output as well as declining water quality due to increased sedimentation. Forests on the steep hillsides along the Tana River had been slowly cleared for agriculture, while reduced soil productivity from intensification of farming had pushed farmers onto steeper slopes.[92] This resulted in soil being washed into the river, further reducing agricultural productivity and clogging hydropower facilities and water management infrastructure.[93]

Figure VI: Structure of Upper Tana-Nairobi Water Fund



[91] Upper Tana Nairobi Water Fund Trust (2021). Upper Tana Nairobi Water Fund Strategic Plan 2022 – 2026
[92] The Nature Conservancy. Upper Tana-Nairobi Water Fund: Innovation at the nexus of water, food energy and business.
[93] Ibid.

Setting up the UTNWF

Led by The Nature Conservancy, a steering committee was created in 2014 to assess the business case for setting up a water fund and analysed the potential benefits and costs of implementing upper watershed conservation activities around the Upper Tana.[94] The steering committee consisted of TNC, Nairobi City Water and Sewerage Company (NCWSC), Kenya Electricity Generating Company (KenGen), International Centre for Tropical Agriculture (CIAT), Tana and Athi Rivers Development Authority (TARDA), Water Resources Management Agency (WRMA), along with downstream corporates such as Coca Cola and East Africa Breweries.[95] To model the investment opportunity, the costs and benefits of different interventions, and the potential economic benefits, the analysis used:

i. **Resource Investment Optimisation System (RIOS):** an open-source tool for targeting investments in conservation activities[96]

ii. **Soil and Water Assessment Tool (SWAT):** a tool to assess the likely impacts of different land management practices

iii. **A range of economic valuation tools:** to assess the potential economic benefits of the interventions on upstream and downstream communities.

The analysis concluded that investment into conservation measures in the watershed, administered through a water fund would deliver a viable return on investment and deliver substantial ecological and economic benefits, such as a 50% reduction in sediment concentration, up to a 15% increase in water yields and a USD 250,000 in annual cost savings for NCWSC.[97] The study also found that farming communities would benefit financially from changing management practices with up to USD 3 million per year in increased agricultural yields. Overall, the committee estimated that a USD 10 million upfront investment in the Fund could yield USD 21.5 million in economic benefits over 30 years.[98]

The Fund was officially launched in 2015 with funding from the Coca Cola Foundation and the Kenyan Government, and the International Fund for Agriculture (IFAD) acting as the implementing agency. In 2016, the Global Environment Facility (GEF) contributed USD 6 million in grant funding and secured an additional USD 25 million in co-financing to set up the Fund.[99] The Fund was incorporated as a Trust in 2017, with funds managed as an endowment to ensure a stable source of funding over the long term. Overall, the Trust has been able to mobilise and deploy over USD 15 million in public sector funding and over USD 4 million from the private sector and foundations. [100]

[94] TNC (2015). Upper Tana-Nairobi Water Fund Business Case. Version 2. The Nature Conservancy: Nairobi, Kenya
[95] Ibid.
[96] TNC Water Funds Toolbox: Tools for Analysis
[97] TNC (2015). Upper Tana-Nairobi Water Fund Business Case. Version 2. The Nature Conservancy: Nairobi, Kenya
[98] Ibid.
[99] Global Environment Facility. Food-IAP: Establishment of the Upper Tana Nairobi Water Fund (UTNWF)
[100] Earthly. Agroforestry – Upper Tana, Kenya

Interventions

The Fund focused its interventions on shifting agricultural practices to decrease erosion into the Tana.[101] Funding was used to train farmers in new practices and to provide them with materials and input. The primary interventions are:

- Introducing vegetation buffer zones along riverbanks
- Training and materials to implement agroforestry systems
- Terracing steep farmlands to decrease erosion
- Restoration of degraded lands at forest edges
- Planting grass buffer strips in farmlands
- Mitigating erosion from dirt roads

In September 2021, the Fund became an independent, Kenya-registered organisation, no longer under the TNC umbrella. The Fund is now managed by local leadership as an independent Trust. The Fund's interventions are designed not only to improve water quality but also to benefit farmers and build on existing conservation tools such as Rainforest Alliance Certification for conservation measures, with support to 8,500 smallholder coffee farmers on the obtention of this certificate in the project first three years.[102]

Replicability and scalability

As the first of its kind in Africa, the Upper Tana-Nairobi Water Fund has been a knowledge tool to inform the design of new water funds across the continent, for example in the Great Rift Valley in Kenya, in Addis Ababa in Ethiopia and in the Sebou Basin in Morocco or in Tanga in Tanzania.[103] The UTNWF provides a proven model to work at scale with a large number of local stakeholders, a critical criteria for the implementation of nature-based revenue models notably in low-and middle income countries – in this instance the project involved 165,000 local farmers to plant over 3 million trees to stabilise soils and increase carbon sequestration in the area.[104]

Beyond the inclusion of farmers and the local communities, one of the strengths of the project is the integration of a women's empowerment component. At its launch the project provided support to 39% women-led households, in comparison with the average of 24% women-led households in the region.[105]

[101] Fondas de Agua. Upper Tana-Nairobi Water Fund: Innovation at the nexus of water, food, energy and business.
[102] International Water Association. The Upper Tana-Nairobi Water Fund
[103] IFAD (2022) Project Implementation report – Food-IAP: Establishment of the Upper Tana Nairobi Water Fund (UTNWF)
[104] Earthly. Agroforestry – Upper Tana, Kenya
[105] Ibid.

Lessons Learned

- Developing a robust business case using recognised methodologies is an integral part of designing an investment proposition for NbS for water. The business case is necessary for demonstrating the cost-effectiveness and potential economic, environmental and social co-benefits of proposed interventions. This is an essential tool for attracting investment in watershed conservation programmes.

- The Upper Tana-Nairobi Water Fund is a strong example of the economic opportunity that investments in green rather than grey infrastructure represent for better water quality and availability. Research carried out on behalf of the Fund found that a USD 10 million investment in the Fund's conservation activities could return USD 21.5 million in economic benefits over 30 years.[106]

- The UTNWF illustrates the ability of water fund schemes to engage a large number of smallholder farmers and to combine better environmental outcomes and increased livelihoods for these communities. Training farmers on the reduction of soil erosion which resulted both in higher agricultural yields and improved downstream water quality ensured the sustainability of the project.

- Active communication around the project both locally and internationally is a strong tool to mobilise more support for the project from funders to the general public. The UTNWF used a combination of media engagement, community outreach, school groups presentations and marathon sponsorships.[107]

The inclusion of capacity building activities for farmers is at the core of this scheme's success and contributes largely to the sustainability of the UTNWF by helping farmers improve their positive impact/reduce their negative impact on water as well as becoming more resilient.

[106] Blended Finance Taskforce, Case Study, Paying for nature, Nature Funds.
[107] International Water Association. The Upper Tana-Nairobi Water Fund

Payments for Ecosystem Services

Payments for Ecosystem Services (PES) are a type of market-based instrument that is increasingly used to finance nature conservation. Payment of ecosystem services programmes allow for the translation of the ecosystem services that ecosystems provide for free into financial incentives for their conservation, targeted at the local actors who own or manage the natural resources.[108]

One of the most well-known PES initiatives is in Costa Rica, where the Fondo Nacional de Financiamiento Forestal (FONAFIFO) directly pays land owners to conserve forest ecosystems in recognition of the societal and environmental benefits the forests provide.[109] Financing for the fund comes from a 3.5% fuels tax, along with donations and voluntary corporate contributions. In Uganda, PES is used to protect endangered chimpanzees by compensating farmers who conserve critical habitats who would otherwise have cleared forested land for agriculture.[110] In the UK, some private water companies have developed payment programmes to support farmers in transitioning to more nature-friendly practices, reducing pollution downstream and decreasing treatment costs.[111]

The Chishui River and Kumamoto case studies below, explore how particular sectors can address their water-related risks by developing, facilitating and financing PES schemes.

[108] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), Policy instrument
[109] IIED (2013). Payments for environmental services: lessons from the Costa Rican PES programme
[110] UNEP (2016). Fresh look-back at a Payment for Ecosystem Services (PES) project in Uganda
[111] Severn Trent (2021). Severn Trent environmental protection scheme.

Chishui River Payments for Watershed Services

The Chishui River, a tributary of the Upper Yangtze in China, is critical for maintaining regional water quality and ecosystem health. The Chishui River Basin is a key ecoregion and biodiversity hotspot, hosting 32 protected areas and 400 species of rare or endangered flora and fauna. Unlike other Yangztze tributaries, the Chishui is free from dams, maintaining its flow and allowing for the migration of fish and other aquatic species. The river sustains local communities, agriculture, and the production of baijiu, a traditional Chinese spirit, which relies on high-quality water for its distillation process. However, in the past decades, rapid deforestation, land conversion, increasing use of synthetic agricultural inputs, and industrial activities have contributed to soil erosion, declining water quality, and increased sedimentation in the watershed.[112]

To address these environmental challenges, the Chishui River Payments for Watershed Services (PWS) scheme was introduced to incentivise upstream landowners and farmers to adopt sustainable land-use practices that enhance water quality and watershed resilience. The initiative aligns the interests of downstream water users, particularly the baijiu industry, with economic development concerns of upstream communities, creating a mutually beneficial financial mechanism for environmental stewardship.

Design of the Scheme

The PWS scheme was designed jointly by UNDP and the Foreign Economic Cooperation Office, Ministry of Ecology and Environment, as a Global Environment Facility (GEF) project and initiated in 2014 through collaboration between local community representatives, environmental NGOs, and private baijiu producers. Given the dependency of the industry on high-quality water, baijiu companies were engaged to co-finance conservation activities in upstream areas.

Under the scheme, payments from Baijiu companies were provided to upstream communities which committed to activities such as reforestation, reduced fertiliser use, and agroforestry. Specific interventions included:

- **Forest restoration:** Financial incentives for maintaining and expanding riparian buffer zones to reduce soil erosion and improve water retention.
- **Low-input:** Payments to farmers adopting traditional or low-input farming techniques to minimise agrochemical runoff.
- **Soil erosion control:** Implementation of terracing and cover cropping to stabilize slopes and reduce sedimentation in the river.

[112] Cardascia (2022) Landscape financing in the Chishui River basin

Payments varied based on the type of intervention, land area, and the environmental benefits generated. Communities received payments as a collective and then distributed funds to participating farmers and landowners. The scheme was designed to be flexible, allowing participants to opt in voluntarily and adapt their commitments based on economic considerations and the specific conditions of their land.

Impact and Results

The Chishui River PWS scheme has demonstrated positive environmental and socio-economic outcomes:

- **Improved water quality:** Reduction in sedimentation and chemical runoff has benefited both local ecosystems and downstream water users, including the baijiu industry.
- **Economic benefits for farmers:** Diversified income streams from conservation payments have helped alleviate rural poverty while promoting sustainable land use.
- **Increased private sector engagement:** The involvement of baijiu producers has created a scalable model for corporate participation in ecosystem services, strengthening business resilience against environmental risks.

By 2020, the scheme had engaged over 10,000 farmers, covering approximately 50,000 hectares of land.[113] Monitoring data indicated a significant reduction in sediment loads, aligning with the water quality requirements of the baijiu industry.

Replicability & Scalability

Once the Chishui River PWS GEF programme was officially closed in 2021, the intention was that the scheme would be continued, just without the support of the UNDP team. The terminal evaluation report suggested that both the downstream companies and upstream communities were interested in continuing the scheme. The Asian Development Bank also indicated its intention to scaling a similar scheme across the entire Chishui Basin to expand impact to a landscape scale. Some considerations for scaling highlighted by the terminal evaluation report include:

1. **Scientific grounding:** The scheme was built on hydrological research that identified key areas for intervention, ensuring maximum impact for investments.
2. **Multi-stakeholder collaboration:** The success of the scheme relied on partnerships between government agencies, private sector actors, and local communities, demonstrating the importance of cross-sector engagement.
3. **Private sector alignment:** The scheme effectively linked conservation financing with industry needs, illustrating how businesses can be incentivized to invest in ecosystem services that directly benefit their operations.
4. **Flexibility and voluntary participation:** Farmers had the autonomy to choose conservation activities that suited their needs, increasing buy-in and long-term sustainability.

[113] Karki & Rong Dai (2019) Terminal Evaluation Report: Payment for Watershed Services in the Chishui River Basin for the Conservation of Globally Significant Biodiversity

Lessons Learned

- The PWS approach provided a more economically viable alternative to costly downstream water treatment solutions. Demonstrating the cost-effectiveness of NbS compared to traditional grey infrastructure interventions is key to generating buy-in for PES schemes.
- Ensuring that farmers and landowners received adequate compensation was key to participation and long-term success. Allowing communities to manage the payments themselves ensured a high level of autonomy and inclusion. Land owners were also allowed to freely leave the scheme at will, reducing risks of initial participation.

Kumamoto PES scheme

In Kumamoto prefecture on Kyushu island in southern Japan, over one million inhabitants, along with agriculture and other industry, rely on groundwater reserves for their water supply. Population growth and the expansion of industry has led to increased abstraction of groundwater in the region, while urbanisation and changes in farming practices has hindered groundwater recharge.[114]

Rice production is key to groundwater recharge in Kumamoto with one third of recharge being due to the irrigation of rice paddy fields with water diverted from the Shirakawa River.[115] Conversion of paddy fields to produce upland crops and paving over fields to accommodate an expanding urban population exacerbated the decline in water availability downstream. In 2001, a semiconductor plant, Sony Semiconductor Manufacturing, began operations at its Technology Centre in the area, requiring significant amounts of water to be abstracted from the groundwater reserves.

Design of the Scheme

The Technology Centre was approached with a proposal from a local NGO, Kumamoto Environmental Network (KEN) to address the declining water availability in the area and have the company compensate for its additional pressure on the groundwater reserves. The Technology Center, in collaboration with KEN started making agreements with upland farmers to pay them to flood their unused rice fields, allowing groundwater to recharge.[116] Declining rice consumption in previous years had been leading farmers to at times, leave their fields fallow or change to alternative, more lucrative crops. This made payments for flooding their unused fields an attractive source of revenue for fields which may have been unprofitable and a suitable intervention for an ageing farming community.[117]

The agreements between the farmers and the Technology Centre were voluntary, allowing farmers to exit at any time. Participating farmers were paid JPY 11,000 (USD 100), JPY 16,500 (USD 150) and JPY 22,000 (USD 200) for flooding a 1,000m2 rice field for 1, 2 and 3 months, respectively.[118] By 2009, the groundwater that had been extracted by the Technology Centre since the scheme began (9.8 million tons), had been successfully recharged.[119]

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[114] Shivakoti, Ichikawa and Villholth (2018). Incentivising groundwater recharge through payment for ecosystem services (PES): success factors of an offsetting scheme in Kumamoto Japan.

[115] OECD (2017). Payments for groundwater recharge to ensure groundwater supply in Kumamoto, Japan

[116] Okiria, E.; Zaki, M.K.; Noda, K. (2021). A Review of Payment for Ecosystem Services (PES) in Agricultural Water: Are PES from the Operation of Agricultural Water Control Structures Ubiquitous? Sustainability, 13, 12624.

[117] Shivakoti, Ichikawa and Villholth (2018). Incentivising groundwater recharge through payment for ecosystem services (PES): success factors of an offsetting scheme in Kumamoto Japan.

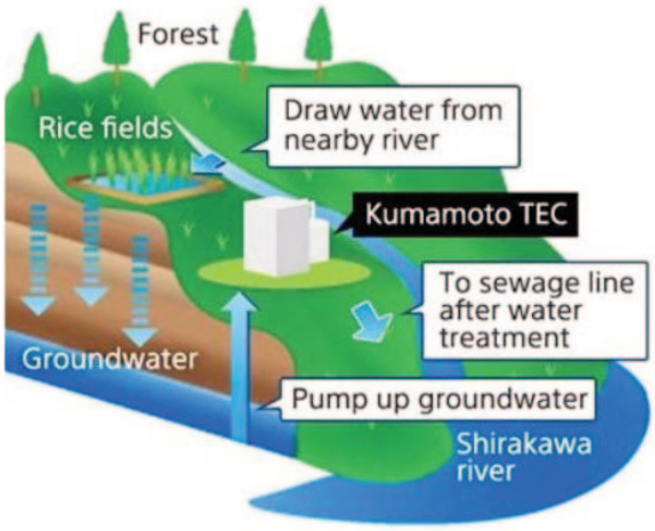
[118] UNESCO (2021) Managing aquifer recharge: a showcase for resilience and sustainability

[119] Okiria, Zaki, Noda (2021). A Review of Payment for Ecosystem Services (PES) in Agricultural Water: Are PES from the Operation of

Seeing the success of the scheme, other small and medium-sized companies that relied on groundwater joined the initiative. By 2017, 38 companies and organisations in the Kumamoto and Kyushu regions were taking part in the scheme by paying for their own offsetting and promoting and purchasing eco-labelled products.[120] Managed groundwater recharge is now also a key water management priority for the Kumamoto City Government. Additionally, the demonstrated ecological impact of the scheme has led to a parallel approach for incentivising rice production for groundwater recharge. Farmers are now selling rice produced adjacent to the Shirakawa River as eco-labelled products, which can fetch a premium price on the market.[121]

Nature-based revenue models are critical to address the challenges resulting from the development of water-intensive industries such as semiconductors with their sales forecasted to reach USD 602 billion in 2024. Some of the largest producers such as Taiwan are already experiencing droughts and Asia notably will need to continue investing in models which enable the continent to match its water needs and growth aspirations.[122]

Figure VII: Conceptual diagram of the scheme's hydrology



Source: Dillon, Pavelic., et al (2006). Role of aquifer storage in water reuse

Replicability & Scalability

The Kumamoto PES scheme demonstrated that nature-based interventions for groundwater recharge can be a cost-effective, economically and socially viable pathway to improved water quality and availability in water-stressed areas. The success of the scheme first relied on the development of a thorough scientific understanding of the groundwater system in Kumamoto. The initial analysis was conducted by experts and researchers from local universities, which then informed the design of the payments scheme. To generate buy-in from farmers, the scheme was administered by the local agricultural association, Midori Network Ookiku (MNO), which negotiated flooding contracts between farmers and companies, monitored the flooding condition of fields and distributed payments.[123]

Agricultural Water Control Structures Ubiquitous? Sustainability, 13, 12624.

120 Shivakoti, Ichikawa and Villholth (2018). Incentivising groundwater recharge through payment for ecosystem services (PES): success factors of an offsetting scheme in Kumamoto Japan.

121 Ibid.

122 CDP, Financial Sector Water Knowledge Hub.

123 UNESCO (2021) Managing aquifer recharge: a showcase for resilience and sustainability

Proposing appropriate interventions and setting appropriate payment rates was also crucial to the models' success. For the aging farming community, leaving their fields to flood was a relatively low-effort commitment which would also allow them to improve the profitability of potentially fallow fields. Payment rates needed to be sufficient to incentivise adoption while being cost-effective for buyers. With a high market risk for rice production, the payment (typically averaging to about USD 925/year per family) was sufficient to incentivise participation of farmers who had multiple sources of income. For the water utility and private sector, estimated increased pumping costs due to declining groundwater storage was estimated at JPY 61.4 million (USD 0.54 million) over a decade, which is less that one tenth the cost of the PES scheme for the private sector.[124]

There may also be space to specifically engage the semiconductor industry in investing into water conservation. Global semiconductor manufacturing is expected to grow by 6% in 2024 and 7% in 2025, driven in part by the proliferation of AI processing.[125] Engaging this industry in designing market solutions to water scarcity can provide significant opportunities for communities to both attract manufacturing and secure access to safe and sufficient freshwater resources. By aligning industry interests with local ecosystem services, the PES model offers a scalable solution for other water-stressed regions.

Lessons Learned

- The scheme proved highly cost-efficient when compared to alternative solutions. The estimated expenses for the utility and private sector to engage with the scheme were less than one-tenth of what would have been required to expand pumping capacity.
- A robust scientific understanding of the local groundwater system, provided by experts, was crucial for designing a scheme with the highest likelihood of success. Involving both the scientific community and individuals with local knowledge is essential to identify effective interventions that can achieve the scheme's environmental objectives.
- This PES demonstrates the importance of public private dialogues to identify innovative schemes which can increase private sector financing for nature in accordance with companies specific interdependencies with nature. The Kumamoto PES scheme came from a proposal from a local environmental NGO which was attending a summit held by the semiconductor manufacturer.[126]
- The scheme tailored interventions to align with the region's demographics, particularly addressing the needs of an aging farming community. It offered low-effort actions that increased the profitability of fallow fields, making participation attractive. The scheme also provided flexibility, allowing farmers to opt out at any time.

[124] UNESCO (2021) Managing aquifer recharge: a showcase for resilience and sustainability
[125] SEMI (2024) Press release : Global Semiconductor Fab Capacity Projected to Expand 6% in 2024 and 7% in 2025
[126] Japan Ministry of Environment. (2010). Conserving water by recharging groundwater in Kumamoto.

Voluntary Credit Mechanisms

Voluntary credit mechanisms refer to companies, investors, or other stakeholders choosing to address their water impacts through the purchase or generation of water-related credits, even when not legally required to do so. This is often driven by corporate sustainability commitments, stakeholder pressure, or efforts to demonstrate leadership in water stewardship.

These mechanisms can take several forms, including directly funding watershed restoration projects that issue credits, purchasing water credits based on established metrics, or investing in collective action initiatives that improve water quality, quantity, and ecosystem health. Water replenishment strategies, discussed above, can generate quantifiable credits, either by companies themselves or by external project developers. These voluntary efforts can contribute to emerging voluntary 'nature markets,' where companies seek to demonstrate positive impact through verified water benefits.

Examples include corporate purchase of Act4Water's Water+ credits whereby companies aim to balance their water footprint by financing replenishment activities that generate verified, tradable credits. While voluntary, these schemes are becoming an important tool for companies seeking to future-proof their business against water risks, build trust with stakeholders, comply with regulations like the CSRD and achieve organisational water-based targets, such as those aligned to Science-based Targets Network's nature framework.[127]

[127] Science-based Targets Network. Freshwater Targets.

Act4Water Positive Water Credits

Act4Water, a collaborative water footprinting and standards initiative has developed a market mechanism to allow companies to voluntarily compensate for their water footprint through the financing of water-replenishment activities. The initiative has introduced the Act4Water Standard, which facilitates the assessment and balancing of water footprints through the generation of tradable credits.[128] This initiative aims to promote projects that generate positive impacts on water resources and the environment, while supporting local community-led conservation.

Act4Water Standard and Positive Water Credits

The Act4Water Standard provides a framework and verification process for water replenishment and watershed restoration projects, and allows for their generation and sale of CAPs. A CAP represents reduced impact on water resources, equivalent to 1000m3 of water footprint savings. Through the Act4Water standard, public or private entities can both measure their own efforts to reduce their water resource impact and estimate the number of CAPs they could purchase to compensate for residual impact and become 'net water positive'. Water replenishment projects can then also use the standard to quantify their water impact and estimate the number of CAPs they can generate and then sell.

Mechanism and Stakeholder Engagement

Act4Water operates a voluntary market for CAPs, connecting organisations aiming to mitigate their water-related impacts with projects delivering improvements for water resources. Companies can acquire CAPs from projects that align with their compensation objectives, providing financial support to ensure the ongoing positive impact of these initiatives. For example, a company that faces water shortages can invest in projects that actively replenish groundwater. The marketplace allows entities that use the Standard to connect with certified projects that directly address their water-related challenges. Through the purchase of CAPs, companies and other organisations can then be certified by Act4Water as officially Water Positive.

Certifications

Act4Water has a series of certification badges that engaged entities can achieve, depending on where they are at in their water sustainability journey.

[128] Act4Water Standard

For projects:

- **Water+** recognises and validates projects that generate a positive impact on water resources, enabling them to issue CAPs. In addition to facilitating financial resources, the certification ensures the continuity of the positive impact and regulatory compliance, thereby strengthening the legitimacy and effectiveness of actions in support of water resources.

For entities:

- **Water Committed** is the initial level of recognition on the path toward sustainable water management. Organisations achieving this certification have assessed their water footprint, developed a concrete reduction plan with clear and measurable targets, and begin implementing actions that demonstrate a tangible commitment to responsible water stewardship.

- **Water Active** recognises organisations that go beyond reducing their water footprint and actively engage in balancing their impact. It is granted to companies that have participated in a collaborative water replenishment or restoration project.

- **Water Positive** is the highest level of certification, reserved for organisations that fully address their water footprint and/or generate a net positive impact. To achieve this distinction, a company must demonstrate that it has completely compensated for its direct water footprint through one or more verified replenishment or restoration projects. This involves a deep and sustained commitment to sustainability through investments in water resource restoration and conservation projects that ensure a positive water balance.

For activities:

- **Water Neutral** can describe a company, a product, a site or even events such as conferences which has reduced its water footprint and compensated for any residual impact.

Types of Eligible Projects

A saving in an entity's water footprint or an improvement that can be eligible to generate CAPs can be established when one of the following occurs:

- Reduction in the volume of freshwater used for a specific purpose, making it available in the watershed

- Improvement in the quality of water discharged into the receiving environment

- Improvement in the quality of the water body

The Act4Water Standard recognises various types of projects eligible for generating CAPs, including:

- **Water Efficiency:** Actions that increase the availability of water resources in a basin.

- **Water Resilience:** Initiatives that enhance a region's resilience to the effects of climate change.

- **Water Quality:** Projects that improve water quality in aquatic or terrestrial environments within a basin.

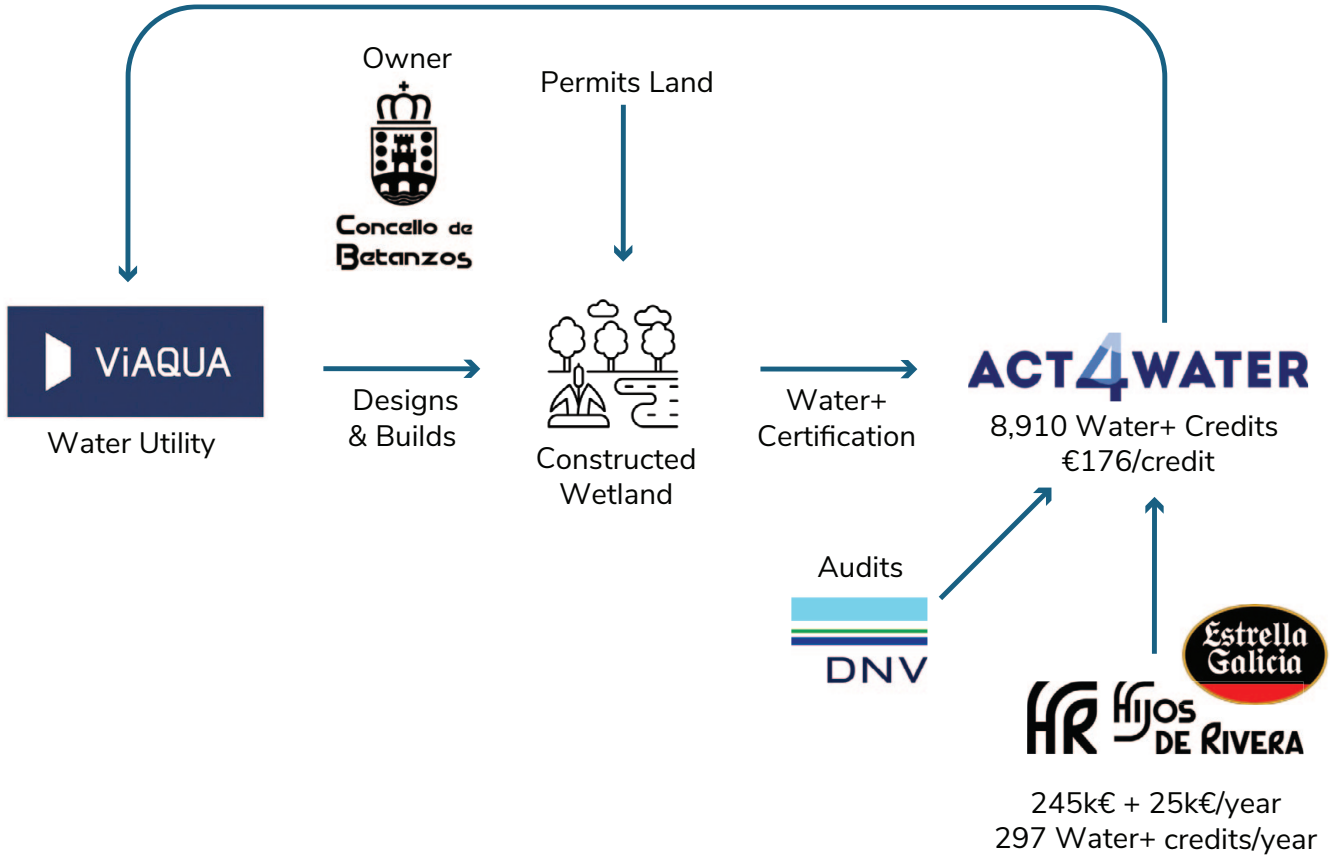
- **Ecosystems and Biodiversity:** Efforts that promote the improvement or preservation of ecosystems and biodiversity.

- **Water Reuse and Circularity:** Activities that enable the wastewater reclamation for various applications or wastewater resources recovery, reducing the extraction of resources from the environment

Example Transaction

An illustrative example of the Act4Water Standard and marketplace in practice comes from the Galicia region of Spain, where Hijos de Rivera, a beverage company and the producer of Estrella Galicia beer, owns a brewery and bottling factory and is highly dependent on local water resources for its operations. The company worked with Veolia under the Act4Water Standard to assess its water footprint and identify potential projects to invest in that would improve water resources in their sourcing region. The local water utility, Viaqua, in collaboration with the City Council was at the same time developing plans for a constructed wetland to improve water retention and quality to prevent further pollution problems at the local water reservoir. Act4Water worked with them to validate the CAPs that would be generated by the wetland and certify the project. The project was estimated to generate 8,910 CAPs over its 30-year lifespan, an estimate that was then verified by DNV. Hijos de Rivera provided the upfront funding for the project as well as a commitment to ongoing maintenance funding, in exchange for 297 CAPs per year. The upfront investment of EUR 245,000 allowed the project to move forward while the Act4Water Standard and the auditing done by DNV gave credibility to the project and assurance to Hijos de Rivera that they would receive their required CAPs.

Figure VIII: Viaqua – Hijos de Rivera Water Positive Project



Source: Act4Water; bsd studio for noun project

Replicability and Scalability

Act4Water's model demonstrates a scalable approach to water footprint assessment and balancing that can be adapted to various contexts. It goes beyond water replenishment, as it is based on the water footprint methodology, thus including water availability but also water quality impacts. This is useful to drive projects that really respond to local needs (water scarcity regions may focus on water availability projects while other regions may need to address water pollution). Fifteen initiatives aimed at preserving and restoring water resources are currently generating CAPs in countries like Spain, the Netherlands, South Africa, Ethiopia, Palestine and Indonesia.

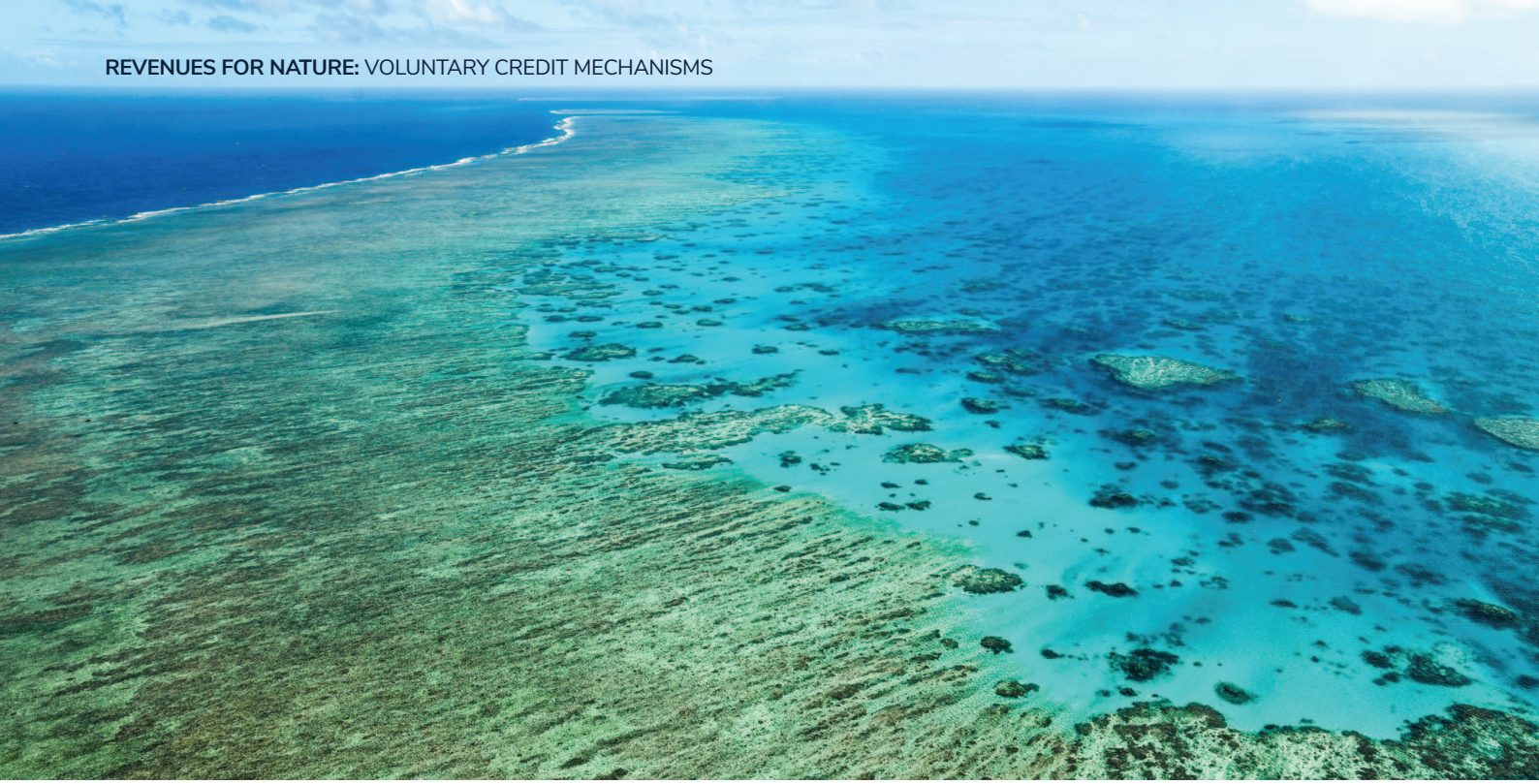
In addition, Act4Water certification marks are currently registered in the EU and UK, and in the process of registering in the US for expansion into the Americas.

Integrating Positive Water Credits into sustainable finances

Act4Water is exploring additional use cases for Positive Water Credits beyond corporate water stewardship objectives, including using Water+ certification as a KPI for sustainability linked loans (SLLs). Hidralia, a private water management company secured a SLL from CaixaBank, Banco Sabadell, Unicaja Banco in 2023. The company aimed to reach 81% water network hydraulic efficiency in 2028, based on a 2022 baseline. In doing this, Hidralia was able to generate expected CAPs, calculated using the Standard and verified by DNV. This generation of CAPs was accepted by the banks as a KPI for their loan, giving them higher flexibility and providing the bank with a KPI addressing adaptation to climate-related risks. Act4Water is working with more banks, both in Spain and internationally to promote the use of CAPs and the achievement of a Water+ certification as a way to access sustainable finance.

Importance of Multi-stakeholder Initiatives

Multi-stakeholder initiatives are fundamental for advancing water resilience, particularly when they foster robust public-private collaboration as seen in the Act4water Water+ projects. These initiatives embody a shared responsibility model, where diverse actors—including CAPs generators, CAPs buyers, standard-setters like Act4water, public supporters such as municipalities, engaged local communities, and the financial sector—work together to protect freshwater resources. This collective approach ensures that expertise, resources, and incentives from both public and private spheres are mobilized, enabling the scaling of nature-based solutions and the financing required for impactful water stewardship. By "thinking globally and acting locally," Act4water's framework demonstrates that only through coordinated, cross-sectoral action and shared accountability can we achieve meaningful and sustainable outcomes for water security. This model not only addresses immediate local needs but also strengthens the resilience of entire hydrological systems, setting a precedent for responsible, inclusive, and scalable water management.



Reef Credits

Reef Credits is a voluntary Australian nature market that incentivises landholders to undertake land management activities that improve water quality in the Great Barrier Reef catchment. These improvements, in turn, generate Reef Credits – tradable units that each represent a quantifiable volume of nutrient or sediment prevented from entering Great Barrier Reef catchments, which can be sold to investors. Although ultimately, the goal of the scheme is to improve marine water quality around the Great Barrier Reef, the interventions undertaken by farmers upstream are designed to improve the rivers and lakes in the Great Barrier Reef catchment. The design of methodologies to quantify the impact of upstream interventions can provide key lessons for diverse programs for investing in NbS for freshwater. The Reef Credit Scheme was initially designed by environmental markets investor GreenCollar, alongside natural resource management organisations, Terrain NRM and NQ Dry Tropics. The scheme is now independently administered by Eco-Markets Australia, which issues credits once water quality outcomes are achieved and verified, manages a public registry where Reef Credit projects, credit issuances, transfers and retirements are logged, and acts as the Reef Credit Secretariat. A Technical Advisory Committee (TAC), acting independently from Eco-Markets has provided feedback and technical advice on all stages of the scheme's development, including reviewing credit generation methodologies.

Figure IX: Eco-Markets Australia Reef Credit

Source: Eco-Markets Australia

Methodologies

The program currently has four approved methodologies that project developers can use to develop Reef Credit projects.

Figure X: Reef Credit

Methodology	Nitrogen Use Efficiency Method 	Gully Method 	Wastewater Method 	Grazing Land Management Method 	Constructed Wetlands Method (Method Under Review) 
Pollutant	Dissolved Inorganic Nitrogen	Sediment	Dissolved Inorganic Nitrogen	Sediment	Dissolved Inorganic Nitrogen
Activities	Soil and nutrient practice change	Landscape rehabilitation and construction	Algal bioremediation at sewerage treatment plant	Fine sediment savings through improved grazing land management practices	Utilise constructed wetlands to prevent dissolved inorganic nitrogen from entering waterways
Crediting period	10 years	25 years	15 years	25 years	25 years
Credits issued	Annually	On rainfall event	Quarterly	On rainfall event	On rainfall event
Independently audited	Annually	On rainfall event	Quarterly	On rainfall event	On rainfall event

Source: Eco-Markets Australia

The DIN Method, also called the Nitrogen Uptake Efficiency Method, measures the reduction of Dissolved Inorganic Nitrogen (DIN) through soil and nutrient practice change activities. These projects generate Reef Credits annually over a 10-year crediting period.[129]

The Gully Method measures the sediment reduction entering the waterways in the Great Barrier Reef catchment. Project activities under this methodology include landscape rehabilitation and construction. Projects under this methodology generate Reef Credits on a rainfall event and have a project crediting period of 25 years.[130]

[129] Schultz & Sinclair (2020). Method for accounting reduction in nutrient run-off through managed fertilizer application – version 1.1.
[130] Brooks et al (2020). Method of accounting for reduction in sediment run-off through gully rehabilitation – version 1.4.

The Wastewater Method measures the reduction of Dissolved Inorganic Nitrogen (DIN) entering the waterways in the Great Barrier Reef catchment through wastewater treatment plants. This methodology uses algal bioremediation technology within wastewater treatment plants to reduce the amount of DIN entering the Reef catchment waterways. Projects under this methodology issue Reef Credits quarterly and projects have a 15-year crediting period.[131]

The Grazing Land Management Methodology measures the reduction of sediment run-off due to improved grazing practices. The aim of the methodology is to increase ground cover ahead of rainfall events. Enhanced ground cover will then decrease sediment runoff into waterways adjacent to grazing lands. Practices under this method could include rotational grazing, matching stocking density to forage budgets, land remediation or infrastructure investments such as fencing.[132]

Methodologies for **Constructed Wetlands** are currently under review.[133]

Anyone can develop new methodologies for Eco-Markets to assess for potential inclusion, or suggest changes to approved methodologies. New methodologies are first screened for adherence to the Reef Credit Guide and Reef Credit Standard, before being submitted to the TAC for independent peer review and go through a public consultation.

The first Reef Credits were issued in 2020, from a pilot project developed by GreenCollar in the Tully River Catchment. The project, in collaboration with a cane farmer, generated 3,125 Reef Credits. HSBC and the Queensland Government purchased these first credits. As of mid-2024 over 50,000 Reef Credits have been generated, representing over 50 tonnes of Dissolved Inorganic Nitrogen being prevented from entering the waterways leading to the Great Barrier Reef. Over 40,000 of those credits have been retired which has generated more than USD 1.8 million (AUD 2.7 million) in returns.[134]

More on the Reef Credits scheme can be found in its case study in the R4N Database here.

Replicability & Scalability

The Reef Credit Scheme offers a replicable and scalable example of robust metric development for voluntary credit mechanisms, which could be adapted to other regions facing similar water quality challenges. This mechanism is relevant to improve the conservation or restoration of natural resources at the intersection of public and private management, in this case Federal and State governments are responsible for water quality which is a public good, but the lands at the source of the pollution issues are owned by private entities.

The Reef Credit Scheme's adaptable methodology framework allows for the development of new, context-specific approaches to addressing water quality issues. These methodologies could be customised and expanded to target different pollutants or environmental stressors in other watersheds globally.

The Reef Credit Scheme's governance, including the independent oversight by Eco-Markets Australia, ensures transparency and builds public trust. For replication, this model of independent oversight can be critical for ensuring credibility, particularly in new regions where environmental markets may face scepticism. Establishing an independent body to review methodologies, verify outcomes, and maintain a public registry would be essential to maintaining the legitimacy and transparency of the scheme in other areas.

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[131] Mulder, Neveaux & RegenAqua Pty Ltd. (2023). Method for accounting DIN reduction in wastewater through managed algal bioremediation operations – version 1.3.

[132] Silverwood & Yates (2024). Reef Credit method for accounting fine sediment abatement through improved grazing land management. v 1.0.

[133] Eco-Markets Australia. Methodologies.

[134] Eco-Markets Australia (2023). EMA quarterly snapshot – Dec 23.

Voluntary participation lowers the barriers to entry for landholders who might otherwise be resistant to regulatory requirements. By creating a market-driven mechanism, the scheme allows participants to enter or exit based on their capacity and willingness to implement sustainable practices. Although a voluntary approach may come up against challenges in generating sufficient demand, a mechanism that is not designed to offset harm elsewhere can result in a net uplift in water quality.

Lessons Learned

- Any methodology should go through rigorous scientific and technical review, including public consultation to assess usability.
- Governments can benefit from delegating the administration of the reef credit scheme to an independent entity, in this case a not-for-profit company, to maintain its focus on overall water quality regulatory requirements that the scheme will comply with.
- Local or central governments play a central role in the start-up phase of nature credit scheme providing more time for private sector demand to emerge.
- Building supply for such schemes require the implementation of pilots with voluntary farmers to test the methodologies associated with the scheme and ensure the credibility and robustness of the scheme.

Corporate Direct Investment

Corporates are increasingly becoming aware of water-related risks in their supply chains. Ceres found that over 50% of major listed companies face moderate to severe water-related risks.[135] Companies are also under pressure from some investors to assess and respond to those risks.[136] To respond to these pressures and risks, companies can make investments into NbS within their supply chains to decrease risks to the water resources they rely on for their operations.

In contrast to Corporate Social Responsibility, direct supply chain investments – sometimes called 'insetting' are typically responding to a strategic risk to the company's operations, rather than a philanthropic contribution towards societal or environmental outcomes. For example, a hydropower company which relies on consistent flow levels and limited sedimentation, may invest directly in erosion control measures upstream Or, as seen in the case study on Reckitt, a company reliant on water resources to produce its consumer products can invest not only in water-saving technologies within its manufacturing facilities, but also in nature-based solutions across the surrounding watershed. These investments help safeguard long-term water availability—supporting the company's operational and supply chain resilience while also ensuring that local communities retain access to the same water resources.

[135] Ceres. Feeding Ourselves Thirsty.

[136] The Valuing Water Finance Initiative, led by Ceres and the Government of the Netherlands is a coalition of investors who engage companies with a large water footprint to take action on their water related risks. The Initiative currently represents over 100 investors representing over USD 17 trillion in assets, engaging a priority 72 global companies.

Reckitt's Water Strategy

Reckitt is a global consumer health and hygiene company, producing household and personal care products for brands like Lysol, Durex, Clearasil and Air Wick. The company depends on and impacts water resources throughout its value chain – from the production of raw materials and water-based products through to their end use – such as with dishwashing liquid and laundry soap. To improve the resilience of its supply chains and decrease its impact on global water resources, the company has developed ambitious targets to drive action:

- 35% reduction in water use from manufacturing by 2020 – achieved
- 50% reduction of the company's water product footprint by 2040
- Become water positive in all water-stressed production sites by 2030

In order to achieve its targets, Reckitt has taken a broad approach: decreasing water use and implementing water recycling measures in its production facilities; developing consumer awareness campaigns to decrease water use associated with its products in households; developing, building broad-community awareness of, and investing in WASH programmes in communities to enable better access to water for health and sanitation; and investing directly in NbS to improve water quantity and availability while delivering biodiversity and climate outcomes.

Assessing Water Risks

As a TNFD Early Adopter, Reckitt pilot tested the nature disclosures framework and contributed to the final framework launched in 2023. Through this process, Reckitt located and evaluated its impacts and dependencies on natural systems, with water emerging as a significant area that could generate risk to business activities but also offer opportunities for investing in interventions.

Reckitt has implemented requirements that all sites adhere to specific external and internal management standards. Since 2023, with the exception of a more recently acquired site, nearly 50 manufacturing sites were independently certified for ISO 14001, which provides a framework for Environmental Management Systems (EMS).[137] Reckitt has also developed internal standards to further guide the management of its production sites and ensure their adherence to the company's broader sustainability ambitions, including wate management and pollution prevention:

[137] International Standards Organisation (2015). ISO 14001:2015: Environmental management systems — Requirements with guidance for use

- Global Water Management Standard: requires sites to go beyond legal compliance and actively support the company's Sustainability Ambitions.[138]

- Global Wastewater Standard: Sets minimum standards for the management of wastewater at all sites.

Collaborative efforts to restore ecosystems

To help to strategise their nature-based interventions, in 2021 Reckitt began a partnership with the WWF to collaboratively tackle biodiversity, water and climate challenges in priority geographies that intersect with Reckitt operations and supply chains.[139] The collaboration has resulted in NbS and watershed restoration projects across India, Brazil and Pakistan, with new activity developing in South Africa and a landscape programme in Indonesia. Efforts have contributed to the protection and restoration of 2,000km of river in the Ganges and Amazon basins and replenished a billion litres of fresh water.[140]

Restoring the Ganges

In the Ganges river basin, Reckitt and WWF are working to restore and protect critical freshwater ecosystems and support farmers in implementing more sustainable practices. This multi-year initiative aims to rehabilitate river corridors and adjacent habitats, focusing on improving water quality, restoring habitat for endangered river dolphins and other aquatic species, and supporting community stewardship of natural resources.

The program uses a suite of NbS, including wetland and canal restoration, enhancing river connectivity to enhance e-flows as well as working with farmers to introduce more sustainable agricultural practices. These ecological interventions are complemented by local engagement activities that train key stakeholders on urban river management. Reckitt's Uttaranchal manufacturing site is amongst those who benefit from this river basin activity.

Water Neutrality at Hosur, India

Reckitt has also directly implemented water conservation activities in its manufacturing sites, particularly in water-stressed regions. At its manufacturing facility in Hosur, India, Reckitt began testing methods to reduce water consumption and began focusing efforts to reach water neutrality in 2019. Through a combination of in-plant water efficiency measures and catchment-level restoration efforts, the site was certified water positive in 2022 using the Volumetric Water Benefit Accounting (VWBA) methodology. Key measures included[141]:

- Implementation of water reuse and recycling processes.

- Installation of rainwater harvesting and storage mechanisms.

- Recharging aquifers and decreasing sedimentation through the construction of check dams and infiltration ponds, repairing spill-ways and deepening canals.

[138] Reckitt (2022) Our Sustainability Ambitions.
[139] WWF
[140] Reckitt (2025). Reckitt and WWF: Together let's restore our world.
[141] Reckitt report: Water 2022

- Community-based watershed projects that restored degraded lands, reduced monsoon and runoff and supported water retention in nearby agricultural areas.

These interventions were developed in collaboration with local stakeholders, including NGOs and water resource experts, ensuring both social and ecological benefits. The project has improved water availability for both the plant and local communities and reduced the site's dependency on external water sources. A similar programme at Mysore, India, has also now achieved a similar water positive outcome, and the company is now implementing similar approaches for sites in Mexico, South Africa and Pakistan.[142]

Driving Water Access through Innovative Finance

Since 2019, through their partnership with water.org Reckitt have provided access to clean water or sanitation to 2.4 million people.[143] By supporting their WaterCredit model, Reckitt introduced micro-finance tools to work to solve the water and sanitation crises and close the funding gap. Water.org connects families in need with affordable financing to install water taps and toilets in their homes. The borrowers, 90% of which are women, are repaying their loans at a 98% rate so the capital can be reused repeatedly to support other families. Through this model, the overall investment has mobilised USD 146 million for improvements in water and sanitation, with an ambition of reaching 5 million people with lasting access by 2030.

Through their partnership with WaterEquity, Reckitt leveraged its balance sheet to invest USD 7.4 million in two impact funds, driving collective action alongside other investors such as Microsoft, Starbucks and Ecolab. The funds support climate-resilient infrastructure and provide capital to scale access to micro-credits for household infrastructure across the world. Reckitt reinvests the financial returns of the funds to increase the impact and reach of these investments. By the end of the funds' lifetimes, they aim to provide water and sanitation access to 1.5 million people.

Influencing Consumer Behavior & End-of-life water use

Reckitt aims to decrease water use throughout the value chain of its products. To decrease water use in households, the company introduced the #SkipTheRinse campaign for its Finish dishwasher tablets. The campaign asked customers for 'pledges' to stop pre-rinsing their dishes before using their dishwashers. For each pledge taken, the company would then contribute USD 1 to TNC. Reckitt estimates that the campaign has saved over 5.6 million gallons of water as of 2020.[144] The #SkipTheRinse campaign, without the financial match-contribution, has run in various other countries including Australia, Turkey and the UK to build consumer awareness on water resources and the role they can play in helping them for the future.

[142] Interview with David Croft, April 2025.
[143] Reckitt (2024). Building a Cleaner World: Social Impact Investment Report 2024
[144] Reckitt (2020). #SkipTheRinse with Finish

Beyond Water: NbS for climate and nature

Beyond efforts to minimise and compensate for the company's water impacts, Reckitt is also exploring insetting approaches to reduce emissions within its supply chains. Reckitt is working with Nature Based Insights (NBI), a partnership between the Earthworm Foundation and Oxford University, to implement NbS in the company's rubber supply chain. The company relies on smallholder rubber farmers for its Durex brand products and is working with NBI to support farmers in implementing agroforestry to both increase carbon sequestration and improve biodiversity outcomes. These efforts are currently being piloted in Thailand.

Lessons Learned

When investing in NbS for water within a company's supply chain, the impact on water resources alone may not always demonstrate sufficient value for money. Interventions with co-benefits—such as agroforestry, which reduces erosion and sequesters carbon in addition to business and societal impacts. Similarly, social impact and health benefits from WASH provision and stronger water resources provide further value. This is especially the case for Reckitt given its use of water but even more so, from its business and brand focus on health and hygiene, and its approach to addressing the adverse impact of climate change on health, which has been particularly visible since COP26 in Glasgow. Building impacts on a broad range of outcomes may further reduce internal barriers to programmes. This may be further aided where activity, including emissions reductions, align more directly with mainstream sustainability targets and are easier to quantify than biodiversity outcomes.

Conclusion

There are significant opportunities for the private sector to invest in NbS to address freshwater quality and availability challenges. This Guidebook has demonstrated that such investments present a strong business case due to the cost-effectiveness of nature-based interventions, their potential to deliver co-benefits for the environment and society, and their role in mitigating risk while enhancing business resilience in the face of climate change. The models presented illustrate diverse mechanisms for mobilising private sector investment in the protection and restoration of freshwater ecosystems.

However, replicating and scaling these models is not without challenges. Project developers and local communities may lack the sufficient scientific and financial knowledge to develop investable NbS for water projects; local authorities or other oversight bodies may face capacity or resourcing issues if given administrative oversight of new NbS markets and regulations. Corporates may find it challenging to demonstrate the cost-effectiveness of NbS interventions when traditional CBA prioritises grey infrastructure.

Government can play a key role in addressing these challenges by creating effective enabling policies that incentivise NbS for water. Proactive policies, capacity development within local authorities, and government support for project pipelines are essential to making NbS for water a viable and attractive option for corporate investment. Furthermore, continuous monitoring of environmental and economic outcomes is vital for building transparency and demonstrating the long-term benefits of NbS for water projects.

Collaboration and alignment between government and the private sector can help swiftly mobilise private investment into NbS, allowing governments to achieve their nature-related targets and for the private sector to mitigate and respond to water-related risks. By addressing both environmental and business needs, NbS can offer scalable solutions that provide sustainable water management while delivering significant benefits for environment and society, both now and into the future.

Appendix I: Multi-Stakeholder Governance Checklist

Each model discussed in this guidebook will require different approaches to stakeholder engagement. However, there are some common considerations for developing nature-based revenue models for freshwater that should be kept in mind through the conception, design, implementation and monitoring of such models. The following checklist of considerations is by no means exhaustive, but can help to any party involved in the design and administration of a nature-based model for freshwater. This list draws on lessons from the case studies in this guidebook, The Nature Conservancy's Resilient Watersheds Toolbox and the OECD's Water Governance Indicator Framework.[145]

Stakeholder Identification and Design

- **Stakeholder Mapping:** Map the landscape of stakeholders and rights-holders including Indigenous Peoples, local communities, water utilities, regulators, landowners, corporates and investors who impact or depend on the target freshwater resource or watershed.
- **Equity & Representation:** Prioritise inclusion, representation and equity when reaching out to stakeholders and potential partners, aiming to ensure participation of those most affected by water and land-use decisions.
- **Roles & Expectations:** Clarify roles and contributions early, to define what each stakeholder group is expected to contribute – for example, which parties are expected to contribute data, funding/financing, decision-making and strategic or technical support.
- **Capacity & Constraints:** Consider the time, resources, and capabilities each stakeholder group can realistically contribute, and plan engagement strategies accordingly.

Design & Structuring

- **Value Proposition:** Develop a value proposition for the intended revenue model and be ready to explain how this model will interact with existing water governance and water funding structures for different stakeholder groups.
- **Governance Model:** Assess options for governance mechanisms and legal frameworks, ensuring alignment to existing legal frameworks and considering which governance arrangement would best enable the model to achieve its stated purposes.[146]

[145] The OECD's Water Governance Indicator Framework is a self-assessment tool for water governance policy frameworks. For governments interested in developing innovative and robust freshwater policy or compliance-based financing mechanisms, the Indicator Framework and broader OECD Principles on Water Governance may be a useful resource.

[146] The Governance section of the Resilient Watersheds Toolbox explores different governance mechanisms and legal frameworks for Watershed Investment Programmes (Water Funds)

Power Dynamics and Decision-making Processes

- **Power Asymmetries:** Acknowledge asymmetries in powe and knowledge of various stakeholder groups. Intentionally create space for diverse worldviews and non-technical expertise, including Indigenous and traditional knowledge.
- **Inclusive Governance:** Establish shared governance mechanisms and tools, such as co-developed terms of reference and consensus or majority-based decision-making processes.
- **Transparency:** Build trust with diverse stakeholders through transparency, including clear communication of goals, trade-offs, financial flows, challenges and expected outcomes. Establish and maintain codes of conduct or charters that codify norms of transparency.
- **Capacity building:** Support the building of capacity of participating groups by providing technical, legal or financial training or support.

Conflict Management and Accountability Frameworks

- **Conflict-resolution and Accountability Pathways:** Create pathways for resolving conflict from the beginning, including processes to engage in mediation and community-based accountability forums.
- **Adaptive Governance:** Revisit decisions regularly and develop processes for integrating learnings and respond to ecological, political or social changes.
- **Documentation:** Maintain documented agreements, such as memoranda of understanding (MOUs), partnership agreements, founding documents, codes of conduct, which codify principles, aims, responsibilities and conflict management processes.

Appendix II: Supportive Tools

NGOs, international organisations and private companies have developed a number of supportive tools to aid water sector stakeholders in assessing the enabling environment for water investment and designing appropriate models to mobilise investment into NbS for water.

CDP Water Disclosure and Water Watch Tool

CDP's Water Security Questionnaire is a voluntary disclosure mechanism that enables companies to assess and report their water-related impacts, dependencies, and risks. Through an annual questionnaire, businesses disclose information on water withdrawals, discharges, consumption, governance, and risk management. This data helps investors, customers, and policymakers understand how water issues affect business continuity and financial performance.

CDP's Water Reporting Platform is a globally recognised disclosure system that supports companies, cities, and regions in identifying and managing water-related risks and opportunities. For businesses exploring investments in NbS for water, CDP's disclosure framework can help establish baseline water use, highlight priority areas for intervention, and demonstrate stewardship progress to external stakeholders. CDP Capital Market signatories and Supply Chain members are required to disclose as part of their membership or as a response to requests from investors. Companies can also voluntarily disclose, as well as cities and state and regional authorities. Data also feeds into broader environmental datasets used by financial institutions for risk screening and decision-making.

CDP's Water Watch is a complementary online tool that ranks industrial activities based on their potential impact on water quantity and quality. It supports companies and investors in identifying sectors and geographies where water risks are most material, helping to prioritize action and investment in solutions like NbS.

Water Footprint Network and Water Footprint Implementation

The Water Footprint Network is a non-profit, multi-stakeholder network comprising water footprint professionals, donors and interested organisations that conduct research, share water management best practices and develop tools and guidance for entities interested in assessing and managing their water footprint. Water Footprint Implementation (WFI) spun out of WFN to operationalise the research and insights developed by WFN. WFI offers companies, municipalities, water utilities and other interested stakeholders with water footprint calculation, along with strategic support to address and manage their water related risks. provides a comprehensive framework for understanding and quantifying water use across value chains.

Water Footprint Implementation offer a variety of tools and guidance, including the Water Footprint Assessment Tool, which supports companies, governments, and investors in identifying water-related risks and opportunities across operations, supply chains, and investment portfolios. The methodology calculates the total water footprint of a product, service, or organisation, capturing not only the volume of water used, but also the geographic and temporal context, including water scarcity and pollution impacts.

The framework divides water use into three components:

- **Blue water footprint** – surface and groundwater consumption.
- **Green water footprint** – rainwater used for crops or vegetation.
- **Grey water footprint** – freshwater needed to assimilate pollutants to meet ambient water quality standards.

For water sector stakeholders and investors interested in NbS, water footprint assessments can be a valuable tool for identifying priority areas for intervention, including where NbS can reduce water risks, improve efficiency, and enhance watershed health. By supporting organisations with assessing and managing their water footprint, WFI helps organisations understand their dependencies and impacts on water resources, informing more effective investment strategies.

OECD Scorecard for Water Investment

The OECD and the Asian Development Bank have developed a Scorecard for Water Investment which is a tool that assesses the enabling environment for investment in water security. Through a questionnaire, across four dimensions that is rated out of 5, the scorecard identifies the conditions necessary to attract and maintain investments in water security. The scorecard is for policymakers and investors so that they can identify and solve barriers to water investment and understand how to use existing capital or mobilise additional investment.

The scorecard collects and evaluates mostly publicly available data but also primary data on the following themes:

Dimension 1: Overall policy framework for investment

- This dimension evaluates if a country is attractive for investors using a modified version of the OECD Policy Framework for Investment (PFI). It looks at macroeconomic, credit markets, policy and governance indicators to assess a country's investment environment.

Dimension 2: Water policy framework for investment

- This section assesses a country's investment opportunities and risks in relation to water security. It evaluates a country's water sector policies, market conditions, policy barriers, and regulations that may have an impact.

Dimension 3: Bankability and sustainability of projects

- Dimension 3 assesses whether the necessary structures are in place to support projects that are commercially viable. It assesses the roles of institutions involved and their capacity in developing projects.

Dimension 4: Contribution of other economic sectors to water security

- This section looks at other sectors such as agriculture and measures their economic impact on water security. It assesses how they consider their impacts and what their risks are on water resources.

The tool was pilot tested in seven Asian countries and was successful in identifying the conditions for investment in water.

TNC Resilient Watersheds Toolbox

The TNC Resilient Watersheds Water Fund Toolbox is a resource developed by The Nature Conservancy (TNC) to guide the development and management of Water Funds. The Toolbox offers practical tools, methodologies, and best practices to help organisations and governments establish Water Funds. The toolbox is structured into four main sections.

1. WIP Project Cycle – A step-by-step guide for setting up a Water Fund based on a 4-phased cycle: pre-feasibility, feasibility, design and execution, including tools templates for each stage.

2. Introduction to Watershed Investment Programs – Resources to learn the basics of how water funds work. NbS can be used to improve water security, along with representative case studies.

3. Resources – A library of case studies, guidance documents, scientific articles and templates.

4. Trainings and Network – The Resilient Watersheds Network offers a community of practitioners to connect and share lessons learned and best practices for developing NbS projects for water and for designing and implementing water funds.

The Resilient Water Accelerator

The Resilient Water Accelerator is a global initiative that aims to attract private and public finance into water projects. The initiative focuses on market conditions and support countries in designing water security programmes, identifying investment opportunities, and bringing together relevant stakeholders, including governments, financial institutions and corporates to strengthen the enabling environment. The initiative has developed a pipeline of projects for investors and comprehensive programmes that is intended to be replicated and scaled.

NbS Benefits Explorer Tool

The NbS Benefits Explorer Tool was created for organisations wanting to invest in nature-based solutions (NbS) for watersheds. The interactive tool provides the types of activities and processes that can be undertaken and the benefits that are generated as a result. The tool is for public and private sector actors that want to develop either effective policies, programs, or projects. The tool also includes a valuation projection tool, and a benefit forecast for users to understand where and when benefits will occur. This tool is part of a wider project that looks at investing into water NbS.

WBCSD NbS Blueprint

The World Business Council on Sustainable Development (WBCSD) developed the Nature-based Solutions Blueprint, which provides a six-step process for developing the business case for NbS across sectors and biomes, including wetlands, and rivers and lakes.

Alongside the Blueprint, WBCSD launched the Nature-based Solutions Map a tool to support companies in identifying the types of NbS interventions that best address their priority challenges and opportunities for business growth and impact.

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